MDOT Use Only
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01 -

SM No. CSTBG0010011801

PROPOSAL AND CONTRACT DOCUMENTS

FOR THE CONSTRUCTION OF

01
I-10 Jackson County Welcome Center, known as Federal Aid Project No. STBG-0010-01(180) / 109171301 in Jackson County.

Project Completion: 06/30/2028

(STATE DELEGATED)

NOTICE

BIDDERS MUST COMPLETE AN ONLINE REQUEST FOR PERMISSION TO BID THIS PROJECT.

Electronic addendum updates will be posted on www.gomdot.com

SECTION 900

OF THE CURRENT 2017 STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION

JACKSON, MISSISSIPPI

MISSISSIPPI DEPARTMENT OF TRANSPORTATION
TABLE OF CONTENTS

PROJECT: STBG-0010-01(180)/109171301 - Jackson

Section 901 - Advertisement

Section 904 - Notice to Bidders

#1	Governing Specification, w/ Supplement
#2	Status of ROW, w/ Attachments
#296	Reduced Speed Limit Signs
#445	Mississippi Agent or Qualified Nonresident Agent
#516	Errata and Modifications to the 2017 Standard Specifications
#757	Additional Erosion Control Requirements
#1225	Early Notice to Proceed
#1226	Material Storage Under Bridges
#1241	Fuel and Material Adjustments
#1434	Erosion Control Plan
#2172	App for Storm Water Reports
#2206	MASH Compliant Devices
#2273	Mississippi Special Fuel Tax Law
#2954	Reflective Sheeting for Signs
#3676	Asphalt Gyratory Compactor Internal Angle Calibration
#4113	Unique Entity ID Requirement For Federal Funded Projects
#4638	Storm Water Discharge Associated with Construction Activity (> 5 Acres)
#4702	App for Traffic Control Report
#5086	Detail of Square Tube Sign Posts
#5551	Federal Bridge Formula
#5570	Special Provisions Related to Concrete
#7304	Erosion Control Contract Compliance
#7578	Obligation Date
#7693	Contract Time
#7694	Specialty Items
#7695	Pre-Bid Conference

906	Required Federal Contract Provisions -- FHWA 1273, w/Supplements

Section 907 - Special Provisions

907-101-1	Definitions and Terms
907-102-2	Bidding Requirements and Conditions
907-104-2	Minor Alterations to the Contract
907-105-2	Control of Work
907-106-4	Control of Materials
907-107-2	Contractor's Erosion Control Plan
907-108-4	Subletting of Contract
907-108-6	Default and Termination of Contract
907-109-5	Measurement and Payment
907-234-1	Silt Fence
907-240-2	Interlocking Flexible Block Erosion Control System
907-242-14	Jackson County Welcome Center

907-260-1	Utility Work - Sewer
907-262-1	Utility Work - Water
907-282-3	Irrigation System
907-290-2	Flagpole
907-401-3	Asphalt Pavement - General
907-403-4	Asphalt Pavements
907-601-1	Structural Concrete
907-605-1	Underdrains
907-608-2	Detectable Warning Panels
907-616-1	Colored and Imprinted Concrete Median and Island Pavement
907-618-12	Traffic Control Management
907-619-5	Traffic Control for Construction Zones
907-626-12	Thermoplastic Traffic Markings
907-627-1	Raised Pavement Markings
907-628-6	Cold Plastic Pavement Markings
907-630-1	Remove and Reset Signs
907-700-2	Materials and Tests w/Attachment
907-701-4	Hydraulic Cement, w/ Supplement
907-702-4	Bituminous Materials
907-703-2	Gradation
907-705-1	Stone Riprap
907-707-3	Joint Materials
907-708-4	Concrete Pipe
907-711-2	Plain Steel Wire
907-712-1	Fence and Guardrail
907-714-4	Miscellaneous Materials
907-718-1	Timber and Dimension Lumber
907-720-4	Pavement Marking Materials
907-721-4	Materials for Signing

Section 905 - Proposal, Proposal Bid Items, Combination Bid Proposal
Certification of Performance - Prior Federal-Aid Contracts
Certification Regarding Non-Collusion, Debarment and Suspension
SAM.GOV Registration and Unique Entity ID
Section 902 - Contract Form
Section 903 - Contract Bond Forms

(REVISIONS TO THE ABOVE WILL BE INDICATED ON THE SECOND SHEET OF SECTION 905 AS ADDENDA)

02/26/2026 03:13 PM

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 901 - ADVERTISEMENT

Electronic bids will be received by the Mississippi Transportation Commission at 10:00 o'clock A.M., Tuesday, April 28, 2026, from the Bid Express Service and shortly thereafter publicly read on the Sixth Floor for:

I-10 Jackson County Welcome Center, known as Federal Aid Project No. STBG-0010-01(180) / 109171301 in Jackson County.

The attention of bidders is directed to the Contract Provisions governing selection and employment of labor. Minimum wage rates have been predetermined by the Secretary of Labor and are subject to Public Law 87-581, Work Hours Act of 1962, as set forth in the Contract Provisions.

Contractors may request permission to bid online at http://shop.mdot.ms.gov at no cost. Upon approval, Contractors shall be eligible to submit a bid using Bid Express at http://bidx.com. Specimen proposals may be viewed and downloaded online at no cost at http://mdot.ms.gov or purchased online at http://shop.mdot.ms.gov at a cost of Ten Dollars ($10.00) per proposal plus a small convenience fee. Cash or checks will not be accepted as payment.

Plans must be purchased online at <https://shop.mdot.ms.gov>. Costs of plans will be on a per sheet basis plus a small convenience fee. If you have any questions, you can contact the MDOT Plans Print Shop at (601) 359-7460, or e-mail at plans@mdot.state.ms.us. Plans will be shipped upon receipt of payment. Cash or checks will not be accepted as payment.

Bid bond, signed or countersigned by a Mississippi Agent or Qualified Nonresident Agent, with Power of Attorney attached, a Cashier's check or Certified Check for five (5%) percent of bid, payable to STATE OF MISSISSIPPI, must accompany each proposal.

The attention of bidders is directed to the provisions of Subsection 102.07 pertaining to irregular proposals and rejection of bids.

BRAD WHITE
EXECUTIVE DIRECTOR

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO NOTICE TO BIDDERS NO. 1

DATE: **06/08/2021**

SUBJECT: **Governing Specifications**

Change the web address at the end of the first paragraph to the following.

https://shop.mdot.ms.gov/default.aspx?StoreIndex=1

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 1 **CODE: (IS)**

DATE: 03/01/2017

SUBJECT: Governing Specifications

The current (2017) Edition of the Standard Specifications for Road and Bridge Construction adopted by the Mississippi Transportation Commission is made a part hereof fully and completely as if it were attached hereto, except where superseded by special provisions, or amended by revisions of the Specifications contained within this proposal. Copies of the specification book may be purchased from the MDOT Construction Division, or online at shopmdot/default.aspx?StoreIndex=1.

A reference in any contract document to controlling requirements in another portion of the contract documents shall be understood to apply equally to any revision or amendment thereof included in the contract.

In the event the plans or proposal contain references to the 2004 Edition of the Standard Specifications for Road and Bridge Construction, it is to be understood that such references shall mean the comparable provisions of the 2017 Edition of the Standard Specifications.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 2 **CODE: (IS)**

DATE: 03/01/2017

SUBJECT: Status of Right-of-Way

Although it is desirable to have acquired all rights-of-way and completed all railroad agreements, utility adjustments and work to be performed by others prior to receiving bids, sometimes it is not considered to be in the public interest to wait until each and every such clearance has been obtained. The bidder is hereby advised of possible unacquired rights-of-way, relocates, railroad agreements and utilities adjustments which have not been completed.

The status of right-of-way acquisition, utility adjustments, encroachments, potentially contaminated sites, railroad facilities, improvements, and asbestos contamination are set forth in the following attachments.

In the event right of entry is not available to ALL parcels of right-of-way and/or all work that is to be accomplished by others on the date set forth in the contract for the Notice to Proceed is not complete, the Department will issue a restricted Notice to Proceed.

STATUS OF RIGHT-OF-WAY
STBG-0010-01(180)
109171/301000
Jackson County

All rights of way and legal rights of entry have been acquired **except:**

None.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

Inter-Departmental Memorandum

TO: Don Drake
Right of Way Division

DATE: January 30, 2026

FROM: Martha Brewer MB
District Preconstruction Engineer

SUBJECT OR PROJECT NO: STBG-0010-01(180)
109171/30100

INFORMATION COPY TO
File

COUNTY: Jackson

District Status Report

1. **STATUS OF RIGHT OF WAY:** All work to be done within existing ROW.
2. **RIGHT OF WAY CLEARANCE:** There are no encroachments.
3. **STATUS OF AFFECTED RAILROAD OPERATING FACILITIES:** None affected.
4. **STATUS OF REQUIRED UTILITY RELOCATIONS:** No known conflicts.
5. **STATUS OF CONSTRUCTION AGREEMENT:** None Required

ASBESTOS ABATEMENT STATUS REPORT

STBG-0010-01(180) 109171-301000

Jackson County

February 2, 2026

Reference is made to notices to bidders entitled "Asbestos National Emission Standards for Hazardous Air Pollutants (NESHAP)" and "Removal of Obstructions".

The following pertinent information is furnished concerning asbestos-containing materials (ACMs), if any, found in buildings to be removed by the Contractor.

There is no right-of-way required for this project, and the contractor will not need to remove any buildings.

STATUS OF POTENTIALLY CONTAMINATED SITES REPORT

STBG-0010-01(180) 109171-301000

Jackson County

February 2, 2026

THERE IS NO RIGHT-OF-WAY REQUIRED FOR THIS PROJECT. NO INITIAL SITE ASSESSMENT WILL BE PERFORMED. IF CONTAMINATION ON THE EXISTING RIGHT-OF-WAY IS DISCOVERED, IT WILL BE HANDLED BY THE DEPARTMENT.

IMPROVEMENTS STATUS REPORT

Improvements to be included in the Notice to Bidders to be removed by the Construction Contractor

FMS Construction Project No: 109171-301000

FMS ROW Project No:

External ROW No: STBG-0010-01(180)

Parcel No:
Station No:
Property Owner:
Description/Pictures:

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 296 **CODE: (SP)**

DATE: 07/25/2017

SUBJECT: Reduced Speed Limit Signs

Bidders are advised that when the plans or contract documents require the speed limit on a project to be reduced, the Contractor shall begin work within 48 hours of installing the reduced speed limit signs. Should the Contractor not start work or have no plans to start work within 48 hours of installing the signs, the reduced speed limit signs shall be covered and existing speed limit signs uncovered.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 445 **CODE: (SP)**

DATE: 10/10/2017

SUBJECT: Mississippi Agent or Qualified Nonresident Agent

Bidders are hereby advised of the requirements of Subsections 102.08, 103.05.2, and 107.14.2.1 of the *2017 Standard Specifications for Road and Bridge Construction* as it refers to bonding agents. Proposal guaranties, bonds, and liability insurance policies must be signed by a **Mississippi Agent or Qualified Nonresident Agent.**

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 516 **CODE: (IS)**

DATE: 11/28/2017

SUBJECT: Errata and Modifications to the 2017 Standard Specifications

Page	Subsection	Change
16	102.06	In the seventh full paragraph, change "Engineer" to "Director."
33	105.05.1	In the sixth sentence, change "Contract Administration Engineer" to "Contract Administration Director."
34	105.05.2.1	In subparagraph 2, change "SWPPP, ECP" to "SWPPP and the ECP"
35	105.05.2.2	In subparagraphs 2, add " and" to the end of the sentence. In subparagraph 3, remove ", and" and add ".".
90	109.04.2	In the last paragraph of subparagraph (a), place a period "." at the end of the sentence.
93	109.04.2	In the last paragraph of subparagraph (g), place a period "." at the end of the sentence. Also, in the first paragraph of subparagraph (h), place a period "." at the end of the sentence.
97	109.07	Under ADJUSTMENT CODE, subparagraph (A1), change "HMA mixture" to "Asphalt mixtures."
98	109.11	In the third sentence, change "Engineer" to "Director."
219	308.04	In the last sentence of the last paragraph, change "Contractor's decision" to "Engineer's decision."
300	405.02.5.9	In the first sentence of the second paragraph, change "Hot Mix Asphalt" to "Asphalt Mixtures."
502	630.01.1	In the first paragraph, change "AASHTO" to "AASHTO's LRFD".
636	646.05	Change "each" to "per each" for the pay item units of payment.
640	656.02.6.2	In item 7), change "down stream" to "downstream".
688	630.03.2	Change the subsection number from "630.03.2" to "680.03.2."

725	702.08.3	In the second sentence of the first paragraph, change "hot-mix" to "asphalt."
954	804.02.13.1.6	In the definition for "M" in the % Reduction formulas, change "paragraph 7.3" to "paragraph 5.3."

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 757 **CODE: (IS)**

DATE: 03/20/2018

SUBJECT: Additional Erosion Control Requirements

Bidders are hereby advised of the following requirements that relate to erosion control activities on the project.

THE MAXIMUM TOTAL ACREAGE THAT CAN BE DISTURBED, AT ONE TIME, ON THE PROJECT IS NINETEEN (19) ACRES. THE CONTRACTOR SHALL BE REQUIRED TO STABILIZE DISTURBED AREAS PRIOR TO OPENING UP ADDITIONAL SECTIONS OF THE PROJECT. STABILIZED SHALL BE WHEN THE DISTURBED AREA MEETS ONE OF THE FOLLOWING CRITERIA:

- **THE AREA HAS BEEN SEEDED, EITHER TEMPORARY OR PERMANENT, AND MULCHED ACCORDING TO THE SPECIFICATIONS,OR**
- **A CRUSHED STONE COURSE OR A LIFT OF ASPHALT PAVEMENT HAS BEEN PLACED, OR**
- **THE AREA HAS BEEN CHEMICALLY TREATED USING PORTLAND CEMENT OR LIME-FLY ASH, AND SEALED.**

DISTURBED AREAS INCLUDE THE ROADBED, SLOPES AND REMAINING AREA OUT TO THE ROW LINE.

Clearing and Grubbing: Prior to beginning any clearing and grubbing operations on the project, controls shall be in place to address areas such as drainage structures, wetlands, streams, steep slopes and any other sensitive areas in accordance with the approved Erosion Control Plan or as directed by the Engineer. Clearing and grubbing should be limited to the minimum area necessary to construct the project. Grubbing operations should be minimized in areas outside the construction limits and stumps should be cut off flush with the existing ground elevations. A buffer area of at least fifteen (15) feet or as shown in the Plans shall be in place adjacent to the right-of-way line. The buffer area can either be the existing vegetation that is left undisturbed or re-established by planting new vegetation if clearing and grubbing was required. As applicable, see the Riparian Buffer Erosion Control sheet(s) in the Plans for clearing and grubbing limits adjacent to stream banks.

Unclassified Excavation: Cut sections shall be graded in accordance with the typical sections and plan grades. Permanent erosion control BMP's should be placed as soon as possible after the cut material has been moved. Fill sections that are completed shall have permanent erosion control BMP's placed. Fill sections that are not completed shall be either permanently or temporarily seeded until additional material is made available to complete these sections. All unclassified excavation on the project is be required to be moved prior to incorporating any borrow excavation. The Contractor may have to stockpile unclassified excavation in order to comply with the nineteen (19) acre requirement. No additional compensation will be made for stockpiling operations.

Disturbed areas that remain inactive for a period of more than fourteen (14) days shall be temporary grassed and mulched. Temporary grassing and mulching shall only be paid one time for a given area.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 1225 **CODE: (SP)**

DATE: 11/13/2018

SUBJECT: Early Notice to Proceed

Bidders are advised that if an early notice to proceed is allowed by the Department and the Contractor experiences problems or delays between the early notice to proceed date and the original notice to proceed date, this shall not be justification for any monetary compensation or an extension of contract time.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 1226 **CODE: (IS)**

DATE: 11/16/2018

SUBJECT: Material Storage Under Bridges

Bidders are advised that Subsection 106.08 of the Standard Specifications allows the Contractor to store materials and equipment on portions of the right-of-way. However, the Contractor will not be allowed to store or stockpile materials under bridges without written permission from the Project Engineer. The Contractor shall submit a detailed request of all proposed materials to be stored under bridges to the Engineer a minimum of 14 calendar days prior to anticipated storage. This detail shall include, but not limited to, bridge location, material type, material quantity, and duration of storage. The Project Engineer and any other needed Division will review this information and determine whether to grant approval. The Contractor shall not store any material under any bridge without written approval from the Project Engineer.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 1241 **CODE: (IS)**

DATE: 11/27/2018

SUBJECT: Fuel and Material Adjustments

Bidder's attention is brought to the last paragraph of Subsection 109.07 of the Standard Specifications which states that no fuel or material adjustment will be made after the completion of contract time. Any fuels consumed or materials incorporated into the work during the monthly estimate period falling wholly after the expiration of contract time will not be subject a fuel or material adjustment.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 1434 **CODE: (IS)**

DATE: 03/06/2019

SUBJECT: Erosion Control Plan

Bidders are advised that the Best Management Practices (BMPs) shown at sensitive areas on the Erosion Control Sheets in the Plans shall be shown on the Contractor's Erosion Control Plan and shall be used in the field as indicated on the original plans sheets. Should the installation of these BMPs produce an unsatisfactory result, the Contractor shall submit to the Engineer alternate BMPs for approval. Once approved, the Contractor shall revise the Contractor's Erosion Control Plan to include these changes.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 2172 **CODE: (SP)**

DATE: **01/06/2020**

SUBJECT: **App for Storm Water Reports**

Bidders are advised that the Department has created a smart phone App for completing and submitting storm water reports required on this project. The Contractor who monitors storm water activities and completes storm water reports will be required to download and use this App when completing and submitting storm water reports. The reports will then be readily available to all persons who need access to the forms. The App is free and is available for downloading at the following location.

https://extacctmgmt.mdot.state.ms.us/

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 2206 **CODE: (IS)**

DATE: 01/14/2020

SUBJECT: MASH Compliant Devices

Bidders are hereby advised that compliance associated with the requirements of meeting either the National Cooperative Highway Research Program (NCHRP) Report 350 or the Manual for Assessing Safety Hardware (MASH) for installations of certain traffic control devices and permanent safety hardware devices (guardrails, guardrail terminals, permanent portable barriers, cast-in-place barriers, all other permanent longitudinal barriers, crash cushions, cable barriers, cable barrier terminals, bridge rails, bridge rail transitions, all other terminals, sign supports, and all other breakaway hardware) as listed throughout the Standard Specifications and/or the Standard Drawings, or both, is now replaced with the requirements of meeting the 2016 version of MASH after December 31, 2019. This change applies to new permanent installations and to full replacements of existing installations.

At the preconstruction conference or prior to starting any work on the project, the Contractor shall submit a letter stating that the traffic control devices and permanent safety hardware devices as outlined within the paragraph above that are to be used on the project are certified to meet MASH 2016.

When a MASH 2016-compliant device does not exist for the new permanent installations and/or full replacement installations of permanent safety hardware devices, as listed above, a MASH 2009-compliant or a NCHRP 350-compliant device may be proposed by the Contractor for the project. A written request for such instances must be submitted by the Contractor either at the preconstruction conference or prior to starting any work on the project. The Contractor shall submit the following items to the Project Engineer: (1) a detailed list of the proposed devices and locations thereof; and (2) certification letters indicating that the proposed devices are compliant with either MASH 2009 or NCHRP 350.

When a MASH 2016-compliant device does not exist for the temporary work zone traffic control devices (Category 1, Category 2, and Category 3 devices) , a MASH 2009-compliant or a NCHRP 350-compliant device may be proposed by the Contractor for the project. Temporary work zone traffic control devices (Category 1, Category 2, and Category 3 devices) that are MASH 2009-compliant or NCHRP 350–compliant that have been in use prior to December 31, 2019, and that have a remaining service life may be proposed for use throughout their normal service life on the project by the Contractor. For either of these scenarios for temporary work zone traffic control devices, a written request must be submitted by the Contractor either at the preconstruction conference or prior to starting any work on the project. The Contractor shall submit the following items to the Project Engineer: (1) a detailed list of the proposed devices and locations thereof; and (2) certification letters indicating that the proposed devices are compliant with either MASH 2009 or NCHRP 350.

Work will only be allowed to proceed after the Department has granted written concurrence(s) with the proposed request(s) as listed above.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 2273 **CODE: (SP)**

DATE: 02/12/2020

SUBJECT: Mississippi Special Fuel Tax Law

Bidder's attention is brought to the second paragraph of Subsection 107.02 of the Standard Specifications which states that all Contractors and Subcontractors must comply with all requirements contained in the Mississippi Special Fuel Tax Law, Section 27-55-501, *et seq*. Attached are two Fact Sheets provided by the Mississippi Department of Revenue (MDOR) with additional information.

DEPARTMENT OF REVENUE
STATE OF MISSISSIPPI

Gasoline and Dyed Diesel Used for Non-Highway Purposes

Mississippi provides a reduced rate for gasoline and dyed diesel used for non-highway purposes. The reduced rates are 6.44 cents per gallon and 5.75 cents per gallon of gasoline or dyed diesel. These fuels are generally taxed at 18 cents per gallon if for on road use.

Gasoline Used for Non-Highway Purposes

You may be entitled to a refund of 11.56 cents per gallon (making this an equivalent to a tax rate of 6.44 cents per gallon) if you desire to purchase gasoline to be used off road. The gasoline must be used for agricultural, maritime, industrial, manufacturing, domestic or non-highway purposes only.

Examples of non-highway include gasoline used in boats, golf carts, machinery used for manufacturing or farm equipment used exclusively in plowing, planting or harvesting farm products.

Refund Gasoline User

The refund is based on the amount of gallons used. Before a refund is issued, you are required to…

1. Obtain a refund gasoline user's permit and a certificate for refund booklet from the Department of Revenue;
2. Have a storage tank marked "REFUND GASOLINE"; and,
3. Purchase the gasoline from someone who holds a refund gasoline dealer's permit.

No refund will be allowed for gasoline used in motor vehicles owned or operated by a government entity or used in Mississippi government contracts.

Refund Gasoline Dealer

You must obtain a refund gasoline dealer's permit from the Department of Revenue before selling refund gasoline. At no time should the gasoline be delivered to a tank that is not properly marked. The gasoline must be dyed a distinctive mahogany color at the time of delivery.

The Department of Revenue may waive the dye requirement if the dye may cause damage to the equipment. The refund gasoline user is required to obtain the waiver from the Department of Revenue.

Dyed Diesel Used for Non-Highway Purposes

Unlike gasoline, you are not required to apply for a refund if you desire to purchase dyed diesel to be used off road. Mississippi provides a reduced rate of 5.75 cents per gallon on dyed diesel used off road. Diesel used on road is subjected to 18 cents per gallon. Dyed diesel used in motor vehicles owned or operated by a government entity or used in Mississippi government contracts will be subjected to 18 cents per gallon.

Dyed Diesel Used on the Highway

Any person who purchases, receives, acquires or uses dyed diesel for highway use will be liable to pay 18 cents per gallon and subject to a penalty in the amount of $1000.

Identifying Dyed Diesel

Storage facilities for dyed diesel must be plainly marked "NONHIGHWAY DIESEL FUEL" or "NONHIGHWAY KEROSENE". Retailers are also required to mark all pumps or dispensing equipment.

This fact sheet is intended to help you become more familiar with Mississippi tax laws and your rights and responsibilities under the laws. Nothing in this fact sheet supersedes, alters, or otherwise changes any provisions of the tax law, regulations, court decisions, or notices.

Petroleum Tax Bureau
P. O. Box 1033
Jackson, MS 39215-1033
Phone: (601) 923-7150

DEPARTMENT OF REVENUE
STATE OF MISSISSIPPI

Special Fuel Used on Government Contracts

State and Local Government Contracts

Special fuel purchased, acquired or used in performing contracts with the State of Mississippi, counties, municipalities or any political subdivision is taxed at a rate of 18 cents per gallon. Special fuel includes but is not limited to the following:

- Dyed diesel fuel;
- Kerosene;
- Undyed diesel fuel; and,
- Fuel oil.

State and local government contracts include construction, reconstruction and maintenance or repairs of projects such as roads, bridges, water systems, sewer systems, buildings, drainage canals and recreational facilities. The Department of Revenue may require contractors to remit the excise tax directly to the state in lieu of paying the tax to a distributor.

Special Fuel Direct Pay Permit

Contractors that remit the excise tax to the state will be issued a Special Fuel Direct Pay Permit. This permit relieves the distributor from collecting the tax and requires the contractor to file a monthly special fuel return. The distributor should include the contractor's permit number on all invoices that are related to tax-free sales.

The contractor is required to furnish a surety or cash bond guaranteeing the payment of the excise tax prior to receiving the Special Fuel Direct Pay Permit. The Department of Revenue may accept a contractors tax bond if the bond covers the excise tax levied on special fuel.

Special Fuel Distributors

If the contractor does not have a Special Fuel Direct Pay Permit, distributors are required to collect the 18 cents excise tax and remit the tax to the Department of Revenue. The additional 12.25 cents levied on special fuel (excluding undyed diesel) should be reported on schedules 5F and 5G of the special fuel return.

Environmental Protection Fee

Special fuel distributors are required to collect the environmental protection fee even if the contractor has a Special Fuel Direct Pay Permit. The fee is levied at 4/10^{ths} of a cent per gallon. The fee is suspended or reinstated when the trust fund has exceeded or fallen below the obligatory balance.

Penalties

Any person who knowingly and willfully purchases untaxed fuel for use in equipment utilized on a road or highway construction site in this state is guilty of a misdemeanor and, upon conviction, shall be fined not less than $1,000 or more than $100,000, or imprisoned in the county jail for not more than one year, or both.

This fact sheet is intended to help you become more familiar with Mississippi tax laws and your rights and responsibilities under the laws. Nothing in this fact sheet supersedes, alters, or otherwise changes any provisions of the tax law, regulations, court decisions, or notices.

Petroleum Tax Bureau
P. O. Box 1033
Jackson, MS 39215-1033
Phone: (601) 923-7150

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 2954 **CODE: (IS)**

DATE: **12/01/2020**

SUBJECT: **Reflective Sheeting for Signs**

Bidders are hereby advised that the retroreflective sign sheeting used for signs on this project shall be as listed below and shall meet the requirements of Subsection 721.06.

Temporary Construction Signs

Temporary traffic control (orange) sign sheeting shall be a minimum Type IX Fluorescent Orange sheeting as shown in Special Provision 907-721.

Permanent Signs

Permanent signs, except signs on traffic signal poles/mast arms, shall be as follows:

- Brown background sheeting on guide signs shall be a minimum Type VIII sheeting,
- Green and blue background sheeting on guide signs shall be a minimum Type IX sheeting, and
- All white, yellow, red, fluorescent yellow, and fluorescent yellow/green sheeting shall be Type XI sheeting.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 3676 **CODE: (SP)**

DATE: 09/21/2021

SUBJECT: Asphalt Gyratory Compactor Internal Angle Calibration

Bidders are advised that by March 1, 2022, all asphalt gyratory compactors shall be calibrated to an internal angle of 1.16° ±0.02°. This requirement will be reflected in updates made to MT-78, MT-80, and MT-83. This calibration requirement also extends to all QC/QA testing.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 4113 **CODE: (SP)**

DATE: **03/23/2022**

SUBJECT: **Unique Entity ID (SAM) Requirement for Federal Funded Projects**

Bidders are advised that the Prime Contractor must register and maintain a current registration in the System for Award Management (http://sam.gov) at all times during this project. Upon registration, the Contractor will be assigned a SAM Unique Entity ID.

Bidders are also advised that prior to the award of this contract, they MUST be registered, active, and have no active exclusions in the System for Award Management.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 4638 **CODE: (SP)**

DATE: 02/18/2026

SUBJECT: Storm Water Discharge Associated with Construction Activity (≥ 5 Acres)

PROJECT: STBG-0010-01(180) / 109171301 – Jackson County

A Construction Storm Water General NPDES Permit to discharge storm water associated with construction activity is required.

The Department has acquired Certificate of Permit Coverage MSR-109635 under the Mississippi Department of Environmental Quality's (MDEQ) Storm Water Large Construction General Permit. Projects issued a certificate of permit coverage are granted permission to discharge treated storm water associated with construction activity into State waters. Copies of said permit, completed Large Construction Notice of Intent (LCNOI), and Storm Water Pollution Prevention Plan (SWPPP) are on file with the Department.

Prior to the execution of the contract, the successful bidder shall execute and deliver to the Executive Director an original signed copy of the completed Prime Contractor Certification Forms.

Failure of the bidder to execute and file the completed Prime Contractor Certification Forms shall be just cause for the cancellation of the award.

The executed Prime Contractor Certification Forms shall be prima facie evidence that the bidder has examined the permit, is satisfied as to the terms and conditions contained therein, and that the bidder has the primary responsibility for meeting all permit terms including, but not limited to, the inspection and reporting requirements. For this project, the Contractor shall furnish, set up and read, as needed, an on-site rain gauge.

The Contractor shall make inspections in accordance with condition No. S-5, page 26, and shall furnish the Project Engineer with the results of each weekly inspection as soon as possible following the date of inspection. A copy of the inspection form is provided with the packet. The weekly inspections must be documented monthly on the Inspection and Certification Form. The Contractor's representative and the Project Engineer shall jointly review and discuss the results of the inspections so that corrective action can be taken. The Project Engineer shall retain copies of the inspection reports.

The Engineer will have the authority to suspend all work and/or withhold payments for failure of the Contractor to carry out provisions of MDEQ's Storm Water Construction General Permit, the erosion control plan, updates to the erosion control plan, and /or proper maintenance of the BMPs.

By a full maintenance release or confirmation by the Permit Closeout Committee that the permit is ready for termination, the Construction Division shall submit a completed Request for Termination (RFT) of Coverage to the Office of Pollution Control.

Securing a permit (s) for storm water discharge associated with the Contractor's activity on any other regulated area the Contractor occupies, shall be the responsibility of the Contractor.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 4702 **CODE: (SP)**

DATE: 11/22/2022

SUBJECT: App for Traffic Control Reports

Bidders are advised that the Department has created a smart phone App for completing and submitting traffic control reports (Form CSD-762) required on this project. The Contractor who monitors traffic control activities and completes traffic control reports will be required to download and use this App when completing and submitting traffic control reports. The reports will then be readily available to all persons who need access to the forms. The App is free and is available for downloading at the following location.

https://extacctmgmt.mdot.state.ms.us/

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 5086 **CODE: (SP)**

DATE: 05/02/2023

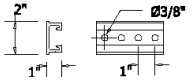
SUBJECT: Detail of Square Tube Sign Posts

Bidders are advised that the following drawings shall be used in the manufacture and installation of square tube sign posts, unless otherwise directed by the Engineer.

FMS CON:

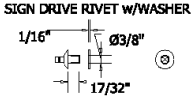
STATE	PROJECT NO.
MISS.	

FLAT PANEL SIGN BRACE



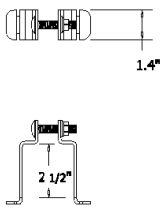
6061-T6 ALUMINUM ALLOY; 2" MOUNTING SURFACE x 7/8" DEPTH x 1/8" NOMINAL WALL THICKNESS. 3/8" HOLES ON 1" CENTERS, CENTERED ALONG ENTIRE LENGTH OF THE BRACE. A MINIMUM OF TWO HORIZONTAL BRACES MUST BE USED.

SIGN DRIVE RIVET w/WASHER



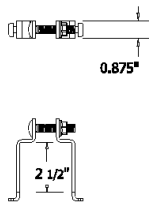
3/8" ALUMINUM SHELL / STEEL CORE RIVET WITH NYLON WASHER. MAXIMUM DISTANCE BETWEEN RIVETS SHOULD BE 12". WASHER MUST BE PRE-INSTALLED AND FIT INTO SIGN BRACE TO SECURE ALUMINUM SIGN PANEL. ALL EXTRUDED PANEL SIGNS SHALL USE 3/16"x3/8" GRIP RANGE ALUMINUM POP RIVITS (#66).

FLAT PANEL SIGN CLAMP



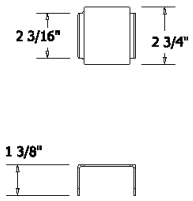
MATERIALS: 1.4" WIDE x 11ga. TYPE 304, #2B FINISHED STAINLESS STEEL BRACKET. INCLUDES STAINLESS STEEL 3/8"-16 x 2" CARRIAGE BOLT AND SERRATED FLANGED NUT. ONE CLAMP REQUIRED FOR EACH BRACE TO POST JUNCTION.

EXTRUDED PANEL SIGN CLAMP



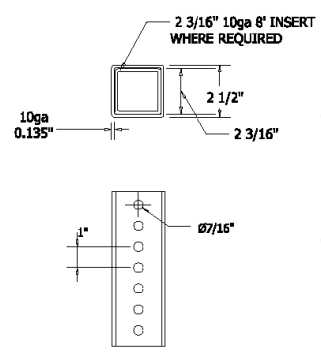
MATERIALS: 1.4" WIDE x 11ga. TYPE 304, #2B FINISHED STAINLESS STEEL BRACKET. INCLUDES STAINLESS STEEL 3/8"-16 x 2" CARRIAGE BOLT AND SERRATED FLANGED NUT. ONE CLAMP REQUIRED FOR EACH BRACE TO POST JUNCTION.

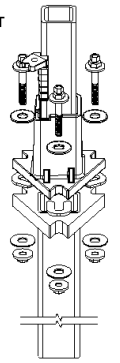
POST CAP



MADE OF 16GA PREGALVANIZED STEEL WITH AN ID CAPABLE OF FITTING INTO THE INSIDE OF A 2-1/2" SQUARE STEEL POST WITHOUT ANY FASTENERS. A CAST ALUMINUM FRICTION FIT CAP MAY ALSO BE USED.

SIGN POSTS



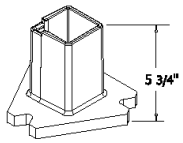


example slip base assembly (detailed below)

NOTES:

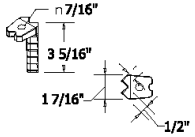
A. CONCRETE FOOTING MUST BE 12" DIAMETER x 36" DEEP.
B. BRASS SHIMS MAY BE USED BETWEEN SLIP PLATES TO LEVEL THE UPPER SLIP PLANE.
C. SLIP BASE IS FHWA ACCEPTED, MEETING CURRENT AASHTO & NCHRP 350 REQUIREMENTS.
D. SIGN BRACE CLAMPS ALLOW SIGN BRACE TO BE ADJUSTED UP, DOWN, LEFT OR RIGHT IN ORDER TO ACHIEVE PERFECT POSITION OF SIGN PANEL.
E. USE INSTALLATION INSTRUCTION RT280U-SQ1.
F. PRODUCT MUST MEET FHWA's MADE IN AMERICA CLAUSE.
G. PAID BY LENGTH OF POST, 36" STUB TO BE ABSORBED.

2-1/2" SQUARE POST RECEIVER



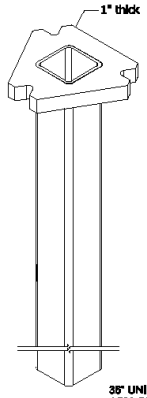
RECEIVER TO BE CAST FROM DUCTILE IRON ASTM A536 CLASS 65-45-12, GALVANIZED PER ASTM A153.

POST LOCKING WEDGE



LOCKING WEDGE FORGED FROM SAE 1035 STEEL AND GALVANIZED PER ASTM A153.

UNIBASE ANCHOR STUB



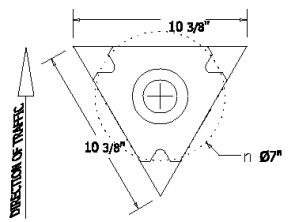
35" UNIBASE ANCHOR A500 GRADE B TUBE WELDED TO A572 SLIP PLATE. GALVANIZED PER ASTM A153.

SIGN CENTROID	2-1/2" x 10ga PSST	2-1/2" x 10ga & 2-3/16" x 10ga Inserted PSST	Sign Bracing**
16'	24.82	43.46	18" maximum distance between braces
15'	26.48	46.36	18" maximum distance between braces
14'	28.38	49.66	18" maximum distance between braces
13'	30.56	53.48	18" maximum distance between braces
12'	33.10	57.94	18" maximum distance between braces
11'	36.12	63.20	18" maximum distance between braces

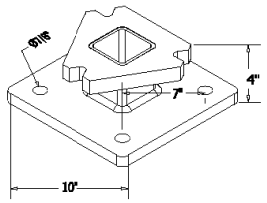
* based on two legs per sign
** Minimum of two braces per flat panel sign

NOTE: Sign area is in square feet.

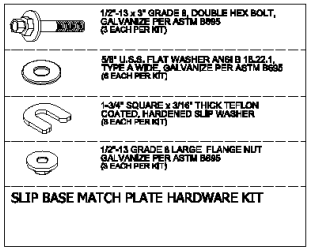
SLIP PLATE DIMENSION



SURFACE MOUNT BASE



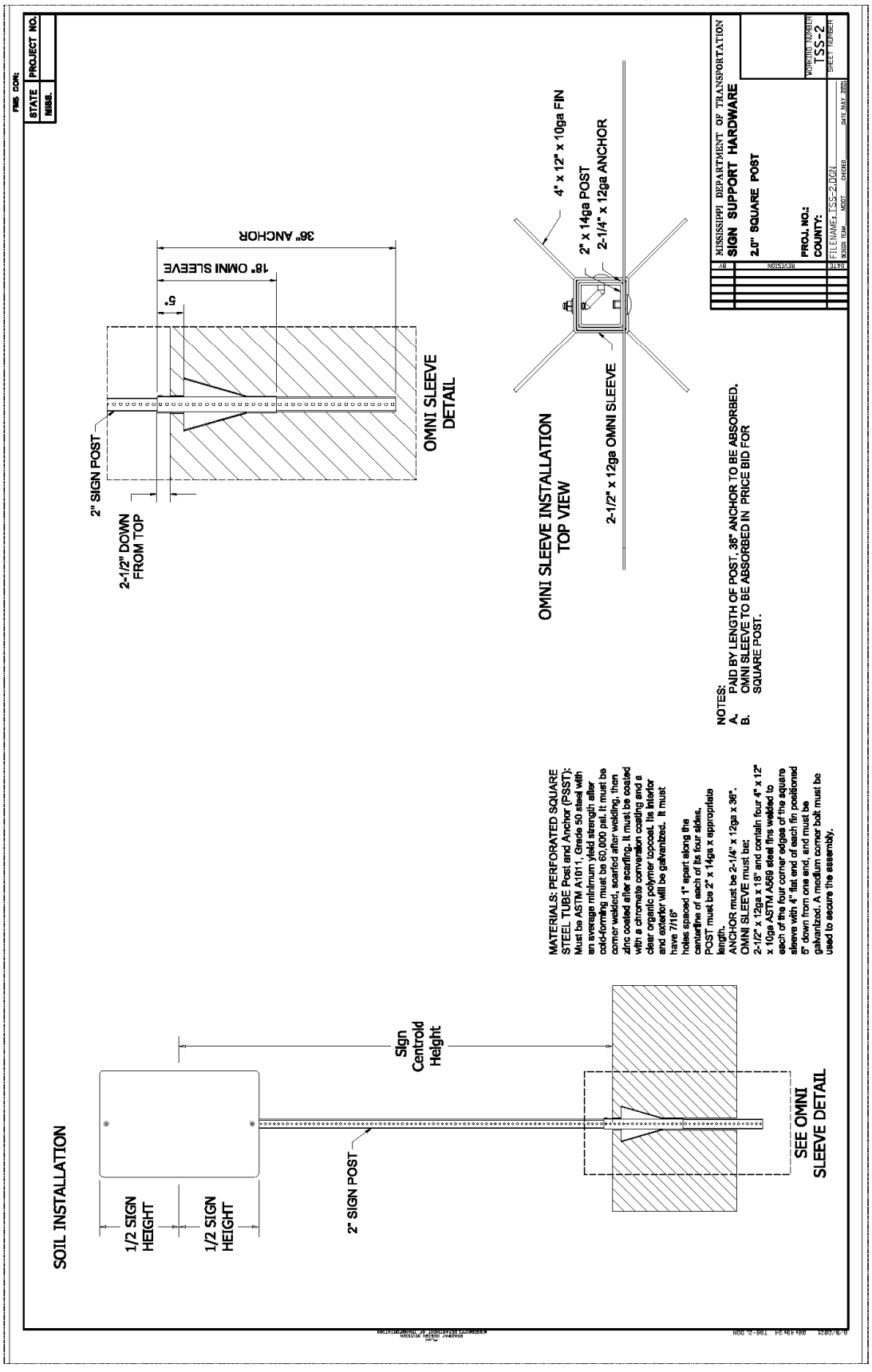
A572 SLIP PLATE WELDED TO A500 GRADE B TUBE WELDED TO A572 MOUNTING PLATE. GALVANIZED PER ASTM A153.

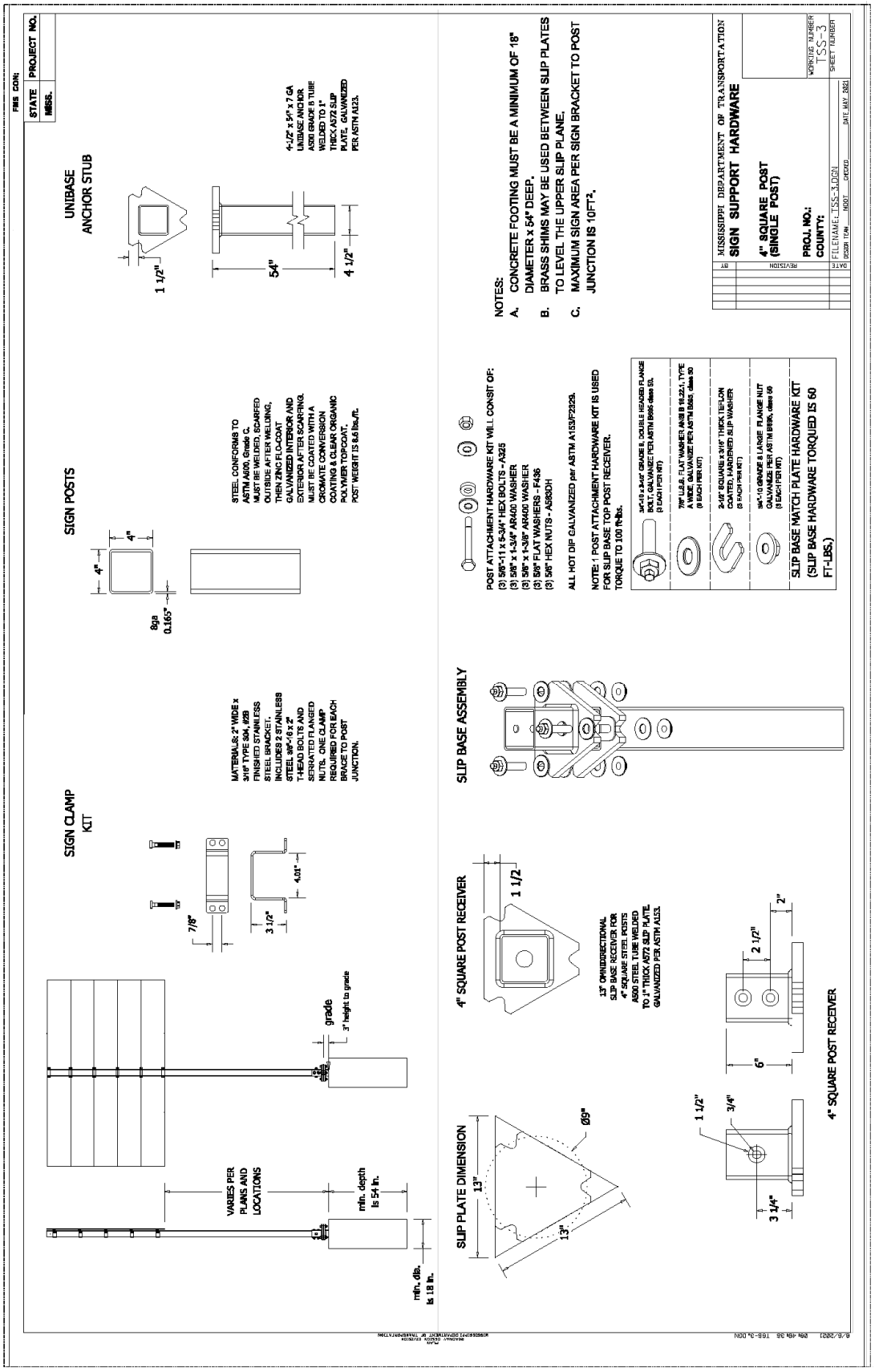


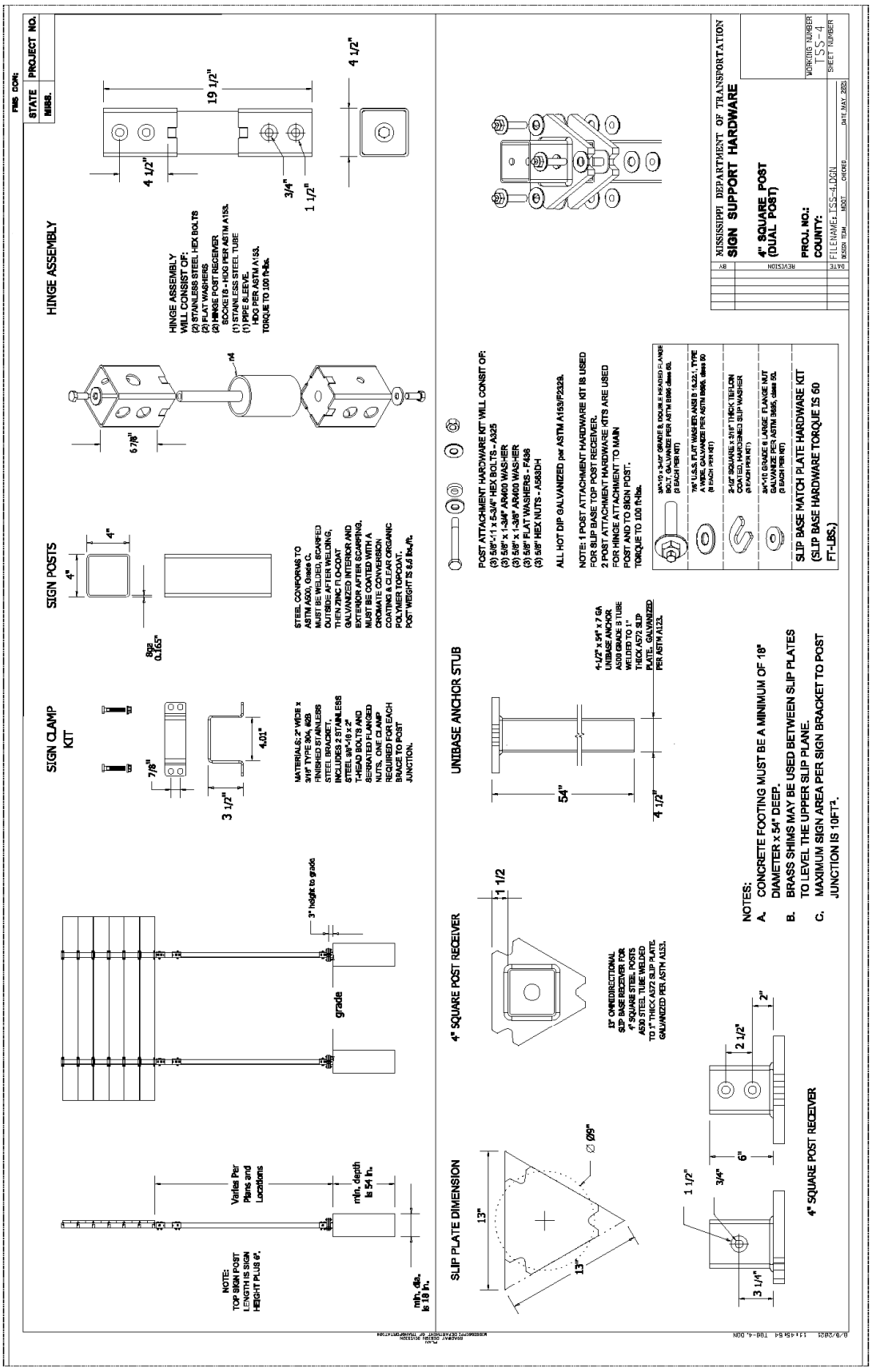
MISSISSIPPI DEPARTMENT OF TRANSPORTATION
SIGN SUPPORT HARDWARE
2.5" SQUARE POST

PROJ. NO.:
COUNTY:
FILENAME: TSS-1.DGN
DESIGN TEAM: MDOT CHECKED: DATE: MAY 2021

WORKING NUMBER: TSS-1
SHEET NUMBER


FHWA CON:
STATE
MISS.
PROJECT NO.
SOIL INSTALLATION
1/2 SIGN HEIGHT
1/2 SIGN HEIGHT
Sign Centroid Height
2" SIGN POST
SEE OMNI SLEEVE DETAIL
MATERIALS: PERFORATED SQUARE STEEL TUBE Post and Anchor (PSST): Must be ASTM A1011, Grade 50 steel with an average minimum yield strength after cold-forming must be 60,000 psi. It must be corner welded, scarfed after welding, then zinc coated after scarfing. It must be coated with a chromate conversion coating and a clear organic polymer topcoat. Its interior and exterior will be galvanized. It must have 7/16" holes spaced 1" apart along the centerline of each of its four sides.
POST must be 2" x 14ga x appropriate length.
ANCHOR must be 2-1/4" x 12ga x 36".
OMNI SLEEVE must be: 2-1/2" x 12ga x 18" and contain four 4" x 12" x 10ga ASTM A569 steel fins welded to each of the four corner edges of the square sleeve with 4" flat end of each fin positioned 5" down from one end, and must be galvanized. A medium corner bolt must be used to secure the assembly.
NOTES:
A. PAID BY LENGTH OF POST. 36" ANCHOR TO BE ABSORBED.
B. OMNI SLEEVE TO BE ABSORBED IN PRICE BID FOR SQUARE POST.
OMNI SLEEVE INSTALLATION TOP VIEW
4" x 12" x 10ga FIN
2" x 14ga POST
2-1/4" x 12ga ANCHOR
2-1/2" x 12ga OMNI SLEEVE
OMNI SLEEVE DETAIL
36" ANCHOR
18" OMNI SLEEVE
5"
2" SIGN POST
2-1/2" DOWN FROM TOP
MISSISSIPPI DEPARTMENT OF TRANSPORTATION
SIGN SUPPORT HARDWARE
2.0" SQUARE POST
REVISION
BY
DATE
PROJ. NO.:
COUNTY:
FILENAME: TSS-2.DGN
DESIGN ITEM
MDOT
CHECKED
DATE: MAY 2005
WORKING NUMBER
TSS-2
SHEET NUMBER


FHWA CON:
STATE
PROJECT NO.
MISS.
UNIBASE
ANCHOR STUB
1 1/2"
54"
4 1/2"
4-1/2" x 5" x 7 GA UNIBASE ANCHOR, A572 GRADE B TUBE WELDED TO 1" THICK A572 SLIP PLATE, GALVANIZED PER ASTM A123.
SIGN POSTS
4"
4"
8ga 0.165"
STEEL CONFORMS TO ASTM A500, Grade C. MUST BE WELDED, SCARFED OUTSIDE AFTER WELDING, THEN ZINC FLO-COAT GALVANIZED INTERIOR AND EXTERIOR AFTER SCARFING. MUST BE COATED WITH A CROMATE CONVERSION COATING & CLEAR ORGANIC POLYMER TOPCOAT. POST WEIGHT IS 8.6 lbs./ft.
SIGN CLAMP
KIT
MATERIAL-2" WIDE x 3/16" TYPE 304 #2B FINISHED STAINLESS STEEL BRACKET. INCLUDES 2 STAINLESS STEEL 3/8"-16 x 2" T-HEAD BOLTS AND SERRATED FLANGED NUTS. ONE CLAMP REQUIRED FOR EACH BRACE TO POST JUNCTION.
7/8"
3 1/2"
4.01"
SLIP BASE ASSEMBLY
POST ATTACHMENT HARDWARE KIT WILL CONSIST OF:
(3) 5/8"-11 x 5-3/4" HEX BOLTS - A325
(3) 5/8" x 1-3/4" AR400 WASHER
(3) 5/8" x 1-3/8" AR400 WASHER
(3) 5/8" FLAT WASHERS - F436
(3) 5/8" HEX NUTS - A563DH
ALL HOT DIP GALVANIZED per ASTM A153/F2329.
NOTE: 1 POST ATTACHMENT HARDWARE KIT IS USED FOR SLIP BASE TOP POST RECEIVER. TORQUE TO 100 ft/lbs.
3/4"-10 x 3-1/2" GRADE 8, DOUBLE HEXAGED FLANGE BOLT, GALVANIZED PER ASTM B695 class 55. (3 EACH PER KIT)
7/8" U.S.S. FLAT WASHER ANSI B 18.22.1, TYPE A WIDE, GALVANIZED PER ASTM B695 class 55 (3 EACH PER KIT)
3-1/8" SQUARE x 3/16" THICK TEFLON COATED, HARDENED SLIP WASHER (3 EACH PER KIT)
3/4"-10 GRADE 8 LARGE FLANGE NUT GALVANIZED PER ASTM B695, class 55 (3 EACH PER KIT)
SLIP BASE MATCH PLATE HARDWARE KIT
(SLIP BASE HARDWARE TORQUED IS 60 FT-LBS.)
NOTES:
A. CONCRETE FOOTING MUST BE A MINIMUM OF 18" DIAMETER x 54" DEEP.
B. BRASS SHIMS MAY BE USED BETWEEN SLIP PLATES TO LEVEL THE UPPER SLIP PLANE.
C. MAXIMUM SIGN AREA PER SIGN BRACKET TO POST JUNCTION IS 10FT².
MISSISSIPPI DEPARTMENT OF TRANSPORTATION
SIGN SUPPORT HARDWARE
4" SQUARE POST (SINGLE POST)
PROJ. NO.:
COUNTY:
FILENAME: TSS-3.DGN
DESIGN TEAM
MOOT
CHECKED
DATE MAY 2021
WORKTAB NUMBER
TSS-3
SHEET NUMBER
DATE
REVISION
BY
VARIES PER PLANS AND LOCATIONS
grade
3" height to grade
mfh. depth is 54 in.
mfh. dia. is 18 in.
SLIP PLATE DIMENSION
13"
13"
13"
69°
4" SQUARE POST RECEIVER
1 1/2
13" OMNIDIRECTIONAL SLIP BASE RECEIVER FOR 4" SQUARE STEEL POSTS A500 STEEL TUBE WELDED TO 1" THICK A572 SLIP PLATE, GALVANIZED PER ASTM A123.
2 1/2"
2"
6"
1 1/2"
3/4"
3 1/4"
4" SQUARE POST RECEIVER
6/8/2021 09:49:35 TSS-3.DGN


HINGE ASSEMBLY
SIGN POSTS
SIGN CLAMP KIT
UNIBASE ANCHOR STUB
4" SQUARE POST RECEIVER
SLIP PLATE DIMENSION
4" SQUARE POST RECEIVER
NOTES:
A. CONCRETE FOOTING MUST BE A MINIMUM OF 18" DIAMETER x 54" DEEP.
B. BRASS SHIMS MAY BE USED BETWEEN SLIP PLATES TO LEVEL THE UPPER SLIP PLANE.
C. MAXIMUM SIGN AREA PER SIGN BRACKET TO POST JUNCTION IS 10FT².
SLIP BASE MATCH PLATE HARDWARE KIT (SLIP BASE HARDWARE TORQUE IS 60 FT-LBS.)
MISSISSIPPI DEPARTMENT OF TRANSPORTATION
SIGN SUPPORT HARDWARE
4" SQUARE POST (DUAL POST)
PROJ. NO.:
COUNTY:
WORKING NUMBER TSS-4
SHEET NUMBER
FILENAME: TSS-4.DGN
DATE MAY, 2021

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 5551 **CODE: (IS)**

DATE: **12/06/2023**

SUBJECT: **Federal Bridge Formula**

Bidders are hereby advised that the latest revision of Federal Highway Administration Publication No. FHWA-HOP-06-105, **BRIDGE FORMULA WEIGHTS**, dated August 2006, is made a part of this contract when applicable.

Prior to the preconstruction conference, the Contractor shall advise the Engineer, in writing, what materials, if any, will be delivered to the jobsite via Interstate route(s).

Copies of the **BRIDGE FORMULA WEIGHTS** publication may be obtained by contacting:

Federal Highway Administration
400 7th Street, SW
Washington, DC 20590
(202) 366-2212

or

https://ops.fhwa.dot.gov/freight/publications/brdg_frm_wghts/

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 – NOTICE TO BIDDERS NO. 5570 **CODE: (SP)**

DATE: 07/28/2025

SUBJECT: Special Provisions Related to Concrete

Bidders are hereby advised that this contract contains one or more of the following **new** Special Provisions related to concrete:

Special Provision No. 907-501-1, Subject: Concrete Pavement
Special Provision No. 907-502-1, Subject: Concrete Bridge End Pavement
Special Provision No. 907-503-1, Subject: Replacement of Concrete Pavement
Special Provision No. 907-504-4, Subject: Fiber-reinforced Concrete Pavement
Special Provision No. 907-601-1, Subject: Structural Concrete
Special Provision No. 907-605-1, Subject: Underdrains
Special Provision No. 907-701-4, Subject: Hydraulic Cement
Special Provision No. 907-799-1, Subject: Hydraulic Cement Concrete Mixtures
Special Provision No. 907-803-6, Subject: Deep Foundations
Special Provision No. 907-804-13, Subject: Concrete Bridges and Structures
Special Provision No. 907-804-14, Subject: Bridge Deck Overlay

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 7304 **CODE: (SP)**

DATE: 08/25/2025

SUBJECT: Erosion Control Contract Compliance

Bidders are hereby advised that Erosion Control measures will be monitored for contract compliance at the specified intervals as per the Contract Documents. The Contractor will be subject to the following conditions:

If a Contractor is found to be in violation of Notice to Bidders 2172 in excess of the time allotted per the MDEQ General Permit without a Contractor's Inspection, or a second consecutive Stormwater Inspection showing a recurring major/critical deficiency without any Corrective Action report showing that the area had been addressed, said Contractor will be issued a Non-Compliance Assessment per violation until the project is found to be back in compliance with the Contract Documents (Stormwater permit included).

Non-Compliance Assessments will accrue per each reporting period that the Contractor remains in violation of the above referenced items. A deduction, calculated from the Non-Compliance Assessment charges listed in Table I, will be made from money due the Contractor. The charges set out in Table I of non-compliance assessments are based on Penalty amounts developed by MDEQ to encourage Contractor Compliance. The Contractor and the Contractor's Sureties shall be liable for all non-compliance assessments in excess of any money due the Contractor.

Erosion Control Inspection reports are required to be submitted until there is a Full Maintenance Release, documented in writing by the State Construction Engineer. The non-compliance assessments may be returned to the Contractor at the completion of the project if the Contractor is found to have three (3) or fewer documented violations during the life of the project. The Contractor will forfeit any non-compliance assessments if found to have been assessed penalties for more than three (3) documented violations.

Should the Contractor come upon an issue that causes a delay or an inability to submit the required reports, said Contractor has twenty-four (24) hours to report to the MDOT's Project Engineer or MDOT's LPA Division (for LPA Projects) of the issue and get assistance. Lack of willingness to use or learn to use the application will not be accepted as a valid reason for nonuse.

Table I

Non-Compliance Assessments of Construction and Mining Storm Water Permits (Per Documented Violation)

Violation	Original Contract Amount		Type of Stormwater Permit*	
			SCNOI	LCNOI
Failure to complete weekly inspection, failure to address a documented major/critical Deficiency (noted as a recurring deficiency)	$<10,000,000	$ 10,000,000	$ 1,000	$ 2,500
	$ 10,000,000	$ 40,000,000	$ 1,000	$ 4,000
	$ 40,000,000	>$40,000,000	$ 1,000	$ 7,000

- **Permit defined by project documents.**

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 – NOTICE TO BIDDERS NO. 7578 **CODE: (IS)**

DATE: 12/16/2025

SUBJECT: Obligation Date

With respect to the obligation date referenced in Special Provision No. 907-700-2 (Materials and Tests), bidders are advised that this project will be obligated on or after October 1, 2025, and before October 1, 2026.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 7693 **CODE: (SP)**

DATE: 02/18/2026

SUBJECT: Contract Time

PROJECT: STBG-0010-01(180) / 109171301 – Jackson County

The calendar date for completion of work to be performed by the Contractor for this project shall be **June 30, 2028** which date or extended date as provided in Subsection 108.06 shall be the end of contract time. It is anticipated that the Notice of Award will be issued no later than **May 12, 2026** and the effective date of the Notice to Proceed / Beginning of Contract Time will be **August 10, 2026**.

Should the Contractor request a Notice to Proceed earlier than **August 10, 2026** and it is agreeable with the Department for an early Notice to Proceed, the requested date will become the new Notice to Proceed date.

All requests for an early Notice to Proceed shall be sent to the Project Engineer who will forward it to the Contract Administration Division.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 7694

DATE: 02/25/2026

SUBJECT: Specialty Items

PROJECT: STBG-0010-01(180)/109171301 - JACKSON

Pursuant to the provisions of Section 108, the following work items are hereby designated as "Specialty Items" for this contract. Bidders are reminded that these items must be subcontracted in order to be considered as specialty items. The Bidder's attention is also called to Subcontracting requirements listed in Document 00 22 13 of Special Provision 907-242-14.

CATEGORY: AGGR BASE AGGR SHLDR LEAN CONC BASE

Line No	Pay Item	Description
1960	304-F001	3/4" and Down Crushed Stone Base
1970	304-F002	Size 610 Crushed Stone Base
1980	304-F003	Size 825B Crushed Stone Base

CATEGORY: ASPHALT CONCRETE

Line No	Pay Item	Description
0850	407-A001	Asphalt for Tack Coat
1680	907-403-A002	12.5-mm, MT, Asphalt Pavement
1690	907-403-A005	19-mm, MT, Asphalt Pavement
1700	907-403-A014	9.5-mm, MT, Asphalt Pavement

CATEGORY: CONCRETE

Line No	Pay Item	Description
0860	501-A004	10" Reinforced Cement Concrete Pavement, Broom Finish
0870	501-D001	Expansion Joints, With Dowels
0880	501-F001	Concrete Lug Anchors

CATEGORY: CURBING, SIDEWALKS, GUTTERS

Line No	Pay Item	Description
1110	608-A001	Concrete Sidewalk, Without Reinforcement
1120	609-B002	Concrete Curb, Header
1130	609-C003	Concrete Integral Curb, Type 3
1140	609-D001	Combination Concrete Curb and Gutter Type 1
1150	609-D004	Combination Concrete Curb and Gutter Type 2 Modified
1160	609-D013	Combination Concrete Curb and Gutter Type 3B
1180	616-A001	Concrete Median and/or Island Pavement, 10-inch
1750	907-608-C001	Detectable Warning Panels
1760	907-608-D002	Stamped and Colored Concrete Sidewalk
1770	907-616-C001	Colored and Imprinted Concrete Median and Island Pavement, 10-inch Thickness

CATEGORY: DISPOSAL OF BUILDINGS, RIGHT OF WAY CLEARING & GRUBBING

Line No	Pay Item	Description
0020	202-B007	Removal of Asphalt Pavement, All Depths
0030	202-B038	Removal of Building Picnic Shelter
0040	202-B038	Removal of Building Security Building
0050	202-B038	Removal of Building Welcome Center

0060	202-B063	Removal of Concrete Paved Ditch
0070	202-B073	Removal of Concrete Pavement, All Depths
0080	202-B080	Removal of Concrete Sidewalk
0090	202-B089	Removal of Curb &/or Curb and Gutter, All Types
0100	202-B126	Removal of Fence, All Types
0110	202-B164	Removal of Inlet and Junction Box, All Types & Sizes
0120	202-B178	Removal of Low Mast Lighting Assembly and Foundation
0130	202-B180	Removal of Manhole
0140	202-B191	Removal of Pipe, 8" And Above
0150	202-B215	Removal of Sign Including Post & Footing
0160	202-B242	Removal of Treatment Plant Sturctures and Appurtenances
0840	406-D001	Fine Milling of Bituminous Pavement, All Depths

CATEGORY: DRAINAGE, CULVERTS, CONDUITS

Line No	Pay Item	Description
0900	603-CA012	18" Reinforced Concrete Pipe, Class III, Rubber Type Gaskets
0910	603-CA027	24" Reinforced Concrete Pipe, Class III, Rubber Type Gaskets
0920	603-CB003	18" Reinforced Concrete End Section
0930	603-CB004	24" Reinforced Concrete End Section
0940	603-CE001	18" x 11" Concrete Arch Pipe, Class A III
0950	603-CE003	22" x 13" Concrete Arch Pipe, Class A III, Flexible Plastic Gaskets
0960	603-CE014	36" x 23" Concrete Arch Pipe, Class A III, Flexible Plastic Gaskets
0970	603-CF002	22" x 13" Concrete Arch Pipe End Section
0980	603-CF004	36" x 23" Concrete Arch Pipe End Section
0990	603-PE001	12" Corrugated Polyethylene Pipe
1000	603-PE003	18" Corrugated Polyethylene Pipe
1010	603-PE009	8" Corrugated Polyethylene Pipe
1020	604-A001	Castings
1030	604-B001	Gratings
1720	907-604-PP002	8" Trench Drain, Per Plans Inline Drain
1730	907-604-PP002	8" Trench Drain, Per Plans Slot Drain

CATEGORY: EARTHWORK, CLEARING & GRUBBING

Line No	Pay Item	Description
0010	201-B001	Clearing and Grubbing
0170	203-A001	Unclassified Excavation, FM, AH
0180	203-EX012	Borrow Excavation, AH, FME, Class B3
0190	203-EX018	Borrow Excavation, AH, FME, Class B7-6
0200	203-G001	Excess Excavation, FM, AH
0210	203-I002	Site Grading
0220	206-A001	Structure Excavation
0230	206-B001	Select Material for Undercuts, Contractor Furnished, FM
0240	209-A004	Geotextile Stabilization, Type V , Woven

CATEGORY: EROSION CONTROL

Line No	Pay Item	Description

0250	211-A001	Topsoil for Slope Treatment, From Right-of-Way
0260	211-B001	Topsoil for Slope Treatment, Contractor Furnished
0270	211-C001	Topsoil for Plant Holes, Contractor Furnished
0280	213-C001	Superphosphate
0290	216-B002	Solid Sodding, Centipede
0300	219-A001	Watering
0310	220-A001	Insect Pest Control
0320	221-A001	Concrete Paved Ditch
0330	223-A001	Mowing
0340	225-A001	Grassing
0350	225-B001	Agricultural Limestone
0360	225-C001	Mulch, Vegetative Mulch
0370	226-A001	Temporary Grassing
0380	227-A001	Hydroseeding
0790	233-C005	Straw Mulch, Class II
0800	237-A002	Wattles, 20"
0810	246-B001	Rockbags
0820	249-A001	Riprap for Erosion Control
0830	249-A001	Riprap for Erosion Control Washed Gravel for Landscaped Areas
1390	815-E001	Geotextile under Riprap
1400	815-E001	Geotextile under Riprap for ditch in Landscape Area
1410	907-234-A001	Temporary Silt Fence
1420	907-234-D001	Inlet Siltation Guard
1430	907-234-E001	Reset Inlet Siltation Guard
1440	907-240-A001	Interlocking Flexible Block Erosion Control System

CATEGORY: FENCE, GATES

Line No	Pay Item	Description
1040	607-B026	72" Type I Chain Link Fence, Class I , With Top Guard
1050	607-B027	72" Type I Chain Link Fence, Class II
1060	607-G061	Gate, 12' x 6' Double Chain Link
1070	607-G098	Gate, 16' x 6' Double Chain Link with Top Guard
1080	607-P1018	Line Post, 9' x 2" Galvanized Steel
1090	607-P2013	Brace Post, 10' x 2 1/2" Galvanized Steel
1100	607-P3009	Gate Post, 9' x 3 1/2" Galvanized Steel
1740	907-607-PP005	Cantilever Gate, Per Plans Tubular Steel Gate

CATEGORY: LANDSCAPING

Line No	Pay Item	Description
0390	230-A036	Shrub Planting, Dwarf Maiden Grass 1 Gallon
0400	230-A041	Shrub Planting, Dwarf Wax Myrtle 3 Gallon
0410	230-A049	Shrub Planting, Francis Mason Abelia 3 Gallon
0420	230-A100	Shrub Planting, Parsons Juniper 3 Gallon
0430	230-A102	Shrub Planting, Pink Creeping Phlox 1 Gallon
0440	230-A119	Shrub Planting, Saw Palmetto 3 Gallon
0450	230-A121	Shrub Planting, Shi-Shi Gashira Camellia 3 Gallon

0460	230-A126	Shrub Planting, Spirea 'Anthony Waterer' 1 Gallon
0470	230-A142	Shrub Planting, Wheeler's Dwarf Pittosporum 3 Gallon
0480	230-A143	Shrub Planting, Formosa Azalea 3 Gallon
0490	230-A144	Shrub Planting, Blue Cascade Distylium 3 Gallon
0500	230-A145	Shrub Planting, Oakleaf Hydrangea 3 Gallon
0510	230-A146	Shrub Planting, Autumn Fern 1 Gallon
0520	230-A147	Shrub Planting, Cast Iron Plant 3 Gallon
0530	230-A148	Shrub Planting, Sand Cordgrass 1 Gallon
0540	230-A149	Shrub Planting, Little Bluestem 1 Gallon
0550	230-A150	Shrub Planting, Bicolor African Iris 1 Gallon
0560	230-A151	Shrub Planting, Copper Iris 1 Gallon
0570	230-A152	Shrub Planting, Giant Blue Iris 1 Gallon
0580	230-A153	Shrub Planting, Evergreen Daylily 1 Gallon
0590	230-A154	Shrub Planting, Variegated Hosta 1 Gallon
0600	230-A155	Shrub Planting, Beautyberry 3 Gallon
0610	230-A156	Shrub Planting, Coral Drift Rose
0620	230-B006	Tree Planting, Bald Cypress 65 Gallon
0630	230-B015	Tree Planting, Chaste Tree 30 Gallon
0640	230-B039	Tree Planting, Flowering Dogwood 30 Gallon
0650	230-B050	Tree Planting, Live Oak 65 Gallon
0660	230-B057	Tree Planting, Nutall Oak 65 Gallon
0670	230-B064	Tree Planting, Redbud 30 Gallon
0680	230-B067	Tree Planting, Savannah Holly 45 Gallon
0690	230-B078	Tree Planting, Southern Wax Myrtle 30 Gallon
0700	230-B084	Tree Planting, Sweetbay Magnolia 45 Gallon
0710	230-B104	Tree Planting, Black Gum 65 Gallon
0720	230-B105	Tree Planting, Bosque Elm 65 Gallon
0730	230-B106	Tree Planting, Japanese Maple 45 Gallon
0740	230-B107	Tree Planting, Longleaf Pine 30 Gallon
0750	230-B108	Tree Planting, Bottlebrush 15 Gallon
0760	230-B109	Tree Planting, Buttonbush 7 Gallon
0770	230-D001	Bed Preparation
0780	233-A003	Tree Bark Mulch, Type III
1490	907-282-A068	Sprinkler Head, 1812-RVAN-18
1500	907-282-A069	Sprinkler Head, 1812-RVAN-24
1510	907-282-A070	Sprinkler Head, 1812-RVAN-24-360
1520	907-282-A071	Sprinkler Head, 1812-RVAN-LCS
1530	907-282-A072	Sprinkler Head, 1812-RVAN-RCS
1540	907-282-A073	Sprinkler Head, 1812-RVAN-SST
1550	907-282-A074	Sprinkler Head, 1812-RVAN-14
1560	907-282-B001	Piping, 1 1/2" Diameter
1570	907-282-B003	Piping, 1" Diameter
1580	907-282-B006	Piping, 2" Diameter
1590	907-282-C003	Sleeves, 4"
1600	907-282-D001	Valve Control Wire

1610	907-282-G008	Electric Controller, 16 Station
1620	907-282-H001	Electric Control Valve, 1 1/2"
1630	907-282-H002	Electric Control Valve, 1"
1640	907-282-H003	Electric Control Valve, 2"
1650	907-282-J003	Isolation Valve, 2"
1660	907-282-J003	Isolation Valve, 2" Master Valve

CATEGORY: MISCELLANEOUS/ SPECIALTY WORK ITEMS

Line No	Pay Item	Description
1170	612-A001	Flowable Fill, Excavatable

CATEGORY: NON ROADWAY ITEMS

Line No	Pay Item	Description
1450	907-242-A001	Construction of Welcome Center Facility
1460	907-242-PP003	Installation of Irrigation System Pump
1670	907-290-A001	Flagpole

CATEGORY: PAVEMENT STRIPING AND MARKING

Line No	Pay Item	Description
1800	907-626-B003	6" Thermoplastic Double Drop Traffic Stripe, Continuous White
1810	907-626-F004	6" Thermoplastic Double Drop Edge Stripe, Continuous Yellow
1820	907-626-G003	Thermoplastic Detail Stripe, Blue-ADA
1830	907-626-G006	Thermoplastic Double Drop Detail Stripe, White
1840	907-626-G007	Thermoplastic Double Drop Detail Stripe, Yellow
1850	907-626-H001	Thermoplastic Legend, Blue-ADA Handicap Symbol
1860	907-626-H006	Thermoplastic Double Drop Legend, White
1870	907-626-H007	Thermoplastic Double Drop Legend, White
1880	907-627-K001	Red-Clear Reflective High Performance Raised Markers
1890	907-628-E002	6" Cold Plastic Detail Stripe, Blue-ADA
1900	907-628-H004	Cold Plastic Legend, Blue-ADA Handicap Symbol
1910	907-628-K003	High Performance Cold Plastic Detail Stripe, White
1920	907-628-K004	High Performance Cold Plastic Detail Stripe, Yellow
1930	907-628-L003	High Performance Cold Plastic Legend, White
1940	907-628-L004	High Performance Cold Plastic Legend, White

CATEGORY: RIPRAP, MAILBOXES

Line No	Pay Item	Description
1380	815-A002	Loose Riprap, Size 100

CATEGORY: STRUCTURES

Line No	Pay Item	Description
0890	602-A001	Reinforcing Steel
1710	907-601-B001	Class "B" Structural Concrete, Minor Structures

CATEGORY: TRAFFIC CONTROL - PERMANENT

Line No	Pay Item	Description
1290	630-A001	Standard Roadside Signs, Sheet Aluminum, 0.080" Thickness

1300	630-A003	Standard Roadside Signs, Sheet Aluminum, 0.125" Thickness
1310	630-A005	Standard Roadside Signs, Sheet Aluminum, 0.1" Thickness
1320	630-B002	Interstate Directional Signs, Bolted Extruded Aluminum Panels, Ground Mounted
1330	630-C001	Square Tube Posts, 4.0 lb/ft
1340	630-C004	Square Tube Posts, 9.0 lb/ft
1350	630-C005	Square Tube Posts, 2.0 lb/ft
1360	630-C1001	Square Post Inner Sleeve
1950	907-630-O001	Remove and Reset Sign Assembly

CATEGORY: TRAFFIC CONTROL - TEMPORARY

Line No	Pay Item	Description
1190	619-A5001	Temporary Traffic Stripe, Detail
1200	619-D1001	Standard Roadside Construction Signs, Less than 10 Square Feet
1210	619-D2001	Standard Roadside Construction Signs, 10 Square Feet or More
1220	619-F1001	Concrete Median Barrier, Precast
1230	619-F2001	Remove and Reset Concrete Median Barrier, Precast
1240	619-G4005	Barricades, Type III, Single Faced
1250	619-G5001	Free Standing Plastic Drums
1260	619-G7001	Warning Lights, Type "B"
1270	619-G8001	Warning Lights, Type "C"
1790	907-619-E3001	Changeable Message Sign

CATEGORY: UTILITY ITEMS

Line No	Pay Item	Description
1470	907-260-A005	Utility Work - Sewer,
1480	907-262-A007	Utility Work - Water,

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 7695 **CODE: (SP)**

DATE: 02/25/2026

SUBJECT: Pre-Bid Conference

PROJECT: STBG-0010-01(180) / 109171301 – Jackson County

A **MANDATORY** Pre-Bid meeting of the project will be held at the MDOT District Six Headquarters, 6356 Highway 49 North, Hattiesburg, Mississippi at 10:00 A.M. on Tuesday, April 01, 2026 to discuss with prospective bidders is requirements of the plans and specifications for this project.

"General Decision Number: MS20260052 01/23/2026

Superseded General Decision Number: MS20250052

State: Mississippi

Construction Type: Building
BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

County: Jackson County in Mississippi.

Modification Number	Publication Date
0	01/02/2026
1	01/23/2026

CARP1846-005 01/01/2025

	Rates	Fringes
CARPENTER (Includes Drywall Hanging, Finishing/Taping and Form Work)	$ 31.36	13.45

* ELEC0903-012 12/01/2025

	Rates	Fringes
ELECTRICIAN (Includes Low Voltage Wiring)	$ 32.90	7.89+9.75%

ENGI0624-007 01/01/2024

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
Crane	$ 35.50	14.55
Forklift	$ 35.50	14.55

IRON0798-009 07/01/2025

	Rates	Fringes
IRONWORKER, REINFORCING	$ 31.00	17.77

PLUM0568-007 11/01/2024

	Rates	Fringes
PIPEFITTER (Includes HVAC Unit Installation (Excludes HVAC Pipe Installation))	$ 30.41	11.47
PLUMBER (Includes HVAC Pipe Installation (Excludes HVAC Unit Installation))	$ 29.91	11.97

SFMS0669-001 04/01/2025

	Rates	Fringes
SPRINKLER FITTER (Fire Sprinkler)	$ 32.65	23.55

SHEE0441-006 07/01/2022

	Rates	Fringes
SHEET METAL WORKER (Includes HVAC Duct Installation)	$ 30.45	13.88

SUMS2015-013 04/03/2017

	Rates	Fringes
BRICKLAYER	$ 20.29	0.00
CEMENT MASON/CONCRETE FINISHER	$ 18.37	0.00
IRONWORKER, STRUCTURAL	$ 18.05	0.00
LABORER: Common or General	$ 13.57	0.00
LABORER: Mason Tender - Cement/Concrete	$ 12.50	0.00
OPERATOR: Backhoe/Excavator/Trackhoe	$ 17.89	1.62
OPERATOR: Bulldozer	$ 15.14	1.03
PAINTER (Brush and Roller)	$ 17.00	0.00
ROOFER	$ 14.50	0.00
TILE SETTER	$ 18.00	0.00
TRUCK DRIVER: Dump Truck	$ 14.11	0.27

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the

Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least $13.30 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2025. The applicable Executive Order minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under Executive Order 13658 is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than ""SU"", ""UAVG"", ?SA?, or ?SC? denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

?SU? wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the ?SA? identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

a) a survey underlying a wage determination
b) an existing published wage determination
c) an initial WHD letter setting forth a position on a wage determination matter
d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or

by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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END OF GENERAL DECISION"

SUPPLEMENT TO FORM FHWA-1273

DATE: 07/26/2022

SUBJECT: Federal Contract Provisions for Subcontracts

Federal Contract Provisions for Subcontracts

All subcontracts shall be in writing and contain all pertinent provisions and requirements of the prime contract.

Each "Request for Permission to Subcontract" (Mississippi Department of Transportation Form CAD-720) shall include a copy of the subcontract. The federal contract provisions (FHWA-1273, SUPPLEMENT TO FORM FHWA-1273, NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY (EXECUTIVE ORDER 11246), DAVIS-BACON AND RELATED ACT PROVISIONS (WAGE RATES)) must be physically incorporated as part of the subcontract. A completed Mississippi Department of Transportation Form CAD-521 and Form CAD-725 must be attached to the CAD-720.

REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS

I. General
II. Nondiscrimination
III. Non-segregated Facilities
IV. Davis-Bacon and Related Act Provisions
V. Contract Work Hours and Safety Standards Act Provisions
VI. Subletting or Assigning the Contract
VII. Safety: Accident Prevention
VIII. False Statements Concerning Highway Projects
IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
X. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion
XI. Certification Regarding Use of Contract Funds for Lobbying
XII. Use of United States-Flag Vessels:

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under title 23, United States Code, as required in 23 CFR 633.102(b) (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services). 23 CFR 633.102(e).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider. 23 CFR 633.102(e).

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services) in accordance with 23 CFR 633.102. The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in solicitation-for-bids or request-for-proposals documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract). 23 CFR 633.102(b).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract. 23 CFR 633.102(d).

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. 23 U.S.C. 114(b). The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors. 23 U.S.C. 101(a).

II. NONDISCRIMINATION (23 CFR 230.107(a); 23 CFR Part 230, Subpart A, Appendix A; EO 11246)

The provisions of this section related to 23 CFR Part 230, Subpart A, Appendix A are applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR Part 60, 29 CFR Parts 1625-1627, 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding $10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR Part 60, and 29 CFR Parts 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR Part 230, Subpart A, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal Employment Opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (*see* 28 CFR Part 35, 29 CFR Part 1630, 29 CFR Parts 1625-1627, 41 CFR Part 60 and 49 CFR Part 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140, shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR Part 35 and 29 CFR Part 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract. 23 CFR 230.409 (g)(4) & (5).

b. The contractor will accept as its operating policy the following statement:

> "It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, sexual orientation, gender identity, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action or are substantially involved in such action, will be made fully cognizant of and will implement the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer or other knowledgeable company official.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to ensure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action

within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs (i.e., apprenticeship and on-the-job training programs for the geographical area of contract performance). In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. 23 CFR 230.409. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established thereunder. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors, suppliers, and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurances Required:

a. The requirements of 49 CFR Part 26 and the State DOT's FHWA-approved Disadvantaged Business Enterprise (DBE) program are incorporated by reference.

b. The contractor, subrecipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate, which may include, but is not limited to:
(1) Withholding monthly progress payments;
(2) Assessing sanctions;
(3) Liquidated damages; and/or
(4) Disqualifying the contractor from future bidding as non-responsible.

c. The Title VI and nondiscrimination provisions of U.S. DOT Order 1050.2A at Appendixes A and E are incorporated by reference. 49 CFR Part 21.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women.

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of more than $10,000. 41 CFR 60-1.5.

As prescribed by 41 CFR 60-1.8, the contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location under the contractor's control where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding $2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size), in accordance with 29 CFR 5.5. The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. 23 U.S.C. 113. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. 23 U.S.C. 101. Where applicable law requires that projects be treated as a project on a Federal-aid highway, the provisions of this subpart will apply regardless of the location of the project. Examples include: Surface Transportation Block Grant Program projects funded under 23 U.S.C. 133 [excluding recreational trails projects], the Nationally Significant Freight and Highway Projects funded under 23 U.S.C. 117, and National Highway Freight Program projects funded under 23 U.S.C. 167.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 “Contract provisions and related matters” with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages (29 CFR 5.5)

a. *Wage rates and fringe benefits.* All laborers and mechanics employed or working upon the site of the work (or otherwise working in construction or development of the project under a development statute), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of basic hourly wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. As provided in paragraphs (d) and (e) of 29 CFR 5.5, the appropriate wage determinations are effective by operation of law even if they have not been attached to the contract. Contributions made or costs reasonably anticipated for bona fide fringe benefits under the Davis-Bacon Act (40 U.S.C. 3141(2)(B)) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.e. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics must be paid the appropriate wage rate and fringe benefits on the wage determination for the classification(s) of work actually performed, without regard to skill, except as provided in paragraph 4. of this section. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided,* That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classifications and wage rates conformed under paragraph 1.c. of this section) and the Davis-Bacon poster (WH–1321) must be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b. *Frequently recurring classifications.* (1) In addition to wage and fringe benefit rates that have been determined to be prevailing under the procedures set forth in 29 CFR part 1, a wage determination may contain, pursuant to § 1.3(f), wage and fringe benefit rates for classifications of laborers and mechanics for which conformance requests are regularly submitted pursuant to paragraph 1.c. of this section, provided that:

(i) The work performed by the classification is not performed by a classification in the wage determination for which a prevailing wage rate has been determined;

(ii) The classification is used in the area by the construction industry; and

(iii) The wage rate for the classification bears a reasonable relationship to the prevailing wage rates contained in the wage determination.

(2) The Administrator will establish wage rates for such classifications in accordance with paragraph 1.c.(1)(iii) of this section. Work performed in such a classification must be paid at no less than the wage and fringe benefit rate listed on the wage determination for such classification.

c. *Conformance.* (1) The contracting officer must require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract be classified in conformance with the wage determination. Conformance of an additional classification and wage rate and fringe benefits is appropriate only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is used in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) The conformance process may not be used to split, subdivide, or otherwise avoid application of classifications listed in the wage determination.

(3) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken will be sent by the contracting officer by email to *DBAconformance@dol.gov*. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30–day period that additional time is necessary.

(4) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer will, by email to *DBAconformance@dol.gov*, refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30–day period that additional time is necessary.

(5) The contracting officer must promptly notify the contractor of the action taken by the Wage and Hour Division under paragraphs 1.c.(3) and (4) of this section. The contractor must furnish a written copy of such determination to each affected worker or it must be posted as a part of the wage determination. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph 1.c.(3) or (4) of this section must be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

d. *Fringe benefits not expressed as an hourly rate.* Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor may either pay the benefit as stated in the wage determination or may pay another bona fide fringe benefit or an hourly cash equivalent thereof.

e. *Unfunded plans.* If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided,* That the Secretary of Labor has found, upon the written request of the contractor, in accordance with the criteria set forth in § 5.28, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

f. *Interest.* In the event of a failure to pay all or part of the wages required by the contract, the contractor will be required to pay interest on any underpayment of wages.

2. Withholding (29 CFR 5.5)

a. *Withholding requirements.* The contracting agency may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for the full amount of wages and monetary relief, including interest, required by the clauses set forth in this section for violations of this contract, or to satisfy any such liabilities required by any other Federal contract, or federally assisted contract subject to Davis-Bacon labor standards, that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to Davis-Bacon labor standards requirements and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld. In the event of a contractor's failure to pay any laborer or mechanic, including any apprentice or helper working on the site of the work all or part of the wages required by the contract, or upon the contractor's failure to submit the required records as discussed in paragraph 3.d. of this section, the contracting agency may on its own initiative and after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

b. *Priority to withheld funds.* The Department has priority to funds withheld or to be withheld in accordance with paragraph

2.a. of this section or Section V, paragraph 3.a., or both, over claims to those funds by:

(1) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;

(2) A contracting agency for its reprocurement costs;

(3) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;

(4) A contractor's assignee(s);

(5) A contractor's successor(s); or

(6) A claim asserted under the Prompt Payment Act, 31 U.S.C. 3901–3907.

3. Records and certified payrolls (29 CFR 5.5)

a. *Basic record requirements* (1) *Length of record retention.* All regular payrolls and other basic records must be maintained by the contractor and any subcontractor during the course of the work and preserved for all laborers and mechanics working at the site of the work (or otherwise working in construction or development of the project under a development statute) for a period of at least 3 years after all the work on the prime contract is completed.

(2) *Information required.* Such records must contain the name; Social Security number; last known address, telephone number, and email address of each such worker; each worker's correct classification(s) of work actually performed; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 40 U.S.C. 3141(2)(B) of the Davis-Bacon Act); daily and weekly number of hours actually worked in total and on each covered contract; deductions made; and actual wages paid.

(3) *Additional records relating to fringe benefits.* Whenever the Secretary of Labor has found under paragraph 1.e. of this section that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in 40 U.S.C. 3141(2)(B) of the Davis-Bacon Act, the contractor must maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits.

(4) *Additional records relating to apprenticeship.* Contractors with apprentices working under approved programs must maintain written evidence of the registration of apprenticeship programs, the registration of the apprentices, and the ratios and wage rates prescribed in the applicable programs.

b. *Certified payroll requirements* (1) *Frequency and method of submission.* The contractor or subcontractor must submit weekly, for each week in which any DBA- or Related Acts-covered work is performed, certified payrolls to the contracting agency. The prime contractor is responsible for the submission of all certified payrolls by all subcontractors. A contracting agency or prime contractor may permit or require contractors to submit certified payrolls through an electronic system, as long as the electronic system requires a legally valid electronic signature; the system allows the contractor, the contracting agency, and the Department of Labor to access the certified payrolls upon request for at least 3 years after the work on the prime contract has been completed; and the contracting agency or prime contractor permits other methods of submission in situations where the contractor is unable or limited in its ability to use or access the electronic system.

(2) *Information required.* The certified payrolls submitted must set out accurately and completely all of the information required to be maintained under paragraph 3.a.(2) of this section, except that full Social Security numbers and last known addresses, telephone numbers, and email addresses must not be included on weekly transmittals. Instead, the certified payrolls need only include an individually identifying number for each worker (*e.g.,* the last four digits of the worker's Social Security number). The required weekly certified payroll information may be submitted using Optional Form WH–347 or in any other format desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division website at *https://www.dol.gov/sites/dolgov/files/WHD/legacy/files/wh347/.pdf* or its successor website. It is not a violation of this section for a prime contractor to require a subcontractor to provide full Social Security numbers and last known addresses, telephone numbers, and email addresses to the prime contractor for its own records, without weekly submission by the subcontractor to the contracting agency.

(3) *Statement of Compliance.* Each certified payroll submitted must be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor, or the contractor's or subcontractor's agent who pays or supervises the payment of the persons working on the contract, and must certify the following:

(i) That the certified payroll for the payroll period contains the information required to be provided under paragraph 3.b. of this section, the appropriate information and basic records are being maintained under paragraph 3.a. of this section, and such information and records are correct and complete;

(ii) That each laborer or mechanic (including each helper and apprentice) working on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR part 3; and

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification(s) of work actually performed, as specified in the applicable wage determination incorporated into the contract.

(4) *Use of Optional Form WH–347.* The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH–347 will satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(3) of this section.

(5) *Signature.* The signature by the contractor, subcontractor, or the contractor's or subcontractor's agent must be an original handwritten signature or a legally valid electronic signature.

(6) *Falsification.* The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under 18 U.S.C. 1001 and 31 U.S.C. 3729.

(7) *Length of certified payroll retention.* The contractor or subcontractor must preserve all certified payrolls during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

c. *Contracts, subcontracts, and related documents.* The contractor or subcontractor must maintain this contract or subcontract and related documents including, without limitation, bids, proposals, amendments, modifications, and extensions. The contractor or subcontractor must preserve these contracts, subcontracts, and related documents during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

d. *Required disclosures and access* (1) *Required record disclosures and access to workers.* The contractor or subcontractor must make the records required under paragraphs 3.a. through 3.c. of this section, and any other documents that the contracting agency, the State DOT, the FHWA, or the Department of Labor deems necessary to determine compliance with the labor standards provisions of any of the applicable statutes referenced by § 5.1, available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and must permit such representatives to interview workers during working hours on the job.

(2) *Sanctions for non-compliance with records and worker access requirements.* If the contractor or subcontractor fails to submit the required records or to make them available, or refuses to permit worker interviews during working hours on the job, the Federal agency may, after written notice to the contractor, sponsor, applicant, owner, or other entity, as the case may be, that maintains such records or that employs such workers, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available, or to permit worker interviews during working hours on the job, may be grounds for debarment action pursuant to § 5.12. In addition, any contractor or other person that fails to submit the required records or make those records available to WHD within the time WHD requests that the records be produced will be precluded from introducing as evidence in an administrative proceeding under 29 CFR part 6 any of the required records that were not provided or made available to WHD. WHD will take into consideration a reasonable request from the contractor or person for an extension of the time for submission of records. WHD will determine the reasonableness of the request and may consider, among other things, the location of the records and the volume of production.

(3) *Required information disclosures.* Contractors and subcontractors must maintain the full Social Security number and last known address, telephone number, and email address of each covered worker, and must provide them upon request to the contracting agency, the State DOT, the FHWA, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or other compliance action.

4. Apprentices and equal employment opportunity (29 CFR 5.5)

a. *Apprentices* (1) *Rate of pay.* Apprentices will be permitted to work at less than the predetermined rate for the work they perform when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship (OA), or with a State Apprenticeship Agency recognized by the OA. A person who is not individually registered in the program, but who has been certified by the OA or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice, will be permitted to work at less than the predetermined rate for the work they perform in the first 90 days of probationary employment as an apprentice in such a program. In the event the OA or a State Apprenticeship Agency recognized by the OA withdraws approval of an apprenticeship program, the contractor will no longer be permitted to use apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(2) *Fringe benefits.* Apprentices must be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringe benefits must be paid in accordance with that determination.

(3) *Apprenticeship ratio.* The allowable ratio of apprentices to journeyworkers on the job site in any craft classification must not be greater than the ratio permitted to the contractor as to the entire work force under the registered program or the ratio applicable to the locality of the project pursuant to paragraph 4.a.(4) of this section. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated in paragraph 4.a.(1) of this section, must be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under this section must be paid not less than the applicable wage rate on the wage determination for the work actually performed.

(4) *Reciprocity of ratios and wage rates.* Where a contractor is performing construction on a project in a locality other than the locality in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyworker's hourly rate) applicable within the locality in which the construction is being performed must be observed. If there is no applicable ratio or wage rate for the locality of the project, the ratio and wage rate specified in the contractor's registered program must be observed.

b. *Equal employment opportunity.* The use of apprentices and journeyworkers under this part must be in conformity with

the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

c. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. 23 CFR 230.111(e)(2). The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeyworkers shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract as provided in 29 CFR 5.5.

6. Subcontracts. The contractor or subcontractor must insert FHWA-1273 in any subcontracts, along with the applicable wage determination(s) and such other clauses or contract modifications as the contracting agency may by appropriate instructions require, and a clause requiring the subcontractors to include these clauses and wage determination(s) in any lower tier subcontracts. The prime contractor is responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this section. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and may be subject to debarment, as appropriate. 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract as provided in 29 CFR 5.5.

9. Disputes concerning labor standards. As provided in 29 CFR 5.5, disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility. a. By entering into this contract, the contractor certifies that neither it nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of 40 U.S.C. 3144(b) or § 5.12(a).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of 40 U.S.C. 3144(b) or § 5.12(a).

c. The penalty for making false statements is prescribed in the U.S. Code, Title 18 Crimes and Criminal Procedure, 18 U.S.C. 1001.

11. Anti-retaliation. It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

a. Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the DBA, Related Acts, this part, or 29 CFR part 1 or 3;

b. Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under the DBA, Related Acts, this part, or 29 CFR part 1 or 3;

c. Cooperating in any investigation or other compliance action, or testifying in any proceeding under the DBA, Related Acts, this part, or 29 CFR part 1 or 3; or

d. Informing any other person about their rights under the DBA, Related Acts, this part, or 29 CFR part 1 or 3.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

Pursuant to 29 CFR 5.5(b), the following clauses apply to any Federal-aid construction contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchpersons and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek. 29 CFR 5.5.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph 1. of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages and interest from the date of the underpayment. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or

mechanic, including watchpersons and guards, employed in violation of the clause set forth in paragraph 1. of this section, in the sum currently provided in 29 CFR 5.5(b)(2)* for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph 1. of this section.

* $31 as of January 15, 2023 (See 88 FR 88 FR 2210) as may be adjusted annually by the Department of Labor, pursuant to the Federal Civil Penalties Inflation Adjustment Act of 1990.

3. Withholding for unpaid wages and liquidated damages

a. *Withholding process.* The FHWA or the contracting agency may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for any unpaid wages; monetary relief, including interest; and liquidated damages required by the clauses set forth in this section on this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract subject to the Contract Work Hours and Safety Standards Act that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to the Contract Work Hours and Safety Standards Act and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld.

b. *Priority to withheld funds.* The Department has priority to funds withheld or to be withheld in accordance with Section IV paragraph 2.a. or paragraph 3.a. of this section, or both, over claims to those funds by:

(1) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;

(2) A contracting agency for its reprocurement costs;

(3) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;

(4) A contractor's assignee(s);

(5) A contractor's successor(s); or

(6) A claim asserted under the Prompt Payment Act, 31 U.S.C. 3901–3907.

4. Subcontracts. The contractor or subcontractor must insert in any subcontracts the clauses set forth in paragraphs 1. through 5. of this section and a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor is responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs 1. through 5. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and associated liquidated damages and may be subject to debarment, as appropriate.

5. Anti-retaliation. It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

a. Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the Contract Work Hours and Safety Standards Act (CWHSSA) or its implementing regulations in this part;

b. Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under CWHSSA or this part;

c. Cooperating in any investigation or other compliance action, or testifying in any proceeding under CWHSSA or this part; or

d. Informing any other person about their rights under CWHSSA or this part.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System pursuant to 23 CFR 635.116.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term “perform work with its own organization” in paragraph 1 of Section VI refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions: (based on longstanding interpretation)

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
(2) the prime contractor remains responsible for the quality of the work of the leased employees;

(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and

(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract. 23 CFR 635.102.

2. Pursuant to 23 CFR 635.116(a), the contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. Pursuant to 23 CFR 635.116(c), the contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract. (based on long-standing interpretation of 23 CFR 635.116).

5. The 30-percent self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements. 23 CFR 635.116(d).

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR Part 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract. 23 CFR 635.108.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR Part 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704). 29 CFR 1926.10.

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR Part 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 11, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT (42 U.S.C. 7606; 2 CFR 200.88; EO 11738)

This provision is applicable to all Federal-aid construction contracts in excess of $150,000 and to all related subcontracts. 48 CFR 2.101; 2 CFR 200.327.

By submission of this bid/proposal or the execution of this contract or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, subcontractor, supplier, or vendor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal Highway Administration and the Regional Office of the Environmental Protection Agency. 2 CFR Part 200, Appendix II.

The contractor agrees to include or cause to be included the requirements of this Section in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements. 2 CFR 200.327.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost $25,000 or more – as defined in 2 CFR Parts 180 and 1200. 2 CFR 180.220 and 1200.220.

1**. Instructions for Certification – First Tier Participants:**

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction. 2 CFR 180.320.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default. 2 CFR 180.325.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances. 2 CFR 180.345 and 180.350.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900-180.1020, and 1200. “First Tier Covered Transactions” refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction. 2 CFR 180.330.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold. 2 CFR 180.220 and 180.300.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. 2 CFR 180.300; 180.320, and 180.325. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. 2 CFR 180.335. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (https://www.sam.gov/). 2 CFR 180.300, 180.320, and 180.325.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default. 2 CFR 180.325.

* * * * *

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.335;.

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property, 2 CFR 180.800;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification, 2 CFR 180.700 and 180.800; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default. 2 CFR 180.335(d).

(5) Are not a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(6) Are not a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability (USDOT Order 4200.6 implementing appropriations act requirements).

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal. 2 CFR 180.335 and 180.340.

* * * * *

3. **Instructions for Certification - Lower Tier Participants:**

(Applicable to all subcontracts, purchase orders, and other lower tier transactions requiring prior FHWA approval or estimated to cost $25,000 or more - 2 CFR Parts 180 and 1200). 2 CFR 180.220 and 1200.220.

a. By signing and submitting this proposal, the prospective lower tier participant is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances. 2 CFR 180.365.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900 – 180.1020, and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. “First Tier Covered Transactions” refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated. 2 CFR 1200.220 and 1200.332.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold. 2 CFR 180.220 and 1200.220.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (https://www.sam.gov/), which is compiled by the General Services Administration. 2 CFR 180.300, 180.320, 180.330, and 180.335.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily

excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment. 2 CFR 180.325.

* * * * *

4. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

a. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals:

(1) is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.355;

(2) is a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(3) is a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability. (USDOT Order 4200.6 implementing appropriations act requirements)

b. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal.

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XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000. 49 CFR Part 20, App. A.

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

XII. USE OF UNITED STATES-FLAG VESSELS:

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, or any other covered transaction. 46 CFR Part 381.

This requirement applies to material or equipment that is acquired for a specific Federal-aid highway project. 46 CFR 381.7. It is not applicable to goods or materials that come into inventories independent of an FHWA funded-contract.

When oceanic shipments (or shipments across the Great Lakes) are necessary for materials or equipment acquired for a specific Federal-aid construction project, the bidder, proposer, contractor, subcontractor, or vendor agrees:

1. To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels. 46 CFR 381.7.

2. To furnish within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, ‘on-board’ commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (b)(1) of this section to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Office of Cargo and Commercial Sealift (MAR-620), Maritime Administration, Washington, DC 20590. (MARAD requires copies of the ocean carrier's (master) bills of lading, certified onboard, dated, with rates and charges. These bills of lading may contain business sensitive information and therefore may be submitted directly to MARAD by the Ocean Transportation Intermediary on behalf of the contractor). 46 CFR 381.7.

ATTACHMENT A - EMPLOYMENT AND MATERIALS PREFERENCE FOR APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS ROAD CONTRACTS (23 CFR 633, Subpart B, Appendix B)
This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

NOTICE OF REQUIREMENTS FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY (EXECUTIVE ORDER 11246)

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.

2. The goal for female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work, is 6.9%.

Until further notice	Goals for minority participation for each trade (percent)
SHSA Cities:	
Pascagoula - Moss Point	16.9
Biloxi - Gulfport	19.2
Jackson	30.3
SMSA Counties:	
Desoto	32.3
Hancock, Harrison, Stone	19.2
Hinds, Rankin	30.3
Jackson	16.9
Non-SMSA Counties:	
George, Greene	26.4
Alcorn, Benton, Bolivar, Calhoun, Carroll, Chickasaw, Clay, Coahoma, Grenada, Itawamba, Lafayette, Lee, Leflore, Marshall, Monroe, Montgomery, Panola, Pontotoc, Prentiss, Quitman, Sunflower, Tallahatchie, Tate, Tippah, Tishomingo, Tunica, Union, Washington, Webster, Yalobusha	26.5
Attala, Choctaw, Claiborne, Clarke, Copiah, Covington, Franklin, Holmes, Humphreys, Issaquena, Jasper, Jefferson, Jefferson Davis, Jones Kemper, Lauderdale, Lawrence, Leake, Lincoln, Lowndes, Madison, Neshoba, Newton, Noxubee, Oktibbeha, Scott, Sharkey, Simpson, Smith, Warren, Wayne, Winston, Yazoo	32.0
Forrest, Lamar, Marion, Pearl River, Perry, Pike, Walthall	27.7
Adams, Amite, Wilkinson	30.4

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and nonfederally involved construction.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4.2(d). Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor, employer identification number of the subcontractor, estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.

4. As used in this Notice, and in the contract resulting from this solicitation, the "covered area" is to the county and city (if any), stated in the advertisement.

5. The notification required in Paragraph 3 shall be addressed to the following:

Contract Compliance Officer
Mississippi Department of Transportation
P.O. Box 1850
Jackson, Mississippi 39215-1850

(12/04/2018)

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-101-1 **CODE: (IS)**

DATE: 07/20/2023

SUBJECT: Definitions and Terms

Section 101, Definitions and Terms, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-101.01--Abbreviations. After the abbreviation API on page 1, add the following.

APL Approved Products List

Replace the abbreviation for AWPA on page 1 with the following.

AWPA American Wood Protection Association

907-101.02--Definitions. Delete the sentence after the list of holidays in Subsection 101.02 on page 6 under **holidays, legal**, and substitute the following.

When a legal holiday falls on a Saturday or Sunday, the succeeding Monday, or as proclaimed by the Governor, will be observed as a legal holiday.

Delete the definition for Notice to Proceed in Subsection 101.02 on page 8, and substitute the following.

Notice to Proceed - Written notice to the Contractor to proceed with the contract work.

Delete the definition for "Plans" in Subsection 101.02 on page 8, and substitute the following.

plans - The approved plans, profiles, typical cross-sections, working drawings and supplemental drawings, or exact reproduction thereof, that show the location, character, dimensions, and details of the work to be done. The plans may also include electronic files, referred to on the plans as Electronic Files Identified as Plans, which may include engineering models, spreadsheets, CADD files or other electronic files used to convey design intent. When the contract does not have an official set of plans, reference to the plans shall mean the contract documents.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-102-2 **CODE: (IS)**

DATE: 11/22/2017

SUBJECT: Bidding Requirements and Conditions

Section 102, Bidding Requirements and Conditions, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-102.01--Prequalification of Bidders. Delete the last sentence of the third paragraph of Subsection 102.01 on page 13, and substitute the following.

The Bidder's Certificate of Responsibility number must be on file with the Department's Contract Administration Division prior to request for permission to bid.

907-102.02--Contents of Proposal Forms. Delete the fourth paragraph in Subsection 102.02 on page 13, and substitute the following.

Prospective bidders must complete an online request for permission to be eligible to bid a project. Upon approval, the bidder will be authorized to submit a bid electronically using Bid Express at http://bidx.com.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-104-2 **CODE: (SP)**

DATE: 06/17/2025

SUBJECT: Minor Alteration to the Contract

Section 104, Scope of Work, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-104.02--Alterations of Plans or Character of Work.

907-104.02.3--Minor Alteration to the Contract. In the first paragraph of Subsection 104.02.3 on page 25, change $10,000.00 to $25,000.00.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-105-2 **CODE: (IS)**

DATE: 07/20/2023

SUBJECT: Control of Work

Section 105, Control of Work, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-105.01--Authority of the Engineer. Delete the first sentence of the second paragraph of Subsection 105.01 on page 31, and substitute the following.

The Engineer has the right to suspend the work wholly or in part and to withhold payments because of the Contractor's failure to correct conditions unsafe for workmen or the general public, for failure to carry out provisions of the Contract, or for failure to carry out orders.

907-105.02--Plans and Working Drawings. Delete the first paragraph of Subsection 105.02 on page 31, and substitute the following.

After the contract is executed by the Executive Director, the Contractor will receive, free of charge, two bound copies of the proposal and contract documents (one executed and one blank) two full scale copies of the plans, five half-scale copies of the Plans, and Electronic Files Identified as Plans. The Contractor shall have one copy of the proposal and contract documents and one half-scale copy of the plans available at all times during work activity on the project.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-106-4 **CODE: (IS)**

DATE: 12/16/2025

SUBJECT: Control of Materials

Section 106, Control of Materials, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

After Subsection 106.13 on page 47, add the following:

907-106.14--Buy America Materials Sourcing Requirements for Federal-Aid Projects.

The "Infrastructure Investment and Jobs Act" (the "Act"), or Bipartisan Infrastructure Law (BIL), was enacted on November 15, 2021 (See Public Law No. 117-58, Sections 70901-70953). The Buy America provisions of the Act expand the previous Buy America requirements beyond what was currently required for steel and iron products.

Articles, materials, or supplies will only be classified under one of the following categories: iron or steel products, construction materials, manufactured products, or excluded materials (as further described in subsection 907-700.01.1). An article, material, or supply shall not be considered to fall under multiple categories. The applicable classification of the article, material, or supply being permanently incorporated into a construction project will be based on the status at the time the article, material, or supply is brought to the project work site.

Any iron or steel products, construction materials, and manufactured products that are permanently incorporated into a construction project, shall be domestically manufactured and compliant with current requirements of the Act, including 2 CFR 184, 2 CFR 200.322, 0MB 24-02 Memo and related requirements therein, and with the current requirements within 23 CFR 635.410.

It is the prime Contractor's responsibility to ensure all submittals and/or certifications required by the above listed Buy America provisions are submitted to the Project Engineer prior to the article, material, or supply being incorporated into the work.

Buy America provisions do not apply to temporarily used articles, materials, or supplies that: (1) are specified to be removed at the end of the project per the contract provisions, or (2) are specified to remain in place per the contract provisions and are also documented by the Department in the contract provisions to be removed in a subsequent imminent, near-term phased project.

The following categories, as described above, require Domestic Materials Self-Certification Form (as described within Subsection 907-700.01.2) on construction projects:

Iron or Steel Products
Construction Materials
Manufactured Products.

Buy America provisions do not apply to excluded materials.

A list of items that must comply with the above listed Buy America requirements and require Buy America Certificate of Conformance may be viewed at www.goMDOT.com under Business Center ➔ Engineering Standards/Guides/Manuals ➔ Construction Materials.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-107-2 **CODE: (SP)**

DATE: **01/31/2018**

SUBJECT: **Contractor's Erosion Control Plan**

Section 107, Legal Relations and Responsibility to Public, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-107.22--Environmental Protection.

907-107.22.1--Contractor's Erosion Control Plan (ECP). After the first sentence of the first paragraph of Subsection 107.22.1 on page 63, add the following.

The ECP shall be submitted electronically to the Project Engineer who will forward it to the appropriate MDOT Divisions.

Delete the example Narrative in Subsection 107.22.1 on page 65, and substitute the following.

EXAMPLE
MISSISSIPPI DEPARTMENT OF TRANSPORTATION
Storm Water Pollution Prevention Plan (SWPPP)
Narrative

General Permit Coverage No: MSR_____
Project Number: _____
County: _____
Route: _____

SITE INFORMATION

This project consists of grading and installing drainage structures necessary to construct approximately 6 miles of parallel lanes on SR 31 between the Hinds County Line and the Rankin County Line.

SEDIMENT AND EROSION CONTROLS

a) Vegetative Controls: Clearing and grubbing areas will be minimized to comply with the buffer zones (minimum of 15 feet along the ROW lines and 5 feet along creeks) as per the contract documents. A combination of temporary and permanent grassing will be used to protect slopes as construction progresses. **Should a disturbed area be left undisturbed for 14 days or more, placement of temporary BMPs (seeding & mulching, silt fences, basins, ditch checks, slope drains, etc.) or permanent erosion control measures (seeding & mulching, riprap, paved ditch, flumes, etc.) will be initiated by the next working day after the land disturbing activities have stopped.**

b) Structural Controls: Gravel construction entrance/exit will be installed near Stations 145+50, 159+50, 164+50 & 172+50. Riprap ditch checks will be constructed at Stations 144+50, 151+75, 162+00 & 166+25. The Concrete washout area will be at Stations 140+25, 152+00 & 168+50.

c) Housekeeping Practices: Structural BMPs will be cleaned out when sediment reaches 1/3 to 1/2 of the height of the BMP. Maintenance and repair of equipment will be performed off-site, material wash out will occur either off-site or within designated wash out areas.

d) Post-Construction Control Measures: As construction is completed, permanent vegetative growth will be established on disturbed soils to improve soil stability and provide a buffer zone for loose material. Paved ditches and flumes will be placed as specified in the ECP to reduce erosion in concentrated flow areas and rip rap will be placed as specified to dissipate flow energy and reduce flow velocity.

IMPLEMENTATION SEQUENCE

Perimeter controls will be installed first. Clearing and grubbing will be performed in 19-acre sections beginning at the BOP and temporary grassing will be installed as needed. Temporary erosion control BMPs will be installed at the drainage structures prior/during construction of the drainage structures. Grading activities will commence at the BOP and proceed towards the EOP, fill slopes will be permanently grassed in stages for fill heights that exceed 5 feet. Base materials will be installed on completed grading sections with the paving to follow.

MAINTENANCE PLAN

All erosion and sediment control practices will be checked for stability and operation following every rainfall but in no case less than once every week. Any needed repairs will be made immediately to maintain all practices as designed. Sediment basins will be cleaned out when the level of sediment reaches 2.0 feet below the top of the riser. Sediment will be removed from the front/upstream end of the BMPs when it becomes about 1/3 to 1/2 height of BMP.

_____ _____
Prime Contractor's Signature Date

_____ _____
Printed Name Title

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-108-4 **CODE: (SP)**

DATE: 10/07/2020

SUBJECT: Subletting of Contract

Section 108, Prosecution and Progress, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-108.01--Subletting of Contract.

907-108.01.1--General. Delete the third sentence of the tenth paragraph of Subsection 108.01.1 on the bottom of page 72.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-108-6 **CODE: (SP)**

DATE: 03/11/2025

SUBJECT: Default and Termination of Contract

Section 108, Prosecution and Progress, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-108.08--Default and Termination of Contract. At the end of the Subsection 108.08 on page 85, add the following.

907-108.08.1--Debarment of Contractor. If the Contractor is declared to be in default under this Subsection and the Contract terminated for the reason(s) indicated in Subsections 108.08 (d), (f), or (g) above, the Commission may, in its discretion and in addition to default and termination, declare the Contractor to be debarred from bidding on any other projects for a period of one (1) year from the date of the termination letter. If the debarred Contractor has multiple on-going Contracts with the Commission and receives a one (1) year debarment, the on-going Contract(s) may continue; however, the Contractor will not be allowed to bid another project until one (1) year has passed from date of the termination letter.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-109-5 **CODE: (IS)**

DATE: 11/14/2023

SUBJECT: Measurement and Payment

Section 109, Measurement and Payment, of the 2017 Edition of the Mississippi StandardSpecifications for Road and Bridge Construction is hereby amended as follows.

907-109.01--Measurement of Quantities. Delete the sixth full paragraph of Subsection 109.01on page 88, and substitute the following.

If appropriate based on the specific circumstances of the project, the Contractor may request that material specified to be measured by the cubic yard or ton be converted to the other measure. The Contractor must submit this request to the Engineer. The Engineer will provide an approval or denial in writing. The decision is in the sole discretion of the Engineer. If approved, factors for this conversion will be determined by the District Materials Engineer and agreed to by the Contractor. The conversion of the materials along with the conversion factor will be incorporated into the Contract by supplemental agreement. The supplemental agreement must be executed before such method of measurement is used.

907-109.04--Extra Work.

907-109.04.1--Supplemental Agreement. Delete the second paragraph of Subsection 109.04.1 on page 90.

907-109.04.2--Force Account Agreement. Delete the last sentence of subparagraph (c) in Subsection 109.04.2 on page 91, and substitute the following.

An amount will be added equal to fifteen percent (15%) of the sum thereof, excluding sales tax.

Delete subparagraph (d) in Subsection 109.04.2 on pages 91 & 92, and substitute the following.

(d) **Equipment.** Equipment used for force account work shall be of sufficient size and type necessary to perform the required work in an economic and expeditious manner. The Contractor must provide the manufacturer, make, model, year, type of fuel and other necessary information to determine proper hourly payment rates. Subject to advance approval of the Engineer, actual transportation cost for a distance of not more than 200 miles will be reimbursed for equipment not already on the project.

For equipment authorized by the Engineer for use on the force account work, the Engineer will use the equipment rental rates from the "*Rental Rate Blue Book*" as published on the Equipment Watch website www.equipmentwatch.com for the time period the force account work is authorized to determine payment to the Contractor. The maximum allowable rates

are determined as follows:

1. The hourly equipment rate will equal the FHWA total hourly rate. This rate takes into account adjustment factors for age and region.
2. The hourly estimated operating costs have been included in the FHWA total hourly rate.
3. The idle and standby rates shall be as listed in the "*Rental Rate Blue Book*" as reported by *Equipment Watch*.
4. These rates include the basic machine plus any necessary attachments.

Standby rates shall apply when equipment is not in operation and is approved by the Engineer to standby for later use to complete the work. Idle rates shall apply to equipment located on the project and the engine is burning fuel but no ground engaging or other components are actively engaged in meaningful work. In general, idle or standby rates shall apply when equipment is not in use, but will be needed again to complete the work and the cost of moving the equipment will exceed the accumulated standby cost. If the idle standby cost should exceed the equipment moving cost to or from the work site, the Contractor will be entitled to the moving cost only. Idle or standby rates will be used under the following conditions:

1. The equipment is totally dedicated to the force account work and not used intermittently on other work.
2. Idle or standby cost will be considered only after equipment has been operated on force account work.
3. The sum of idle or standby time and operating time shall not exceed eight (8) hours per day or 40 hours in a week.
4. Idle or standby payment will not apply to days not normally considered to be work days such as holidays, weekends, or days of inclement weather when no other work is taking place.

The Department will not pay for idle or standby time when equipment is inoperable, for time spent repairing equipment, or for the time elapsed after the Engineer has advised the Contractor that the equipment is no longer needed. The Department will determine if it will be more cost effective to pay standby time on approved equipment on site or for multiple mobilizations.

If equipment is needed, which is not included in the *Rental Rate Blue Book* as reported by *Equipment Watch*, the Department and Contractor will agree upon reasonable rental rates in writing before the equipment is used.

All equipment shall be subject to approval from day to day in accordance with the requirements of Subsection 108.05.

907-109.06--Partial Payment.

907-109.06.2--Advancement on Materials.
Delete the next to last paragraph of Subsection 109.06.2 on page 95, and substitute the following.

Materials for which an advanced payment has been allowed must be paid for by the Contractor within 30 days of the estimate on which the advanced payment was first allowed and proof of said payment must be verified by the supplier. If proof of payment is not furnished within the allowable 30 days, the advanced payment will be deducted on subsequent current estimates until such time that proof of payment is furnished.

907-109.07--Changes in Material Costs. After the fifth paragraph of Subsection 109.07 on page 96, change the web address to the following.

https://mdot.ms.gov/portal/current_letting

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-234-1 **CODE: (SP)**

DATE: 10/13/2021

SUBJECT: Silt Fence

Section 234, Silt Fence, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-234.02--Materials. Delete the first paragraph of Subsection 234.02 on page 181, and substitute the following.

Materials used in silt fence and super silt fence may be accepted by certification per Subsection 700.05.1. Geotextile fabric, posts, staples and woven wire backing, when required, shall meet the requirements of Subsection 714.13.

907-234.05--Basis of Payment. Add the "907" prefix to the pay items listed on page 183.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-240-2 **CODE: (SP)**

DATE: 10/25/2022

SUBJECT: Interlocking Flexible Block Erosion Control System

Section 907-240, Interlocking Flexible Block Erosion Control System, is hereby added to and made a part of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-240 -- INTERLOCKING FLEXIBLE BLOCK EROSION CONTROL SYSTEM

907-240.01--Description. This work consists of installing a cellular concrete interlocking erosion control grid system in accordance with the requirements of this specification and to the line, grade and dimensions shown on the plans, or as directed by the Engineer.

907-240.02--Materials. The erosion control system shall be a multi-directional, positive-interlocking type mat and, when installed, shall exhibit the ability to expand and contract with the underlying terrain.

The erosion control system shall be one of the following, or an approved equal.

Armorflex	**UltraLok**	**Shoreblock SD**
by: Armortec	by: Submar	by: Shoretec
www.armortec.com	www.submar.com	www.shoretec.com

Any product submitted for approval as an equal to one of the above products shall be submitted at least forty five (45) days prior to use.

The geotextile shall be Type V meeting the requirements of Subsection 714.13.

907-240.03--Construction Requirements. Areas on which geotextile and the erosion control system are to be placed shall be constructed to the lines and grades shown on the plans. Where such areas are below the allowable grade, it shall be brought to grade by placing layers not to exceed eight inches (8") of selected material and compacted as directed by the Engineer. All obstructions such as, but not limited to, roots, lumps and projecting objects shall be removed and any resulting voids filled to the satisfaction of the Engineer

907-240.03.1--Geotextile. The geotextile shall be placed loosely without wrinkles or creases with the long dimension perpendicular to the channel. The strips shall be placed to provide a minimum overlap of two feet (2'). Securing pins shall be inserted through both strips of overlapped geotextile at mid-point and not greater than 2-foot intervals. Additional pins shall be installed throughout the geotextile as necessary to prevent any slippage. The geotextile shall be placed so

that the upstream strip overlaps the downstream strip and the higher slope strip overlaps the lower strip. Each securing pin shall be pushed through the geotextile until the washer bears against the geotextile and secures it firmly.

The geotextile shall be protected from contamination and damage during installation and placement of the erosion control system. Contaminated geotextile shall be replaced, and damaged geotextile shall be repaired or replaced as directed at no cost to the Department.

The geotextile shall be covered with a layer of the specified material within 14 calendar days after placement. Geotextile not covered within this time period shall be removed and replaced at the Contractor's expense if damage or deterioration is evident, as determined by the Engineer.

907-240.03.2--Erosion Control System. The erosion control system shall be placed within the limits shown on the plans. The erosion control system shall be placed individually on the geotextile in such a manner as to produce a continually interlocking surface free from field seams and non-interlocked connections, except as approved by Project Engineer and/or as shown on the plans.

Anchoring trenches, if required, shall be as shown on the plans or recommended by the manufacturer.

Open cell blocks that are below the normal waterline and exhibit an average open area greater than 5%, shall be backfilled with crushed stone as approved by Project Engineer. Open cell blocks that are above the normal waterline shall be backfilled with material approved by Engineer to a minimum depth of 35% of the specified block vertical thickness above the top surfaces.

907-240.04-Method of Measurement. Interlocking flexible block erosion control system will be measured by the square yard of surface area covered.

No separate measurement will be made for geotextile or backfilling the erosion control system.

907-240.05--Basis of Payment. Interlocking flexible block erosion control system, measured as prescribed above, will be paid for at the contract unit price per square yard, which price shall be full compensation for all labor, equipment, furnishing and placing the erosion control system, backfilling geotextile, pins, lapping, sewing, maintaining the geotextile until covered, and incidentals required to satisfactorily completing the work.

Payment will be made under:

907-240-A: Interlocking Flexible Block Erosion Control System - per square yard

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-242-14 **CODE: (SP)**

DATE: 02/25/2026

SUBJECT: Jackson County Welcome Center

PROJECT: STBG-0010-01(180) / 109171301 -- Jackson County

Section 907-242-14 Jackson County Welcome Center, is hereby added to and made a part of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-242 14 – JACKSON COUNTY WELCOME CENTER

The following specifications are to be used only for the construction of the Jackson County Welcome Center. The Mississippi Standard Specifications for Road and Bridge Construction shall be used for all other items of work.

DOCUMENT 00 01 07 SEALS PAGE

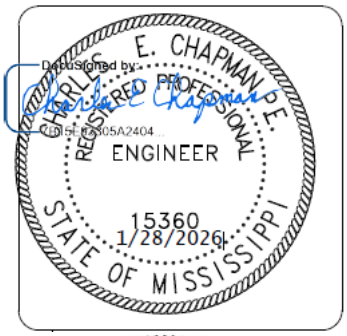
Architectural
EGH Architects
1091 Tommy Munro Drive
Biloxi, MS 39532
(228) 594-2323



Civil
Neel-Schaffer, Inc.
4450 Old Canton Rd, Suite 100
Jackson, MS 39211
(601) 948-3071



Structural
Live Oak Engineering
955-B Howard Avenue
Biloxi, NS 39530
(228) 207-0070



Plumbing / Mechanical
ICT – A Salas O'Brien Company
104 East Cherokee Street
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Electrical
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PROJECT MANUAL TABLE OF CONTENTS

PROJECT: I-10 JACKSON COUNTY WELCOME CENTER
JACKSON COUNTY, MISSISSIPPI

PROJECT NUMBER: STBG-0010-01(180)

PROCUREMENT AND CONTRACTING REQUIREMENTS GROUP

Division 0 – General Information

Section 00 01 07 – Seals Page
Section 00 01 10 – Table of Contents
Section 00 01 15 – List of Drawing Sheets

Division 0 – Bidding Requirements

Section 00 21 13 – Instructions to Bidders
Section 00 22 13 – Supplementary Instructions to Bidders
Section 00 25 13 – Pre-Bid Meetings
Section 00 31 32 – Geotechnical Data
- Geotechnical Report

Division 0 – Contracting Requirements

Section 00 72 00 – AIA Document A201 – 2007 General Conditions
Section 00 91 13 – Addenda

SPECIFICATIONS GROUP
GENERAL REQUIREMENTS SUBGROUP

Division 1 – General Requirements

Section 01 10 00 – Summary
Section 01 21 00 – Allowances
Section 01 25 00 – Substitution Procedures
Section 01 26 00 – Contract Modification Procedures
Section 01 29 00 – Payment Procedures
Section 01 31 00 – Project Management and Coordination
Section 01 31 23 – Project Website
Section 01 32 00 – Construction Progress Documentation
Section 01 32 33 – Photographic Documentation
Section 01 33 00 – Submittal Procedures
Section 01 33 00.1 – Domestic Materials – Self Certification Form AASHTO
Section 01 40 00 – Quality Requirements
Section 01 42 00 – References
Section 01 43 39 – Mockup Requirements
Section 01 45 10 – Construction Quality Control
Section 01 45 29 – Testing Laboratory Services

Section 01 50 00 – Temporary Facilities and Controls
Section 01 60 00 – Product Requirements
Section 01 73 00 – Execution
Section 01 74 19 – Construction Waste Management and Disposal
Section 01 77 00 – Closeout Procedures
Section 01 78 23 – Operation and Maintenance Data
Section 01 78 39 – Project Record Documents
Section 01 91 13 – Commissioning

Division 2 – Site Construction

- Refer to MDOT Standard Specifications and Special Provisions Contained Elsewhere in this Contract.

Division 3 – Concrete

Section 03 12 10 – Formliners for Architectural Concrete
Section 03 30 00 – Cast-in-Place Concrete
Section 03 31 26 – Self-Consolidating Concrete (SCC)

Division 4 – Masonry

Section 04 22 00 – Concrete Unit Masonry
Section 04 22 23 – Architectural Unit Masonry
Section 04 72 00 – Cast Stone Masonry

Division 5 – Metals

Section 05 12 00 – Structural Steel Framing
Section 05 31 00 – Steel Decking
Section 05 41 00 – Cold Formed Steel Stud Framing
Section 05 50 00 – Metal Fabrications
Section 05 73 00 – Decorative Metal Railings

Division 6 – Wood and Plastics

Section 06 06 60 – Translucent Resin Panel System
Section 06 10 00 – Rough Carpentry
Section 06 17 13 – Glue Laminated Construction
Section 06 17 19 – Cross Laminated Timber Decking
Section 06 20 23 – Interior Finish Carpentry
Section 06 30 23 – Wood Veneer Faced Panels
Section 06 40 23 – Interior Architectural Woodwork

Division 7 – Thermal and Moisture Protection

Section 07 14 30 – Liquid Applied Waterproofing
Section 07 19 00 – Water Repellents
Section 07 21 00 – Thermal Insulation
Section 07 23 00 – Spray Applied Insulation
Section 07 26 00 – Vapor Retarders
Section 07 41 13 – Standing Seam Metal Roof Panels
Section 07 42 00 – Aluminum Composite Wall Panels
Section 07 62 00 – Sheet Metal Flashing and Trim
Section 07 92 00 – Joint Sealants

Division 8 – Openings
- Section 08 11 13 – Hollow Metal Doors and Frames
- Section 08 14 13 – Painted Flush Wood Doors
- Section 08 31 00 – Access Doors and Panels
- Section 08 36 00 – Sectional Overhead Doors
- Section 08 41 13 – Aluminum Framed Entrances and Storefronts
- Section 08 71 00 – Door Hardware
- Section 08 80 00 – Glazing
- Section 08 90 00 – Cantilevered Sunshades
- Section 08 91 00 - Louvers

Division 9 – Finishes
- Section 09 22 16 – Non-Structural Metal Framing
- Section 09 29 00 – Gypsum Board
- Section 09 30 00 – Tiling
- Section 09 51 13 – Acoustical Panel Ceilings
- Section 09 65 10 – Resilient Tile Flooring
- Section 09 66 23 – Epoxy Terrazzo
- Section 09 68 13 – Carpeting
- Section 09 72 00 – Digitally Printed Wall Cladding
- Section 09 80 13 – Acoustical Treatment
- Section 09 90 00 – Painting and Coating
- Section 09 96 00 – High Performance Coatings
- Section 09 96 53 – Elastomeric Coatings
- Section 09 97 23 – Concrete Sealer

Division 10 – Specialties
- Section 10 11 00 – Visual Display Boards
- Section 10 14 00 – Signage and Graphics
- Section 10 21 13 – Phenolic Toilet Compartments
- Section 10 28 00 – Toilet and Bath Accessories
- Section 10 30 00 – Passive Wall Ventilation Accessories
- Section 10 44 13 – Fire Extinguisher Cabinets
- Section 10 75 00 – Flagpoles
- Section 10 82 11 – Architectural Coiled Wire Grilles and Screens

Division 11 – Equipment
- Section 11 40 00 – Food Service Equipment

Division 12 – Furnishings
- Section 12 48 00 – Entrance Floor Grilles
- Section 12 49 40 – Roller Shades
- Section 12 50 00 – Furniture
- Section 12 93 00 – Site Furnishings

Division 13 – Special Construction
- Section 13 14 22 – Pre Engineered Structures

Division 14 – Conveying Equipment
- *Not a part of these specifications*

Division 21 – Fire Suppression

Section 21 01 00 – Fire Protection General Provisions
Section 21 13 13 – Automatic Sprinkler Systems

Division 22 – Plumbing
Section 22 01 00 – Plumbing General Provisions
Section 22 07 19 – Plumbing Insulation
Section 22 11 16 – Domestic Water Piping and Valves
Section 22 11 19 – Domestic Water Backflow Preventers, Trap Primers, and Shock Absorbers
Section 22 11 23 – Domestic Water Pumps
Section 22 13 16 – Sanitary Waste and Vent Piping
Section 22 13 19 – Sanitary Waste Piping Specialties
Section 22 33 30 – Residential, Storage Electric Domestic Water Heaters
Section 22 33 35 – Water Heater, Electric Instantaneous
Section 22 42 13 – Commercial Plumbing Fixtures

Division 23 – Heating, Ventilating, And Air Conditioning
Section 23 01 00 – General Provisions of HVAC Systems
Section 23 05 13 – Electric Motors
Section 23 05 33 – Electric Heat Tracing
Section 23 05 48 – Vibration Isolation
Section 23 05 49 – Basic Materials and Methods for HVAC
Section 23 05 93 – Testing, Adjusting, and Balancing
Section 23 07 10 – Insulation
Section 23 09 23 – Direct Digital Control Building Automation System (DDC BAS)
Section 23 21 13 – Hydronic Piping
Section 23 21 20 – Hydronic Specialties
Section 23 25 15 – Water Treatment for Closed Hydronic Systems
Section 23 29 23 – Variable Frequency Motor Controllers
Section 23 31 10 – Sheet Metal Ductwork Low Pressure
Section 23 31 11 – Sheet Metal Ductwork Medium Pressure
Section 23 33 10 – Sheet Metal Specialties
Section 23 34 20 – Centrifugal Exhaust Fans
Section 23 34 25 – Propeller Fans
Section 23 34 30 – Ceiling Cabinet Exhaust Fans
Section 23 34 50 – Square Centrifugal In Line Fans
Section 23 64 20 – Packaged Air Cooled Chiller Scroll
Section 23 73 13 – Air Handling Unit Medium or Low Pressure
Section 23 82 40 – Electric Heaters
Section 23 82 42 – Electric Duct Heaters

Division 26 – Electrical
Section 26 01 00 – General Provisions for Electrical Systems
Section 26 05 19 – Conductors 600 Volt and Below
Section 26 05 26 – Grounding and Bonding for Electrical Systems
Section 26 05 29 – Supporting Devices and Hangers
Section 26 05 34 – Raceways and Conduit Systems
Section 26 05 37 – Outlet Boxes
Section 26 05 38 – Pull and Junction Boxes
Section 26 05 45 – Pad Transformer Electric Service
Section 26 05 47 – Seismic Restraint of Electrical Equipment and Suspended Utilities
Section 26 24 16 – Panelboards
Section 26 27 26 – Wiring Devices

Section 26 28 18 – Safety Switches
Section 26 29 13 – Individual Starters and Controls
Section 26 32 13 – Diesel Engine Driven Generator Sets System
Section 26 36 00 – Automatic Transfer Switch
Section 26 41 13 – Lightning Protection
Section 26 43 00 – Surge Protective Devices
Section 26 51 00 – Interior Lighting and Lamps
Section 26 56 00 – Exterior Lighting and Lamps
Section 26 56 10 – Exterior Lighted Bollards

Division 27 – Communication Systems
Section 27 00 00 – General Provisions for Communications Work
Section 27 01 05 – Cable Plant
Section 27 05 26 – Grounding and Bonding for Communications
Section 27 05 28 – Firestopping for Communications
Section 27 10 08 – MATV Antenna Cable System
Section 27 15 00 – Structured Voice and Data Cabling Infrastructure
Section 27 37 00 – Low Voltage Rough In Specifications

Division 28 – Safety & Security Systems
Section 28 31 00 – Fire Alarm System

Division 31 – Earthwork
Section 31 23 22- Excavation and Fill for Structures
Section 31 31 16 – Termite Control
- Refer to MDOT Standard Specifications and Special Provisions Contained Elsewhere in this Contract.

Division 32 – Exterior Improvements
Section 32 31 19 – Ornamental Steel Gate System

Division 33 – Utilities
- Refer to MDOT Standard Specifications and Special Provisions Contained Elsewhere in this Contract.

END OF SECTION

DOCUMENT 00 01 15 LIST OF DRAWING SHEETS

1.01 LIST OF DRAWINGS

A. List of Drawings: Drawings consist of the following Contract Drawings and other drawings of type indicated:

WORKING NUMBER	SHEET NUMBER	DESCRIPTION
TITLE SHEET (1)		
DETAILED INDEX & GENERAL NOTES (5)		
DI-1	2	DETAILED INDEX
DI-2	3	DETAILED INDEX
REV-1	4	REVISIONS
GN-1	5	GENERAL NOTES
GN-2	6	GENERAL NOTES
TYPICAL SECTION SHEETS (4)		
TS-1	7	TYPICAL SECTIONS - ENTRY RAMP, CAR/TRUCK SPLIT, TRAIL ACCESS LANE
TS-2	8	TYPICAL SECTIONS - CAR/TRUCK LANE, CAR PARKING AND UTILITY ROAD
TS-3	9	TYPICAL SECTIONS - TRUCK & BUS LANES AND MAINLINE PARALLEL EXIT RAMP
TS-4	10	TYPICAL SECTIONS - TRUCK/BUS PARKING AREA
QUANTITY SHEETS (12)		
SQ-1	11	SUMMARY OF QUANTITIES
SQ-2	12	SUMMARY OF QUANTITIES
SQ-3	13	SUMMARY OF QUANTITIES
SQ-4	14	SUMMARY OF QUANTITIES
SQ-5	15	SUMMARY OF QUANTITIES
EQ-1	16	ESTIMATED QUANTITIES - REMOVAL ITEMS, HYDRAULIC SUMMARY
EQ-2	17	ESTIMATED QUANTITIES - DRAINAGE STRUCTURES
EQ-3	18	ESTIMATED QUANTITIES - CURB & GUTTER, ISLAND PAVEMENT, CONCRETE SIDEWALK AND PERMANENT EROSION CONTROL
EQ-4	19	ESTIMATED QUANTITIES FOR TRAFFIC CONTROL SIGNS
EQ-5	20	ESTIMATED QUANTITIES FOR TRAFFIC CONTROL, PAVEMENT MARKINGS
EQ-6	21	ESTIMATED QUANTITIES - STANDARD ROADSIDE SIGNS AND DIRECTIONAL SIGN ASSEMBLIES
EQ-7	22	ESTIMATED QUANTITIES - STANDARD ROADSIDE SIGN ASSEMBLIES
PLAN SHEETS (15)		
LAY-1	23	PROJECT SITE LAYOUT - OVERALL
DEMO-1	24	EXISTING CONDITIONS AND DEMOLITION PLAN
DEMO-2	25	EXISTING CONDITIONS AND DEMOLITION PLAN
GRD-1	26	SITE GRADING PLAN
GRD-2	27	SITE GRADING PLAN
PLN-1	28	SITE PLAN - TRAIL-HEAD PARKING ACCESS & ENTRY RAMP FROM TRUCK / CAR PARKING AREAS
PLN-2	29	SITE PLAN - PASSENGER CAR PARKING AREA
PLN-3	30	SITE PLAN - TRUCK / CAR SPLIT-TRAFFIC LANE & MAINLINE PARALLEL EXIT RAMP
PLN-4	31	SITE PLAN - TRUCK PARKING & EMPLOYEE PARKING AREAS

PLN-5	32	SITE PLAN - TRUCK/BUS PARKING AREA
PLN-6	33	SITE PLAN - UTILITY ACCESS ROAD
PLN-7	34	SITE PLAN - INTERIOR SIDEWALK LAYOUT
PLN-8	35	SITE PLAN - PERIMETER FENCE AND TUBULAR STEEL GATE
PLN-9	36	SITE PLAN - DETENTION PONDS
PLN-10	37	SITE PLAN - DETENTION PONDS

PLAN & PROFILE SHEETS (19)

WK-3	38	PLAN AND PROFILE - BASELINE "CAR" - B.O.P. TO STA. 497+00
WK-4	39	PLAN AND PROFILE - BASELINE "CAR" - STA. 497+00 TO E.O.P.
WK-5	40	PLAN AND PROFILE - BASELINE "BUS" - STA. 10+00 TO STA. 24+00
WK-5A	41	DRAINAGE PLAN - BUILDING DOWNSPOUT COLLECTION SYSTEM
WK-6	42	PLAN AND PROFILE - BASELINE "BUS" - STA. 24+00 TO STA. 31+95.54
WK-7	43	PLAN AND PROFILE - BASELINE "TRUCK" - STA. 40+00 TO STA. 54+70.51
WK-8	44	PLAN AND PROFILE - BASELINE "TRUCK-AUX" - STA. 60+00 TO STA. 73+10.34
WK-9	45	PLAN AND PROFILE - BASELINE "TRAIL" - STA. 1+00 TO STA. 8+00 – BASELINE "CAR-AUX" - STA. 1+00 TO STA. 3+39.24
WK-10	46	PLAN AND PROFILE - BASELINE "UTILITY" - STA. 1+00 TO STA. 3+18.38
		FORM GRADE SHEETS (5)
FG-1	47	FORM GRADES - B.O.P. TO E.O.P. FOR "TRAIL", "CAR-AUX" AND "UTILIITY" BASELINE "CAR" - B.O.P. TO STA. 489+13 & BASLINE "BUS" - B.O.P. TO STA. 14+75
FG-2	48	FORM GRADES - BASELINE "CAR" - STA. 489+13 TO E.O.P. – BASLINE "BUS" - STA. 26+00 TO E.O.P.
FG-3	49	FORM GRADES - BASELINE "BUS" - STA. 14+75 TO STA. 20+00 & EMPLOYEE PARKING AREA
FG-4	50	FORM GRADES - BASELINE "BUS" - STA.20+00 TO STA. 26+00 & BUS PARKING AREA
FG-5	51	FORM GRADES - INTERIOR SIDEWALK
		TRAFFIC CONTROL SHEETS (5)
CS-1	52	TRAFFIC CONTROL DETAILS - CONSTRUCTION SIGNING
TC-1	53	TRAFFIC CONTROL PLAN - PHASE I
TC-2	54	TRAFFIC CONTROL PLAN - PHASE 2
TC-3	55	TRAFFIC CONTROL PLAN - PHASE 3
TCD-1	56	TRAFFIC CONTROL DETAILS

EROSION CONTROL PLANS (4)

ECP-3	57	EROSION CONTROL PLAN - BASELINE "CAR" - B.O.P. TO STA. 497+00
ECP-4	58	EROSION CONTROL PLAN - BASELINE "CAR" - STA. 497+00 TO E.O.P.
ECP-5	59	EROSION CONTROL PLAN - BASELINE "TRUCK-AUX" – STA. 60+00 TO STA. 73+10.34
ECP-6	60	EROSION CONTROL PLAN - BASELINE "UTILITY" – STA. 1+00 TO STA. 3+18.38

UTILITY SITE IMPROVEMENTS PLANS (25)

UTIL-1	61	OVERALL UTILITY IMPROVEMENTS LAYOUT
UTIL-2	62	WATER TREATMENT PLANT LAYOUT
UTIL-3	63	WASTE WATER TREATMENT PLANT LAYOUT
UTIL-4	64	WATER WELL DETAIL
UTIL-5	65	GROUND STORAGE TANK, PLAN AND ELEVATION
UTIL-6	66	WATER TREATMENT PLANT BUILDING, PLAN VIEW
UTIL-7	67	WATER TREATMENT PLANT BUILDING, SECTION VIEWS
UTIL-8	68	CHLORINATION SYSTEM DETAILS
UTIL-9	69	HYDROPNEUMATIC TANK DETAILS
UTIL-10	70	WATER MAIN & SERVICES, PLAN & PROFILE, STA. 5+00 TO STA. 16+00
UTIL-11	71	SEWER MAIN "A", PLAN & PROFILE, STA. 5+00 TO STA. 16+00
UTIL-12	72	SEWER MAIN - LATERAL "A-1", PLAN & PROFILE, STA. 4+50 TO STA. 9+50
UTIL-13	73	WASTE WATER TREATMENT PLANT, PLAN AND ELEVATION VIEWS
UTIL-14	74	MISCELLANEOUS UTILITY DETAILS

UTIL-15	75	MISCELLANEOUS UTILITY DETAILS
UTIL-16	76	UTILITY ELECTRICAL - WATER TREATMENT BUILDING – ELECTRICAL SITE PLAN
UTIL-17	77	UTILITY ELECTRICAL - WATER TREATMENT BUILDING - LIGHTING PLAN
UTIL-18	78	UTILITY ELECTRICAL - WATER TREATMENT BUILDING - POWER PLAN
UTIL-19	79	UTILITY ELECTRICAL - WATER TREATMENT BUILDING - GROUNDING PLAN
UTIL-20	80	UTILITY ELECTRICAL - WASTE WATER TREATMENT PLANT - POWER PLAN
UTIL-21	81	UTIILITY ELECTRICAL - MISCELLANEOUS DETAILS
UTIL-22	82	UTIILITY ELECTRICAL - MISCELLANEOUS DETAILS
UTIL-23	83	UTILITY ELECTRICAL - ONE LINE DIAGRAM
UTIL-24	84	UTILITY ELECTRICAL - CONTROL PANEL IN MCC CONTROL SECTION
UTIL-25	85	UTILITY ELECTRICAL - GENERATOR PAD DETAILS

SPECIAL DESIGN SHEETS (17)

CJP-1	86	CONCRETE PAVEMENT JOINT PLAN
CJD-1	87	CONCRETE PAVEMENT JOINT LAYOUT DETAILS
CJD-2	88	CONCRETE PAVEMENT MISCELLANEOUS JOINT DETAILS
RCD-1	89	RAISED CROSSWALK DETAIL
SDCFI-1	90	SPECIAL DESIGN CURB FLUME INLET
MCD-1	91	MISCELLANEOUS CONSTRUCTION DETAILS - ISLANDS
MCD-2	92	MISCELLANEOUS CONSTRUCTION DETAILS – SIDEWALK JOINTS AND FLAGPOLE DETAILS
MCD-3	93	MISCELLANEOUS CONSTRUCTION DETAILS - MAIN ENTRY PLAZA LAYOUT AND FLAGPOLE LAYOUT
MCD-4	94	MISCELLANEOUS CONSTRUCTION DETAILS – MAIN ENTRY PLAZA FOUNDATION, GRADE BEAM AND SLAB
MCD-5	95	MISCELLANEOUS CONSTRUCTION DETAILS – BUILDING ENTRY - WEST PLAZA
MCD-6	96	MISCELLANEOUS CONSTRUCTION DETAILS – BUILDING ENTRY - EAST PLAZA
MCD-7	97	MISCELLANEOUS CONSTRUCTION DETAILS – TUBULAR STEEL GATE
MCD-8	98	MISCELLANEOUS CONSTRUCTION DETAILS – DOWNSPOUT CONNECTION TO BUILDING PERIMETER DRAIN SYSTEM
TSS-1	99	SIGN SUPPORT HARDWARE - 2.0" SQUARE POST
TSS-2	100	SIGN SUPPORT HARDWARE - 2.5" SQUARE POST
TSS-3	101	SIGN SUPPORT HARDWARE - 4" SQUARE POST (SINGLE POST)
TSS-4	102	SIGN SUPPORT HARDWARE - 4" SQUARE POST (DUAL POST)

PAVEMENT MARKING DETAILS (5)

PMD-1	103	PAVEMENT MARKING DETAILS - TRAIL-HEAD PARKING ACCESS & ENTRY RAMP FROM TRUCK / CAR PARKING AREAS
PMD-2	104	PAVEMENT MARKING DETAILS - PASSENGER CAR PARKING AREA
PMD-3	105	PAVEMENT MARKING DETAILS - TRUCK / CAR TRAFFIC LANE SPLIT & MAINLINE PARALLEL EXIT RAMP
PMD-4	106	PAVEMENT MARKING DETAILS – TRUCK PARKING & EMPLOYEE PARKING AREAS
PMD-5	107	PAVEMENT MARKING DETAILS - TRUCK / BUS PARKING AREA

PERMANENT SIGNING PLANS (8)

PSP-1	1001	PERMANENT SIGNING PLAN - TRAILHEAD PARKING ACCESS & ENTRY RAMP FROM TRUCK / CAR PARKING AREAS
PSP-2	1002	PERMANENT SIGNING PLAN - PASSENGER CAR PARKING AREA & TRUCK / CAR TRAFFIC LANE SPLIT
PSP-3	1003	PERMANENT SIGNING PLAN - TRUCK / CAR TRAFFIC LANE SPLIT & MAINLINE PARALLEL EXIT RAMP
PSP-4	1004	PERMANENT SIGNING PLAN - TRUCK PARKING AND EMPLOYEE PARKING AREAS

PSP-5	1005	PERMANENT SIGNING PLAN - TRUCK / BUS PARKING AREA
PSD-1	1006	PERMANENT SIGNING DETAILS
PSD-2	1007	PERMANENT SIGNING DETAILS
PSD-3	1008	PERMANENT SIGNING DETAILS

LANDSCAPE AND IRRIGATION PLANS (12)

LS-1	5001	LANDSCAPE PLAN
LS-2	5002	LANDSCAPE PLAN
LS-3	5003	LANDSCAPE PLAN
LS-4	5004	LANDSCAPE PLAN
LS-5	5005	LANDSCAPE PLAN
LS-6	5006	LANDSCAPE PLAN
LD-1	5007	LANDSCAPE DETAILS
VS-1	5008	VEGETATION SCHEDULE
IRR-1	5009	IRRIGATION PLAN
IRR-2	5010	IRRIGATION PLAN
IRR-3	5011	IRRIGATION PLAN, INSET A
IRR-4	5012	IRRIGATION DETAILS AND SCHEDULE

STANDARD DRAWINGS (38)

CIP-1	6011	CONCRETE ISLAND PAVEMENT DETAILS
PM-4	6054	PAVEMENT MARKING DETAILS FOR INTERCHANGE EXIT RAMPS (PARALLEL & TAPER)
PM-6	6056	PAVEMENT MARKING LEGEND DETAILS
ECD-1	6101	TYPICAL TEMPORARY EROSION / SEDIMENT CONTROL APPLICATIONS
ECD-2	6102	DETAILS OF SEDIMENT BARRIER APPLICATIONS
ECD-3	6103	DETAILS OF SILT FENCE INSTALLATION
ECD-6	6106	DETAILS OF EROSION CONTROL WATTLE DITCH CHECK
ECD-11	6111	TYPICAL APPLICATIONS AND DETAILS FOR INLET CONSTRUCTION
ECD-13	6113	INLET PROTECTION DETAILS OF WATTLES
ECD-15	6115	INLET PROTECTION DETAILS OF SANDBAGS
ECD-16	6116	STABILIZED CONSTRUCTION ENTRANCE
DT-1	6123	DETAILS OF TYPICAL DITCH TREATMENTS
CL-1	6184	FENCE: CHAIN LINK CLASS I
CL-2	6185	FENCE: CHAIN LINK CLASS II
CLG-1	6191	FENCE: CHAIN LINK GATE
CMB-3	6226	CONCRETE MEDIAN BARRIER (PRECAST) (32")
SN-1	6301	STANDARD DIRECTIONAL (GUIDE) SIGNS
SN-3	6303	STANDARD ROADSIDE SIGNS
SN-3A	6304	STANDARD ROADSIDE SIGNS
SN-4	6306	STANDARD ROADSIDE SIGN ASSEMBLY AND INSTALLATION
SN-5	6309	TYPICAL INSTALLATION OF GROUND MOUNTED DIRECTIONAL SIGNS
TCP-4	6354	TRAFFIC CONTROL PLAN FOR POSTED SPEED LIMIT OF 65 OR 70 MPH (INTERSTATES AND OTHER 4-LANE DIVIDED HIGHWAYS)(MEDIAN LANE OR OUTSIDE LANE CLOSURE)(EXTENDED PERIOD)
TCP-8	6358	HIGHWAY SIGN AND BARRICADE DETAILS FOR CONSTRUCTION PROJECTS
TCP-16	6366	TRAFFIC CONTROL DETAILS DRUM PLACEMENT AND SHOULDER CLOSURE
IR-1A	6416	INTERCHANGE DESIGN FOR HIGH-SPEED PARALLEL EXIT RAMP
SD-1	6419	DRIVEWAYS, CURB & GUTTER, & SIDEWALK
SD-2	6420	DRIVEWAYS, CURB & GUTTER, & SIDEWALK
CR-1	6421	CURB RAMPS RAMP DESIGN ELEMENTS
CR-2	6422	CURB RAMPS PLACEMENT DETAILS
CR-3	6423	CURB RAMPS PLACEMENT DETAILS
CR-4	6424	CURB RAMPS DETECTABLE WARNING DETAILS
PF-1	6426	DETAILS OF PAVED FLUMES
PI-2	6502	FLEXIBLE PIPE CULVERT INSTALLATION
PA-1	6520	PAVED INLET APRON AND MEDIAN DITCH PLUG
SS-2	6524	STORM SEWER INLET TYPE SS-2
B-9	6527	DROP INLET AND GRATE DETAILS FOR PIPE AND BOX CULVERTS

FE-1	6530	FLARED END SECTION FOR CONCRETE PIPE
FE-1A	6531	FLARED END SECTION FOR CONCRETE ARCH PIPE

INDEX – GENERAL (9)

G000	8000	COVER
G001	8001	DRAWINGS INDEX & PROJECT INFORMATION
G002	8002	ADA DIAGRAMS
G003	8003	GENERAL NOTES
G004	8004	PARTITION TYPES
G005	8005	PARTITION TYPES
G006	8006	EXTERIOR RENDERINGS
G007	8007	EXTERIOR RENDERINGS
G008	8008	INTERIOR RENDERINGS

INDEX – LIFE SAFETY (2)

LS100	8100	LIFE SAFETY INFORMATION
LS101	8101	LIFE SAFETY FLOOR PLAN

INDEX – STRUCTURAL (26)

S000	8200	GENERAL NOTES
S001	8201	GENERAL NOTES
S002	8202	C&C DIAGRAMS
S101	8203	FOUNDATION PLAN
S102	8204	LOW ROOF FRAMING PLAN
S103	8205	HIGH ROOF FRAMING PLAN
S201	8206	TYPICAL DETAILS
S202	8207	TYPICAL DETAILS
S203	8208	TYPICAL DETAILS
S204	8209	TYPICAL DETAILS
S301	8210	SHEAR WALL ELEVATIONS
S302	8211	SHEAR WALL ELEVATIONS
S303	8212	SHEAR WALL ELEVATIONS
S304	8213	SHEAR WALL ELEVATIONS
S310	8214	TRUSS ELEVATIONS
S311	8215	TRUSS CONNECTION DETAILS
S312	8216	TRUSS CONNECTION DETAILS
S320	8217	CONCRETE COLUMN
S401	8218	FOUNDATION SECTIONS
S410	8219	FRAMING SECTIONS
S411	8220	FRAMING SECTIONS
S412	8221	FRAMING SECTIONS
S420	8222	FRAMING SECTIONS
S500	8223	PEMB BLDG PLANS AND SECTIONS
S600	8224	PAVILION PLAN AND SECTIONS
S601	8225	2-BAY PAVILION PLAN AND SECTIONS

INDEX – ARCHITECTURAL (58)

A001	8300	ARCHITECTURAL SITE PLAN
A002	8301	SITE DETAILS
A050	8302	STORAGE BUILDING FLOOR PLAN
A051	8303	STORAGE BUILDING EXTERIOR ELEVATIONS
A052	8304	STORAGE BUILDING SECTIONS
A060	8305	PAVILIONS - SITE FLOOR PLAN
A061	8306	PAVILIONS - ELEVATIONS / SECTIONS
A100	8307	FLOOR PLAN - GROUND LEVEL - INFORMATIONAL
A101	8308	FLOOR PLAN - GROUND LEVEL - DIMENSIONAL
A102	8309	CLERESTORY PLAN

A120	8310	1ST FLOOR RCP
A130	8311	ROOF PLAN
A131	8312	ROOF DETAILS
A190	8313	COORDINATION DIAGRAMS - CEILING SYSTEMS
A191	8314	COORDINATION DIAGRAMS - ELEVATIONS
A192	8315	COORDINATION DIAGRAMS - ELEVATIONS
A200	8316	ELEVATIONS
A201	8317	COURTYARD ELEVATIONS
A300	8318	BUILDING SECTIONS
A301	8319	BUILDING SECTIONS
A302	8320	BUILDING SECTIONS
A303	8321	BUILDING SECTIONS
A304	8322	BUILDING SECTIONS
A340	8323	WALL SECTIONS
A341	8324	WALL SECTIONS
A342	8325	WALL SECTIONS
A343	8326	WALL SECTIONS
A344	8327	WALL SECTIONS
A345	8328	WALL SECTIONS
A346	8329	WALL SECTIONS
A347	8330	WALL SECTIONS
A348	8331	WALL SECTIONS
A349	8332	WALL SECTIONS
A400	8333	ENLARGED PLANS
A401	8334	ENLARGED PLANS
A402	8335	ENLARGED PLANS
A500	8336	SECTION DETAILS
A501	8337	SECTION DETAILS
A502	8338	SECTION DETAILS
A503	8339	SECTION DETAILS
A504	8340	SECTION DETAILS
A505	8341	SECTION DETAILS
A506	8342	SECTION DETAILS
A507	8343	SECTION DETAILS
A510	8344	PLAN DETAILS
A511	8345	PLAN DETAILS
A512	8346	PLAN DETAILS
A513	8347	PLAN DETAILS
A520	8348	CEILING DETAILS
A600	8349	OPENING SCHEDULE
A601	8350	FRAME TYPES
A602	8351	FRAME TYPES
A610	8352	OPENING DETAILS
A611	8353	OPENING DETAILS
A612	8354	OPENING DETAILS
A613	8355	OPENING DETAILS
A614	8356	OPENING DETAILS
A615	8357	OPENING DETAILS

INDEX – INTERIORS (19)

I100	8400	OVERALL FINISH PLAN
I101	8401	ENLARGED FINISH PLAN
I102	8402	ENLARGED FINISH PLAN
I103	8403	ENLARGED FINISH PLANS
I106	8404	TERRAZZO PLAN
I107	8405	TERRAZZO DETAILS
I200	8406	INTERIOR ELEVATIONS
I201	8407	INTERIOR ELEVATIONS
I202	8408	INTERIOR ELEVATIONS

I203	8409	INTERIOR ELEVATIONS
I400	8410	MILLWORK PLANS, ELEVATIONS, SECTIONS
I401	8411	MILLWORK PLANS, ELEVATIONS, SECTIONS
I402	8412	MILLWORK PLANS, ELEVATIONS, SECTIONS
I403	8413	MILLWORK PLANS, ELEVATIONS, SECTIONS
I404	8414	MILLWORK PLANS, ELEVATIONS, SECTIONS
I405	8415	MILLWORK PLANS, ELEVATIONS, SECTIONS
I406	8416	MILLWORK PLANS, ELEVATIONS, SECTIONS
I500	8417	FINISH KEY / SCHEDULES
I600	8418	FURNITURE, EQUIPMENT & EXHIBIT PLAN

INDEX - FIRE PROTECTION (4)

FP000	8500	LEGENDS - FIRE PROTECTION
FP100	8501	FLOOR PLAN - FIRE PROTECTION
FP200	8502	DETAILS - FIRE PROTECTION
FP201	8503	DETAILS - FIRE PROTECTION

INDEX – PLUMBING (13)

P000	8600	LEGENDS - PLUMBING
P001	8601	SITE PLAN - PLUMBING
P100	8602	FLOOR PLAN - PLUMBING
P101	8603	STORAGE BUILDING FLOOR PLAN - PLUMBING
P200	8604	UNDERGROUND PLAN - SANITARY
P300	8605	FLOOR PLAN - SANITARY
P330	8606	ROOF PLAN - SANITARY
P400	8607	RISER - PLUMBING
P401	8608	RISER - SANITARY
P500	8609	DETAILS - PLUMBING
P501	8610	DETAILS - PLUMBING
P502	8611	DETAILS - PLUMBING
P600	8612	SCHEDULES - PLUMBING

INDEX – MECHANICAL (18)

M000	8700	MECHANICAL LEGENDS
M100	8701	FLOOR PLAN - HVAC
M101	8702	STORAGE BUILDING FLOORPLAN - HVAC
M130	8703	ROOF PLAN - HVAC
M200	8704	FLOOR PLAN - HVAC PIPING
M201	8705	STORAGE BUILDING FLOOR PLAN – HVAC PIPING
M300	8706	ENLARGED PLANS AND SECTIONS - HVAC
M301	8707	ENLARGED PLANS AND SECTIONS - HVAC
M400	8708	MECHANICAL DETAILS
M401	8709	MECHANICAL DETAILS
M402	8710	MECHANICAL DETAILS
M403	8711	MECHANICAL DETAILS
M404	8712	MECHANICAL DETAILS
M500	8713	MECHANICAL SCHEDULES
M501	8714	MECHANICAL SCHEDULES
M600	8715	MECHANICAL CONTROLS
M601	8716	MECHANICAL CONTROLS
M602	8717	MECHANICAL CONTROLS

INDEX – ELECTRICAL (23)

E000	8800	ELECTRICAL LEGENDS
E001	8801	SITE PLAN - ELECTRICAL
E002	8802	PARTIAL SITE PLANS - ELECTRICAL
E003	8803	ELECTRICAL – LIGHTNING PROTECTION

E100	8804	FLOOR PLAN - LIGHTING
E101	8805	CLERESTORY PLAN - LIGHTING
E102	8806	STORAGE BUILDING FLOOR PLANS - ELECTRICAL
E200	8807	FLOOR PLAN - POWER
E230	8808	ROOF PLAN - POWER
E300	8809	FLOOR PLAN - SYSTEMS
E400	8810	ELECTRICAL DETAILS
E401	8811	ELECTRICAL DETAILS
E402	8812	ELECTRICAL - SECTION VIEWS
E403	8813	ELECTRICAL - SECTION VIEWS
E404	8814	ELECTRICAL - SECTION VIEWS
E405	8815	ELECTRICAL - ENLARGED VIEWS
E406	8016	LIGHTNING PROTECTION DETAILS
E407	8017	LIGHTNING PROTECTION DETAILS
E500	8818	ELECTRICAL RISER
E501	8819	ELECTRICAL SCHEDULES
E502	8820	PANEL SCHEDULES
E503	8821	PANEL SCHEDULES
E504	8822	PANEL SCHEDULES

INDEX – TECHNOLOGY (6)

T000	8900	LEGEND - TECHNOLOGY
T101	8901	FLOOR PLAN - TECHNOLOGY
T900	8902	TECHNOLOGY - DETAILS
T901	8903	TECHNOLOGY – DETAILS
T902	8904	TECHNOLOGY DETAILS
T903	8905	TECHNOLOGY DETAILS

EXISTING SITE INFORMATIONAL SHEETS (13)

INFO-1	9001	INFORMATIONAL SHEET - PICNIC SHELTER
INFO-2	9002	INFORMATIONAL SHEET - FOUNDATION PLAN – WELCOME CENTER BUILDING
INFO-3	9003	INFORMATIONAL SHEET - EXTERIOR ELEVATIONS – WELCOME CENTER BUILDING
INFO-4	9004	INFORMATIONAL SHEET - BUILDING CROSS SECTIONS – WELCOME CENTER BUILDING
INFO-5	9005	INFORMATIONAL SHEET - WALL SECTIONS – WELCOME CENTER BUILDING
INFO-6	9006	INFORMATIONAL SHEET - SITE PLAN - WATER & SEWER
INFO-7	9007	INFORMATIONAL SHEET - IRRIGATION SYSTEM
INFO-8	9008	INFORMATIONAL SHEET - MISCELLANEOUS SITE DETAILS
INFO-9	9009	INFORMATIONAL SHEET - ELECTRICAL SITE PLAN
INFO-10	9010	INFORMATIONAL SHEET - SITE LIGHTING FOUNDATION DETAILS
INFO-11	9011	INFORMATIONAL SHEET - PICNIC TABLE & BENCHES - CONCRETE
INFO-12	9012	INFORMATIONAL SHEET - LOW PROFILE INLET AND OUTLET
INFO-13	9013	INFORMATIONAL SHEET - FENCE: CHAIN LINK, CLASS I W/ PICKETS

END OF SECTION

DOCUMENT 00 21 13 INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.01 QUESTIONS

A. Questions Regarding Bidding: Bidders are advised that all questions that arise regarding the contract documents (proposal) or plans on this project shall be directed to the www.gomdot.com current letting webpage. Click on the call number for this project to open an email form to submit your question. Questions must be submitted by 8:00 a.m. on the day prior to the letting. Answers to questions will be posted by 6:00 p.m. on the day prior to the letting. Answers can be viewed by clicking on Q&A link under the Proposal Addenda column.

B. It shall be the Bidders responsibility to familiarize themselves with the questions and answers that have been submitted on this project. Bidders are advised that by signing the contract documents for this project, they agree that the on-line Questions and Answers submitted on this project shall be added to and made part of the official contract.

1.02 BIDDER'S QUALIFICATIONS

A. Prequalification of Bidders: Refer to Mississippi Standard Specifications for Road and Bridge Construction 2017 Edition Section 102 – Bidding Requirements and Conditions, Subsection 102.01 – Prequalification of Bidders.

1.03 NON-RESIDENT BIDDER

A. Consideration of Proposals: Refer to Mississippi Standard Specifications for Road and Bridge Construction 2017 Edition Section 103 – Award and Execution of Contract, Subsection 103.01 – Consideration of Proposal.

1.04 CONDITIONS OF WORK

A. Each Bidder must fully inform themselves of all conditions relating to the construction of the Project and employment of labor thereon. Failure to do so will not relieve a successful Bidder of obligations to furnish all material and labor necessary to carry out the provisions of the Contract. Insofar as possible, the Bidder must employ methods, or means, which will not cause interruption of, or interference with, the work of any other Bidder or Contractor.

1.05 EXAMINATION OF PROPOSAL AND SITE

A. Examination of proposal and Site: Refer to Mississippi Standard Specifications for Road and Bridge Construction 2017 Edition Section 102 – Bidding Requirements and Conditions, Subsection 102.05 – Examination of Plans, Specifications, Special Provisions, Notice to Bidders and Site Work.

B. Attendance of the Pre-Bid Meeting, as referenced in Section 00 25 13 – PRE-BID MEETING, is strongly advised. Failure to visit the site on this day will in no way relieve the successful Bidder from furnishing any materials or performing any work required to complete Work in accordance with the Drawings (Plans) and Project Manual (Proposal) at no additional cost to the Owner.

1.06 LAWS AND REGULATIONS

A. Laws and Regulations: Refer to Mississippi Standard Specifications for Road and Bridge Construction 2017 Edition Section 107 – Legal Relations and Responsibility to Public, Subsection 107.01 – Laws to be Observed.

1.07 BID DOCUMENT

A. The amount for Bid Document (Proposal) is indicated in the advertisement for Bids. Selected plan rooms will be issued one set of documents without charge.

1.08 METHOD OF BIDDING

A. Lump sum, single bids received on a general contract will include general, mechanical and electrical construction (including Pay Items) and work shown on Drawings or specified in the Project Manual (Proposal).

1.09 PROPOSAL FORMS

A. Preparation of Proposal: Refer to Mississippi Standard Specifications for Road and Bridge Construction 2017 Edition Section 102 – Bidding Requirements and Conditions, Subsection 102.06 – Preparation of Proposal.

1.10 TIME OF COMPLETION

A. The Bidder shall agree to commence work on a date specified in a written *NOTICE TO PROCEED* and fully complete the Project within the Contract Time indicated on the Proposal.

1.11 SUBSTITUTIONS

A. No substitutions, qualifications or redefining of the Specification requirements are allowed to be marked on the Proposal Form, unless specifically required by the Bid Documents. Refer to Section 01 25 00 entitled Substitution Procedures which covers procedures after the award of Contract.

1.12 ADDENDA

A. Addenda to the Drawings or Project Manual issued before or during the time of bidding shall be included in the proposal and become a part of the Contract.

B. If the Proposal, Section 905, does not contain acknowledgement of receipt and addition to the Proposal and Contract Documents of all addenda issued prior to opening of bids will be considered irregular and may be rejected.

1.13 BIDDER IDENTIFICATION

A. Signature: The Proposal Form shall be signed, by any individual authorized to enter into a binding agreement for the Business making the bid proposal.

B. Name of Business: The name appearing on the Proposal Form should be complete spelling of bidder's name and address – exact as recorded at the Secretary of State https://corp.sos.ms.gov/corp/portal/c/page/corpBusinessIdSearch/portal.aspx?#clear=1

which should be the same as you applied for at the Mississippi Board of Contractors http://www.msboc.us/

C. Legal Address: The address appearing on the Proposal Form should be the same address exact as recorded at the Secretary of State https://corp.sos.ms.gov/corp/portal/c/page/corpBusinessIdSearch/portal.aspx?#clear=1 which should be the same as you applied for at the Mississippi Board of Contractors http://www.msboc.us/

D. Certificate of Responsibility Number(s): The Certificate of Responsibility Number(s) appearing on the Proposal Form should be the same number appearing in the current Mississippi State Board of Contractors Roster.

1.14 BID SECURITY

A. Proposal Guaranty: Refer to Mississippi Standard Specifications for Road and Bridge Construction 2017 Edition Section 102 – Bidding Requirements and Conditions, Subsection 102.08 – Proposal Guaranty with the exception that the first and second paragraphs in Subsection 102.08 on page 20 should be deleted and substitute:

1. No proposal will be considered unless accompanied by certified check, cashier's check or bid bond, made payable to the State of Mississippi, in an amount of not less than five percent (5%) of the total amount of the proposal offered. The guaranty shall be evidence of good faith that, if awarded the contract, the bidder will execute the contract and give performance and payment contract bond(s) as stipulated in Subsection 103.05.1, 103.05.2, and as required by law.
2. If a bid bond is offered as guaranty, the bond must be made by a Surety acceptable to the Executive Director and signed or countersigned by a Mississippi Agent or Qualified Nonresident Agent and the Bidder. Such bid bond shall also conform to the requirements and conditions stipulated in Subsection 103.05.2, applicable.

1.15 POWER OF ATTORNEY

A. Power of Attorney: Refer to Mississippi Standard Specifications for Road and Bridge Construction 2017 Edition Section 103 – Award and Execution of Contract, Subsection 103.05 – Requirement of Contract Bond.

1.16 SUBMITTAL

A. Delivery of Proposals: Refer to Mississippi Standard Specifications for Road and Bridge Construction 2017 Edition Section 102 – Bidding Requirements and Conditions, Article 102.09 – Delivery of Proposal.

1.17 MODIFICATION TO BID

A. A Bidder may NOT MODIFY the bid prior to the scheduled closing time indicated in the Advertisement for Bids.

1.18 OPENING OF BIDS

A. Public Opening of Proposal: Refer to Mississippi Standard Specifications for Road and Bridge Construction 2017 Edition Section 102 – Bidding Requirements and Conditions, Subsection 102.12 – Public Opening of Proposal.

1.19 IRREGULARITIES

A. Irregular Proposals: Refer to Mississippi Standard Specifications for Road and Bridge Construction 2017 Edition Section 102 – Bidding Requirements and Conditions, Subsection 102.07 – Irregular Proposal. Proposals will be considered irregular and may be rejected for any of the following reasons:

1. If the proposal is on a form other than that furnished by the Department, or if the form is altered or any part thereof is detached except that is allowed.
2. If there are unauthorized additions, conditions or alternate bids, or irregularities of any kind that may tend to make the proposal incomplete, indefinite, or ambiguous as to its meaning.
3. If the bidder adds any provisions reserving the right to accept or reject an award, or to enter into a Contract pursuant to an award.
4. If the proposal, Section 905, does not contain acknowledgement of receipt and addition to the proposal and contract documents of all addenda.
5. Failure to execute required affidavits, certificates, etc., and furnish proposal guaranty.
6. The Commission reserves the right, for any reason, to reject any or all proposals, to waive technicalities or irregularities, or to advertise for newc proposals, and the decision of the Commission to reject any bid or proposal shall not be cause for any liability or damage against the Commission, the Department, or any of its officers or employees.

1.20 PROTEST

A. Any protest must be delivered in writing to the Owner prior to the Award Date.

1.21 ERRORS

A. Any claim of error and request for release from bid must be delivered in writing to the Owner within twenty-four (24) hours after the bid opening. The Bidder shall provide sufficient documentation with the written request clearly proving an error was made.

1.22 AWARD OF CONTRACT

A. Award of Contract: Refer to Mississippi Standard Specifications for Road and Bridge Construction 2017 Edition Section 103 – Award and Execution of Contract, Subsection 103.02 – Award of Contract.

B. Consideration of Proposal: Refer to Mississippi Standard Specifications for Road and Bridge Construction 2017 Edition Section 103 – Award and Execution of Contract, Subsection 103.01 – Consideration of Proposal.

1.23 FAILURE TO ENTER INTO A CONTRACT

A. Failure to Execute Contract: Refer to Mississippi Standard Specifications for Road and Bridge Construction 2017 Edition Section 103 – Award and Execution of Contract, Subsection 103.08 – Failure to Execute Contract.

1.24 SECURITY FOR FAITHFUL PERFORMANCE

A. Requirements of Contract Bonds: Refer to Mississippi Standard Specifications for Road and Bridge Construction 2017 Edition Section 103 – Award and Execution of Contract, Subsection 103.05 – Requirement of Contract Bond.

1.25 BIDDER'S CHECKLIST

A. Proposal Form:

1. Base Bid:
( ) Fill-in the amount of the base bid in numbers.
2. Alternates:
( ) Fill-in each alternates amount in numbers.
3. Certification Form (State Non-Collusion Certificate)
( ) Certification (regarding Non-Collusion, Debarment and Suspension, etc). Form has been executed
4. Acceptance:
( ) Proposal is signed by authorized person.
( ) Name of Business. - complete spelling of bidder's name and address – exact as recorded at the Secretary of State https://corp.sos.ms.gov/corp/portal/c/page/corpBusinessIdSearch/portal.aspx?#clear=1 which should be the same as you applied for at the Mississippi Board of Contractors http://www.msboc.us/
( ) Legal address of the business listed above (at SOS and Contractor's Board).
( ) Correct Certificate of Responsibility Number(s) as it appears in the current Mississippi State Board of Contractors Roster.
5. Certificate of Responsibility Number(s):
( ) Base Bid is under $50,000 and no number is required.
( ) Base Bid is equal to or over $50,000 and number is required.
( ) Joint Venture and *joint venture* number is required.
Or
( ) Joint Venture participants' numbers are required.

B. Bid Security

1. Bid Bond:
( ) Included Bid Bond payable to the STATE OF MISSISSIPPI with Project number identified thereon,
Or
( ) Included Certified Check payable to the STATE OF MISSISSIPPI with Project number identified thereon.
2. Power of Attorney:
( ) Included Power of Attorney.

C. Non-Resident Bidder

1. Preference Law:
( ) Attached a Copy of Non-Resident Bidder's Preference Law.
Or
( ) Attached a Statement.

D. Subcontractors' Name

1. Subcontractor:
( ) List Mechanical, Plumbing, and/or Electrical Subcontractor regardless of cost.
* List name even for under $50,000.
* Fire Protection Sprinkler Contractors do not have to be listed.

* If Mechanical, Plumbing, and/or Electrical Subcontractor is performed by the General Contractor, be sure the General has COR for said discipline.

E. Subcontractors' COR Number

1. Certificate of Responsibility
( ) Certificate of responsibility Number for all listed Sub-Contractors over $50,000.

END OF DOCUMENT

DOCUMENT 00 22 13 SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

1.01 INSTRUCTIONS TO BIDDERS

A. Instructions to Bidders for Project consist of the following:

1.02 WORK IN PROXIMITY OF HIGH VOLTAGE POWER LINES

A. Contractor's Responsibility for Utility Property and Services: Refer to Mississippi Standard Specifications for Road and Bridge Construction 2017 Edition Section 107 – Legal Relations and Responsibility to Public, Subsection 107.18 – Contractor's Responsibility for Utility Property and services.

1.03 PLANT PEST QUARANTINES INFORMATION

A. Quarantine Information: Refer to Mississippi Standard Specifications for Road and Bridge Construction 2017 Edition Section 107 – Legal Relations and Responsibility to Public, Subsection 107.22.7 – Quarantine Information.

1.04 PROMPT PAYMENT

A. General: Refer to Mississippi Standard Specifications for Road and Bridge Construction 2017 Edition Section 108 – Prosecution and Progress, Subsection 108.01.1 – General.

1.05 ALTERATIONS IN BIDDING PROCESS

A. Preparation of Proposal: Refer to Mississippi Standard Specifications for Road and Bridge Construction 2014 Edition Section 102 – Bidding Requirements and Conditions, Subsection 907-102.06 – Preparation of Proposal (as amended).

1.06 CONTRACT TIME

A. Refer to Section 904 – Notice to Bidders (Contract Time) for completion of Contract. Construction Schedule: Refer to Mississippi Standard Specifications for Road and Bridge Construction 2017 Edition [Section 105 – Control of Work, Subsection 105.05 – Cooperation by Contractor and] Section 108 – Prosecution and Progress (as amended).

B. A Construction Schedule as described in Section 01 32 00-Construction Progress Documentation of these Specifications will be required for building construction.

1.07 SUBCONTRACTING

A. The Bidder is specifically advised that any person, firm or other party to whom it proposes to award a subcontract must be acceptable to the Owner. The total allowable subcontract amount shall not exceed **sixty percent (60%) of the Contract Sum,** excluding the value of any "Specialty Items" listed below:

1. Building related Items, Materials, or Systems:

a. Division 3 – Concrete
b. Division 4 – Masonry
c. Division 5 – Metals

d. Division 6 – Wood and Plastics
e. Division 7 – Thermal and Moisture Protection
f. Division 8 – Openings
g. Division 9 – Finishes
h. Division 10 – Specialties
i. Division 11 – Equipment
j. Division 12 – Furnishings
k. Division 13 – Special Construction
l. Division 21 – Fire Suppression
m. Division 22 – Plumbing
n. Division 23 – Heating, Ventilating, and Air Conditioning
o. Division 26 – Electrical
p. Division 27 – Communication Systems
q. Division 28 – Safety & Security Systems
r. Division 31 – Earthwork
s. Division 32 – Exterior Improvements
t. Division 33 – Utilities
u. Picnic Pavilions

2. These items are not to be confused with Division 10 – Specialties of the Specifications.
3. See Notice To Bidders for **Specialty Items** associated with the **Site Improvements** for this Project.

END OF DOCUMENT

DOCUMENT 00 25 13 PREBID MEETING

1.01 PREBID MEETING

A. Owner will conduct a Prebid meeting as indicated below. The meeting date, time, and location will be provided in the Notice to Bidders.

B. Attendance:

1. Prime Bidders: Attendance at Prebid meeting is STRONGLY ADVISED.
2. Subcontractors: Attendance at Prebid meeting is recommended.

C. Agenda: Prebid meeting agenda will include review of topics that may affect proper preparation and submittal of bids, including the following:

1. Procurement and Contracting Requirements:
   a. Advertisement for Bids.
   b. Instructions to Bidders.
   c. Bidder Qualifications.
   d. Bonding.
   e. Insurance.
   f. Bid Security.
   g. Bid Form and Attachments.
   h. Bid Submittal Requirements.
   i. Bid Submittal Checklist.
   j. Notice of Award.
2. Communication during Bidding Period:
   a. Obtaining documents.
   b. Bidder's Requests for Information.
   c. Bidder's Substitution Request/Prior Approval Request.
   d. Addenda.
3. Contracting Requirements:
   a. Agreement.
   b. The General Conditions, including Supplementary Conditions. .
   c. Other Owner requirements.
4. Construction Documents:
   a. Scopes of Work.
   b. Temporary Facilities.
   c. Use of Site.
   d. Work Restrictions.
   e. Alternates, Allowances, and Unit Prices.
   f. Substitutions following award.
5. Separate Contracts:
   a. Work by Owner.
   b. Work of Other Contracts.
6. Schedule:
   a. Project Schedule.
   b. Contract Time.
   c. Liquidated Damages.
   d. Other Bidder Questions.
7. Site/facility visit or walkthrough.
8. Post-Meeting Addendum.

D. Minutes: MDOT will record and distribute meeting minutes to attendees and others known by the issuing office to have received a complete set of Procurement and Contracting Documents. Minutes of meeting are issued as Available Information and do not constitute a modification to the Procurement and Contracting Documents. Modifications to the Procurement and Contracting Documents are issued by written Addendum only.

1. Sign-in Sheet: Minutes will include list of meeting attendees.

END OF DOCUMENT

DOCUMENT 00 31 32 GEOTECHNICAL DATA

1.01 GEOTECHNICAL DATA

A. This Document with its referenced attachments, Proposed I-10 Welcome Center, Project No. STGB-0010-01(180)/109171-101000, Jackson County, Mississippi, prepared by Burns Cooley Dennis, Inc. on January 9, 2024 is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents. Geotechnical Data may also be referred to in the Contract Documents as the “Geotechnical Report” or “Soils Engineering Report”.

B. Because subsurface conditions indicated by the soil borings are a sampling in relation to the entire construction area, and for other reasons, the Owner, the Project Engineer, the Architect, the Architect's consultants, and the firm reporting the subsurface conditions do not warranty the conditions below the depths of the borings or that the strata logged from the borings are necessarily typical of the entire site. Any party using the information described in the soil borings and geotechnical report shall accept full responsibility for its use.

C. All persons intending to provide goods or services in connection with this Work are required to read and understand the referenced document prior to proceeding.

D. In the event of a conflict between the Geotechnical Data and the Construction Documents, notify the Project Engineer in writing of conflict to determine course of action prior to proceeding.

END OF DOCUMENT

BURNS COOLEY DENNIS, INC.

GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

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551 Sunnybrook Road
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Ridgeland, MS 39157
Phone: (601) 856-2332
Fax: (601) 856-3552

January 9, 2024

Ian La Cour, P.E.
Mississippi Department of Transportation
Post Office Box 1850
Jackson, Mississippi 39215-1850

Report No. 220107-9

Geotechnical Exploration
I-10 Welcome Center
Proj. No. STGB-0010-01(180)/109171-101000
Jackson County, Mississippi

Dear Mr. La Cour:

Submitted here is the report of our geotechnical exploration for the above-captioned project. This investigation was authorized on August 15, 2024, through execution of MDOT Work Assignment No. BCD-GEO 2022-09.

We appreciate the opportunity to be of service. If you should have any questions concerning this report, please do not hesitate to call us.

Very truly yours,

BURNS COOLEY DENNIS, INC.

A. E. (Eddie)Templeton, P.E.

Jeffrey W. Williams, P.E.

JEFFREY WAYNE WILLIAMS REGISTERED PROFESSIONAL ENGINEER 16392 STATE OF MISSISSIPPI

JWW/KLW/AET/khb
Copy Submitted: (via e-mail)

TABLE OF CONTENTS

1.0 INTRODUCTION AND PURPOSES 1
1.1 Project Description 1
1.2 Purposes 3

2.0 FIELD EXPLORATION 3
2.1 General 3
2.2 Drilling Methods and Groundwater Observations 4
2.3 Sampling Methods 4
2.4 Field Classifications, Sample Preservation, and Borehole Completion 5

3.0 LABORATORY INVESTIGATION 5
3.1 General 5
3.2 Strength Properties 6
3.3 Compressibility Tests 6
3.4 Classification Tests 6
3.5 Water Content Tests 7
3.6 Sulfate Tests 7

4.0 GENERAL SUBSURFACE CONDITIONS 8
4.1 General 8
4.2 Existing Pavement Thickness 8
4.3 Soil Stratification 8
4.3.1 Pavement Borings. 9
4.3.2 Building and Wayfinding Sign Borings. 9
4.4 Groundwater 10

5.0 DISCUSSION 10
5.1 General 10
5.2 Compressible Soils 10
5.3 Existing Fill Material 11
5.4 Expansive Clays 11
5.5 Unstable Surface Soils 11
5.6 Foundation Loads 12

6.0 RECOMMENDATIONS 12
6.1 Site Preparation and Earthwork 12
6.1.1 Site Preparation. 12
6.1.2 Bridge Lift. 14
6.1.3 Delays. 14
6.1.4 Preloading and Settlement Monitoring. 14
6.1.5 Alternative Soil Improvement Elements. 16
6.2 Groundwater Control 16
6.3 Fill Materials and Placement 17

6.3.1 Fill Beneath Structural Areas 17
6.3.2 Fill Beneath Pavements 17
6.3.3 Fill Material Selection 17
6.3.3 Fill Placement 18
6.3.4 Laboratory and Field Testing 19
6.3.5 Granular Sub-Base Fill Below Slabs 19
6.4 Foundations 19
6.4.1 Building Foundation 20
6.4.2 Building Foundation and Slab Design 20
6.4.3 Wayfinding Sign Foundation. 21
6.4.4 Potential Settlement 22
6.4.4.1 Differential Settlement for Previously Loaded Building Areas 22
6.4.4.2 Settlement Resulting from Mass Fill 22
6.4.4.3 Settlement Resulting from Structural Loads 23
6.4.4.4 Settlement of Sign Foundation 23
6.4.4.5 Surcharge Loading of the Structural Areas 23
6.4.4.6 Settlement Time 24
6.4.5 Foundation Installation 24
6.5 Other Design Considerations 25
6.6 Guideline Pavement Recommendations 25
6.6.1 New Construction 25
6.6.2 Mill and Overlay 26
6.6.3 Construction Practices to Minimize Damage Due to Construction Traffic 27

7.0 REPORT LIMITATIONS 27

FIGURES

Site Location 1A
Plan of Borings 1B
Terms and Symbols 2
Boring Logs ..... 3 through 16
Consolidation Test Results ..... 17, 18, and 19
Stick Logs ..... 20 and 21
Settlement Plate Details 22

APPENDIX

Southern Earth Sciences Report for Wayfinding Sign ..... A

1.0 INTRODUCTION AND PURPOSES

1.1 Project Description

Burns Cooley Dennis, Inc. (BCD) understands that MDOT and its consultants are designing the new I-10 Welcome Center in Jackson County, Mississippi. The welcome center is located on the north side of I-10 about 1 mile west of the intersection of Franklin Creek Road with I-10. The approximate site location is shown on Figure 1.

The welcome center building will be constructed to replace the existing building. Areas of the site where the new building will be constructed are currently partially occupied by the existing building, associated structures and equipment, and sidewalks. Scattered trees are also present. The new building will be rotated so that it is constructed partially over the footprint of the existing welcome center building. The existing building, associated structure and equipment foundations, and sidewalks will be removed to facilitate construction of the new building.

The new building will be single story with a tall eave height. The building will have an approximate area of about 15,000 sq ft with nominal dimensions of about 91.5 ft wide by 214 ft long. The building will mostly be comprised of a concourse, a vestibule, a restroom lobby, men's and women's restrooms, exterior courtyards, and staff and security areas. Conceptual drawings provided during the course of this investigation indicate that concrete masonry unit walls, steel trusses to support the roof, and a brick facade will be utilized for building construction.

Current plans are to support the building on shallow spread and strip footing foundations. Some large spread footings are planned for support of the more heavily loaded columns. Planned loading conditions are indicated in Table 1:

Table 1: Anticipated Foundation Loads

Footing Type	Location	Dead Loads	Live Loads	Wind Loads
Strip	Interior and Exterior North Side of Building	3.5 kips/ft	0.6 kips/ft	0.65 kips/ft
Strip	Cast-in-Place Wall Between Concourse and North Side of Building	3.5 kips/ft	0.6 kips/ft	0.65 kips/ft
Spread	Main South Entrance (Footing dimensions 2.7-ft wide by 12.3-ft long)	125 kips	12.5 kips	13 kips
Spread	South Wall of Concourse (Footing dimensions 2.7-ft wide by 7-ft long)	80 kips	12.5 kips	13 kips

Footing Type	Location	Dead Loads	Live Loads	Wind Loads
Spread	East and West of South Concourse Wall	16 kips	3.5 kips	10 kips

Existing concrete and asphalt drives and parking areas extend across the site. Some of the existing pavements will be refurbished for continued use. New pavements for parking and drive areas are also planned. MDOT provided traffic information including projected ADT (year 2028 – 740 ADT and year 2048 – 1,000 ADT) and 23 percent trucks. Sidewalks will extend throughout the site. Current plans are for sidewalks to have widths ranging from 8 ft to 12 ft.

We understand that the current plan is for the building to have a floor elevation of 21.0 ft. This will necessitate the addition of about 1 ft of fill to achieve finished grades. Original plans were to elevate the site grade in the building area by as much as 5 ft to achieve finished grades. As such, we analyzed potential settlement for the potentially significant grade increases. Minor grade increases or decreases of 1 ft or 2 ft may be required in the pavement areas to achieve finished grades. Geofoam is being considered if needed to decrease pressures and consolidation of the natural soils from the fill material used to elevate the site grade. The planned building site area is relatively level with ground surface elevations ranging from about El. 16 ft to El. 18 ft.

A Coastal Mississippi Wayfinding Sign will be constructed on the south side of the south parking lot. The sign will be about 30 ft tall and 24 ft wide. Current plans are to support the sign on a pedestal that will be supported on a shallow mat foundation that will be about 13 ft wide and will bear about 5.5 ft below the final site grade. Fill material will be placed to elevate the grade above the existing grade in the sign area. The maximum grade increase will be about 3 ft where the existing grade of El. 13 ft will be increased to El. 16 ft.

Final plans of completed work provided to us for our review indicate that the existing welcome center building was constructed in about 1985. The building is supported on shallow spread and strip footings. Exterior strip footings and spread footings supporting column loads are supported 3.25 ft below outside grade and interior strip footings are supported 2.25 ft below the top of the slab. We understand that the existing foundations have performed properly and no settlement or other building foundation issues have been observed.

1.2 Purposes

The specific purposes of this investigation were:

1) to make exploratory soil borings within the areas planned for construction of the new building, Wayfinding Sign, and pavement areas;

2) to verify field classifications and to evaluate pertinent physical properties of the soils encountered in the borings by means of visual examination of the soil samples in the laboratory and routine tests performed on the samples; and

3) after analysis of the soil boring and laboratory test data, to provide recommendations for earthwork construction, building foundation design and construction, and to also provide guideline recommendations for pavement design and construction.

Environmental study, detailed slope, and trench stability, retaining wall evaluation, groundwater dewatering, structure foundation design, detailed pavement evaluation and design, and construction phase services are not a part of the current scope of study.

2.0 FIELD EXPLORATION

2.1 General

Subsurface soil conditions within the proposed building, Wayfinding Sign, and pavement areas were explored by means of 14 borings. The borings were drilled using a truck-mounted drill rig. The approximate locations of the borings are presented in Table 2 below.

Table 2: Boring Depths and Locations

Borings	Boring Depth	Location
1 through 8	5 ft	Planned Parking and Drive Areas
9	100 ft	Planned Building
10, 11, and 12	50 ft	
13	20 ft	
14	50 ft	Mississippi Wayfinding Sign

Four-inch diameter cores were obtained at four locations (C-1 through C-4) in order to determine the existing pavement structure thickness. The thickness of the pavement at the test

locations was determined by measuring each pavement core. Cores were placed back inside the corehole and grouted in place.

The locations of the borings and pavement cores were selected, marked, and located in the field by representatives of Burns Cooley Dennis, Inc. based upon our understanding of the project and the site plan provided to us. The borings were approximately located in the field using a hand-held GPS device with GPS coordinates generated from the drawings provided. Several of the borings were offset from the planned building footprint due to conflicts with buried utilities, trees, and other obstructions. The approximate locations at which the borings were made and cores were cut relative to existing site features are illustrated on Figure 1 of this report. Coordinates and ground surface elevations at the boring locations determined by project consultant, Maptech, Inc., are presented on the boring logs.

A synopsis of the Unified Soil Classification System is presented on Figure 2 along with symbols and terminology typically utilized on graphical soil boring logs. Graphical logs of borings are presented on Figures 3 through 16. The graphical logs illustrate the types of soil encountered with depth below the ground surface at the individual boring locations.

2.2 Drilling Methods and Groundwater Observations

Borings 1 through 8 were advanced full depth by dry augering. Borings 9 through 14 were initially advanced by dry augering to depths ranging from 7 ft to 15 ft and then drilled to the respective completion depths using the rotary wash procedure. Observations were made continuously during auger drilling in an attempt to detect groundwater seepage emerging into the open boreholes. Notes pertaining to observed groundwater conditions are indicated in the lower right corner of the graphic logs.

2.3 Sampling Methods

Samples were obtained directly from the auger at selected depths in Borings 1 through 8 made for pavements. Disturbed and undisturbed samples of the soils were generally obtained at approximate 3-ft to 5-ft intervals of depth in Borings 9 through 14 made for the building and the Wayfinding Sign.

Representative disturbed samples of the soils were obtained by driving a standard 2-in. OD split-spoon sampler 18 in. into the soil with a 140-lb hammer falling freely a distance of 30 in. The

number of blows required to drive the split-spoon sampler each 6-in. increment (total of 18 in. of penetration) is recorded under the "FIELD SPT DATA" column of the graphic boring logs. The number of blows required to penetrate the last foot (sum of the second and third blow count values) is considered the N_{60} value and is plotted as a small circled "x" in the data section of the logs. Where the split-spoon met refusal in strong soils, the number 100+ is recorded. Refusal was considered to be 6 in. or less penetration in 50 blows. WOH is shown at the depths where the split-spoon penetrated the last foot under the weight of hammer.

Relatively undisturbed samples were obtained from selected depths by pushing a 3-in. OD thin-wall Shelby tube sampler approximately 2 ft into the soil.

The actual depths at which the auger, split-spoon, and Shelby tube samples were obtained are indicated by the small I-shaped, crossed rectangular, and shaded rectangular symbols, respectively, under the "Samples" column of the graphic boring logs.

2.4 Field Classifications, Sample Preservation, and Borehole Completion

All soils encountered during drilling were examined and classified in the field by a geotechnical engineering technician. The Shelby tube samples were extruded from the sampling tube in the field. An approximate 6-in. long portion of each Shelby tube sample was sealed with melted paraffin in a cylindrical cardboard container to prevent moisture loss and structural disturbance. An additional portion of each Shelby tube sample and representative portions of the split-spoon samples and the auger cutting samples were sealed in jars to provide material for visual examination and testing in the laboratory.

Borings 9 through 14 were filled from the bottom up with cement-bentonite grout and the remaining shallower boreholes were plugged with soil cuttings after completion of drilling and sampling in accordance with MDEQ requirements. Unless other disposition is requested, we routinely discard soil samples after about six months of storage.

3.0 LABORATORY INVESTIGATION

3.1 General

An evaluation of the strength, compressibility, classification, and expansive properties of the subsurface soils encountered in the borings was considered to be of primary importance for

this investigation. These properties were evaluated by visual examination and from results of the routine laboratory index tests described in the following paragraphs. The strength and compressibility characteristics of the soils encountered in the borings were estimated by means of field classifications of consistency and standard penetration tests, and also from results of laboratory compression and compressibility tests. Sulfate tests were also performed on selected samples.

3.2 Strength Properties

The strength characteristics of the fine-grained soils encountered in the borings were investigated by means of unconsolidated undrained (UU) triaxial tests performed on selected Shelby tube samples. The results of the unconsolidated undrained (UU) triaxial compression tests in terms of cohesion are plotted as small open triangles in the data section of the graphic logs. The water content and dry density were also determined for each compression test specimen. The actual consistency assigned on the boring logs also considers other data including physical examination of the samples. The water contents are plotted as small shaded circles in the data section of the logs. The dry densities are tabulated to the nearest lb per cu ft under the “Dry Density” column of the logs.

3.3 Compressibility Tests

The compressibility characteristics of the fine-grained soils were investigated by means of three (3) consolidation tests performed on selected undisturbed Shelby tube samples from Borings 11, 12, and 14 at depths of about 25 ft to 30 ft. The results of the consolidation tests are presented on Figures 17, 18, and 19 as semi-log plots illustrating the variation of void ratio with vertical effective pressure.

3.4 Classification Tests

The classifications and volume change properties of the fine-grained soils encountered in the borings were investigated by means of Atterberg liquid and plastic limit tests performed on selected representative samples. The results of the liquid and plastic limit tests are plotted as small crosses interconnected by dashed lines in the data section of the graphic boring logs. In accordance with the Unified Soil Classification System, fine-grained soils are classified as either clays or silts

of low or high plasticity based on the results of Atterberg limit tests. The numerical difference between the liquid limit and plastic limit is defined as the plasticity index (PI). The magnitudes of the liquid limit and plasticity index and the proximity of the natural water content to the plastic limit are indicators of the potential for a fine-grained soil to shrink or swell upon changes in moisture content or to consolidate under loading. The proximity of the natural water content to the plastic limit is also an indicator of soil strength. In one instance, the sample being tested was found to be nonplastic and "NP" was recorded in the data section of the graphic log for Boring 9.

To assist in classifying soils which include sand, tests were performed to determine the percent fines passing the No. 200 sieve. The percentage of fines resulting from each test is tabulated at the appropriate depth under the far-right column of the graphic logs.

3.5 Water Content Tests

Water content tests were performed on samples to corroborate field classifications and to extend the usefulness of the strength, plasticity, and field SPT blow count data. The results of the water content tests are plotted as small shaded circles in the data section of the graphic boring logs. The water content data have been interconnected on the logs to illustrate a continuous profile with depth.

3.6 Sulfate Tests

Laboratory testing was performed on six selected samples from the borings to determine the percent of soluble sulfate by mass. The test results indicate moderate concentrations of sulfates at a depth of 69.5 ft in Boring 9. The remaining sulfate test results indicate low concentrations of sulfates. Results of the tests to determine percent soluble sulfate are presented in Table 3.

Table 3: Soluble Sulfate Conditions (Soils)

Boring No.	Depth Interval	Sulfate (SO4), % by mass
B-9	14.5 ft	<0.05
B-9	45 ft	<0.05
B-9	69.5 ft	0.16
B-14	5.5 ft	<0.05
B-14	29.5 ft	<0.05
B-14	49.5 ft	0.09

4.0 GENERAL SUBSURFACE CONDITIONS

4.1 General

A general description of subsurface soil and groundwater conditions encountered in the borings made for this investigation is provided in the following subsections. The graphical logs of the borings shown on Figures 3 through 16 should be referred to for the specific soil conditions encountered at each location explored. Stick logs of the borings are shown in profile on Figures 20 and 21 to aid in visualizing subsurface soil conditions. Tabulated adjacent to the stick logs are Atterberg liquid and plastic limits, water contents, dry densities, cohesions, field SPT blow counts and percentages of fines passing the No. 200 sieve.

4.2 Existing Pavement Thickness

Pavement cores were obtained at four locations (C-1 through C-4) in order to determine the existing pavement thickness. The existing pavement structure at locations C-1 and C-2 was found to be a composite pavement consisting of Portland Cement Concrete (PCC) slabs supported by an asphalt base layer. The thickness of the PCC layer was found to range from approximately 8.5 in. to 9.0 in., with an asphalt base layer thickness ranging from approximately 4.5 in. to 5.3 in. The pavement structure at locations C-3 and C-4 was found to consist of asphalt pavement layers ranging in thickness from approximately 10.5 in. to 11.0 in. The existing pavement layer thickness at each test location is presented in Table 4.

Table 4: Existing Pavement Structure Thickness

Core Location [1]	Concrete	Asphalt
	Thickness (in.)	
C-1	9.0	5.3
C-2	8.5	4.5
C-3	---	11.0
C-4	---	10.5

[1] See Figure 1 for approximate core locations.

4.3 Soil Stratification

Discussions on subsurface soils encountered within the maximum 5-ft exploration depth of the borings made for pavements and the maximum 100-ft exploration depth of the borings made for the building and the Wayfinding Sign are provided in the following paragraphs.

4.3.1 Pavement Borings. Borings 1 through 8 were made within the proposed new parking and drive areas. The subgrade soils encountered within these borings were found to include silty clays (CL and CL-ML), sandy clays (CL and CL-ML), silty sands (SM), and slightly silty sands (SP-SM) to the 5-ft termination depth. The silty and sandy clay (CL and CL-ML) subgrade soils are classified as stiff to hard with respect to consistency and are considered to have moderate to high strength and moderate to low compressibility. The silty sands (SM and SP-SM) are classified as medium dense and are considered to have moderate strength and low-moderate compressibility. The silty clays (CL and CL-ML) and sandy clays (CL and CL-ML) and silty sands (SM and SP-SM) are considered to have low or no shrink/swell potential and can provide adequate pavement support if these soils have adequate compaction and demonstrate stability. A stick log profile illustrating the stratifications encountered in these borings is presented on Figure 20.

4.3.2 Building and Wayfinding Sign Borings. The soils encountered in the borings made for the exploration for the structures generally consist of stiff to hard sandy clays (CL and CL-ML), silty clays (CL), and clays (CH) and loose to dense silty sands (SM), slightly silty sands (SP-SM), sands (SP), clayey sands (SC), and silts (ML). These stiff to hard clays (CL, CL-ML, and CH) and loose to dense sands (SM, SP-SM, SP, and SC) and silts (ML) are considered to be relatively strong and stable with moderate to high strength and moderate to low compressibility.

A zone of weaker, less stable soils consisting of very soft to medium stiff silty clays (CL), sandy clays (CL), and clays (CH) was encountered in all of the borings made for the structures. The zone was encountered at depths ranging from 12 ft to 23 ft and was found to extend to depths ranging from 20 ft to 41 ft. The very soft to medium stiff clays (CL and CH) are considered to have very low to low-moderate strength and moderate-high to very high compressibility.

Clays (CH) were generally found at depths of at least 18 ft below the existing ground surface. The exception was in Boring 13 where the clays (CH) were encountered from a depth of about 1.5 ft to a depth of about 6 ft below the ground surface.

The sandy clays (CL and CL-ML) and silty clays (CL), sands (SM, SP-SM, SP, and SC) and silts (ML) are considered to have low or no shrink/swell potential. The clays (CH) are considered to have high shrink/swell potential.

A stick log profile illustrating the stratifications encountered in these structure borings is presented on Figure 21.

4.4 Groundwater

As indicated previously, observations were made continuously during dry auger drilling to detect groundwater seepage entering the open boreholes. Free water was not observed in any of our borings during auger drilling. Free water observations could not be made below depths ranging from 7 ft to 15 ft in the deeper borings made for the structures since water was introduced into the borings to facilitate rotary wash drilling. The graphic boring logs should be referred to for specific groundwater information at individual boring locations. It should be recognized that the groundwater levels at this site are influenced by rainfall, nearby bodies of water including the Escatawpa River, local drainage conditions, and other environmental factors.

5.0 DISCUSSION

5.1 General

The soils encountered in our borings are generally strong and stable and suitable for support of the building and Wayfinding Sign on shallow foundations and for support of the pavements. However, there are geotechnical concerns that will need to be addressed during design and construction. Potential concerns are discussed in the following subsections.

5.2 Compressible Soils

The primary geotechnical concern is the presence of the relatively weak zone of very soft to medium stiff silty clays (CL) and clays (CH) encountered in the building and Wayfinding Sign borings. The relatively weak clays (CL and CH) were encountered at depths ranging from 12 ft to 23 ft and were found to extend to depths ranging from 20 ft to 41 ft. Compression could be induced in the weaker natural soils causing excessive settlement of shallow foundations and pavements since up to 5 ft of fill will be placed to achieve finished grades.

The site can be temporarily preloaded with a surcharge of fill material placed above finished grade to induce settlement before constructing the building and Wayfinding Sign

foundations. Discussions on surcharging are provided in Section **6.1.4 Preloading and Settlement Monitoring.**

As an alternative to surcharging the site, the presence of the compressible soils can be addressed through the use of geotechnical improvements such as aggregate piers. Discussions on the use of aggregate piers are provided in Section **6.1.5 Alternative Soil Improvement Elements.**

5.3 Existing Fill Material

BCD made all of our borings beyond the perimeter of the existing building. No sampling was made through the existing building slab. Fill materials are likely present beneath the existing building foundation and the foundations of other existing structures. Fill materials may also be present beneath the existing pavements. The fill materials were likely placed during construction of the existing building and pavements. We expect that fill soils were placed in a controlled manner. However, there is inherent risk that compressible fill or unsuitable material within or buried by any fill materials will not be discovered. The owner should be willing to accept this risk if any existing fill materials remain in place. The risk of unforeseen conditions cannot be eliminated without completely removing any existing fill materials, but can be reduced by additional testing and evaluation during construction.

5.4 Expansive Clays

Expansive clay (CH) soils were encountered in most of the borings made for the building and in the boring made for the Wayfinding Sign. Expansive clays (CH) tend to shrink during dry conditions and swell during wet conditions, which can cause movement of foundations and pavements supported upon the expansive clays (CH). As discussed, the clays (CH) were generally found at depths of at least 18 ft below the existing ground surface, except in Boring 13 where the expansive clays (CH) were encountered from a depth of about 1.5 ft to a depth of about 6 ft below the ground surface. Due to the depth of confinement and the limited thickness of the expansive clays (CH), we do not anticipate that their presence will adversely affect foundation performance.

5.5 Unstable Surface Soils

The soils encountered directly beneath the ground surface in our borings were generally found to be stable at the time of our field investigation. However the soils could be weaker at

different times of the year depending on weather conditions. The silty sands (SM) encountered directly beneath the ground surface in several of the borings will be especially susceptible to pumping and instability during wet conditions.

5.6 Foundation Loads

A foundation should be utilized which will accommodate anticipated fill and structural loads and also minimize future differential vertical movements resulting from settlement due to soil consolidation/compression under fill and structural loads. For the soil conditions revealed by the borings, it is our opinion that a shallow foundations system could be used for support of the building provided: 1) column loads are less than 150 kips and wall loads do not exceed 6 kips per ft; 2) estimated settlements are acceptable, and 3) our recommendations for site preparation and earthwork construction are implemented. The anticipated loads indicated in Table 1 of this report do not exceed these maximum column or wall load values. A shallow mat foundation may also be utilized as planned for support of the Wayfinding Sign.

6.0 RECOMMENDATIONS

Discussions on our analyses and our recommendations for earthwork and foundation construction and design, and guideline recommendations for pavement construction and design are provided in this section.

6.1 Site Preparation and Earthwork

6.1.1 Site Preparation. The site is currently occupied by the existing welcome center building, small associated buildings, equipment structures, parking and drive areas, and trees. The initial step in site preparation should consist of removing existing foundations, pavements, and trees and their root systems and stripping to a sufficient depth throughout the construction area to remove any organic-laden surficial soils, vegetation, debris, etc. Fill materials placed during construction of the existing building and associated structures should be evaluated at this time and removed if found to contain or bury unsuitable debris or other deleterious materials.

After clearing the organics, adequate drainage should be established across the site. The exposed soils in structural areas (the building and the Wayfinding Sign) should then be scarified

to a minimum depth of 9 in. and compacted in-place with heavy vibratory equipment to not less than **95** percent of standard Proctor (ASTM D 698) maximum dry density. Soils in pavement areas should be scarified to a minimum depth of 9 in. and compacted to not less than **98** percent of standard Proctor maximum dry density (ASTM D 698) with stability present. Project documents provided to us during the course of this investigation indicate that higher degrees of compaction would be required by the Owner. Requirements for higher degrees of compaction specified in the project documents provided to us for review are acceptable to BCD.

Proofrolling can also be used to evaluate stability using a loaded dump truck in conjunction with compaction. Stability is defined as the absence of significant pumping or yielding of soils under normal fill compaction or loading. If stability is not present in some areas, either excavation or treatment of the in-situ soils with an admixture or a combination of these two approaches or other methods may be required to achieve stable conditions.

If overexcavation to remove unstable soils in structure or pavement areas becomes excessive, a bridge lift can be placed instead of excavating to remove any unstable soils or treatment with an admixture. The use of a bridge lift is discussed in the following subsection.

Excavations made to remove existing foundations, trees, root systems, and any unstable soils should be backfilled with select fill materials in accordance with recommendations provided in a subsequent paragraph. Any upper natural silty sands (SM) or silty clays (CL) removed may be stockpiled for testing to determine if the soils are suitable for possible later use as backfill.

The actual moisture content conditions at the time of construction will be influenced by the rainfall preceding and during construction and by the drying conditions during construction. Therefore, we recommend that the work be performed during a dry season of the year if the schedule permits. It should be noted that the soils having a low Plasticity Index (PI), especially the silty clays (CL-ML) and silty sands (SM), exposed after stripping may be susceptible to pumping under wet conditions.

The construction techniques and types of equipment utilized and site drainage provided during construction will have a great effect on the performance of these soils throughout the project. The routing of heavy rubber-tired equipment should be controlled to minimize, as much as possible, traffic over the site. All traffic should be discouraged during periods of inclement weather. It should be recognized that soils which are demonstrated to be stable during compaction can become unstable if they are disturbed by construction traffic or exposed to rainfall.

6.1.2 Bridge Lift. If overexcavation to remove unstable soils from structure or pavement areas becomes excessive, bridging over unstable soils can be performed rather than excavating the unstable soils to expose stable soils. Should unstable soils be present, a thickened bridge lift (about 18 inches) of clean sand should be placed. Clean crushed stone with few fines such as Size No. 57 stone can be used as an alternative to clean sand. The upper 6 in. of the sand bridging lift should be compacted to not less than 95 percent of standard Proctor maximum dry density (ASTM D 698). No specified compaction is required for clean stone. Subsequent lifts of fill should be placed as outlined in Section **6.3 Fill Materials and Placement**.

A geotextile can be placed between the exposed subgrade soils and the bridge lift materials if necessary to establish a stable working surface upon which to place subsequent layers of fill. We recommend that the geotextile utilized for this purpose consist of Type V geotextile as specified in the Mississippi Standard Specifications for Road and Bridge Construction (1990 Edition). The geotextile could be utilized beneath the bridging materials to initiate compaction with stability.

Bridging materials should consist of either clean sands (SP) or slightly silty sands (SP-SM) with less than 10 percent fines passing the No. 200 sieve. The bridging materials should meet the requirements of MDOT Class B3 borrow. Recommendations for bridge lift material are presented in **Table 5: Fill Material Properties** in Section **6.3. Fill Material Selection**. If bridging will be performed, sufficient undercutting should be performed so that at least 5 ft of compacted fill can be placed beneath the bottom of the building slab and at least 3 ft of compacted fill can be placed beneath pavement areas. Bridging should only be performed with the approval and under the observation of the project geotechnical engineer or their representative.

6.1.3 Delays. If there is some delay between completion of earthwork operations and placement of the foundation elements, deterioration of subgrade conditions may occur. Thus, we recommend that the density and stability of the subgrade soils be confirmed or re-established immediately prior to construction of structure footings and slab.

6.1.4 Preloading and Settlement Monitoring. If the estimated settlements described in this report are unacceptable, post-construction settlements can be reduced by applying a surcharge load. After preparing the exposed soils and placing the fill material required to achieve the up to 5

ft of grade increase planned for the building and the up to 3 ft of grade increase planned for the Wayfinding Sign, a layer of uncompacted fill soil should be placed on each structural area to preload the soils prior to foundation construction. At least 4 ft of uncompacted fill soil should be placed on top of the building area if the grade will be increased by 5 ft and at least 2 ft of uncompacted fill soil should be place on top of the Wayfinding Sign area if the grade will be increased by 3 ft. Less of this surcharge material may be needed if the fill increases will be less than the maximums described. BCD should be contacted to comment if this is the case. Optionally, 2 ft of compacted fill can also be placed on top of pavement areas.

The uncompacted fill should extend at least 4 ft beyond the outside edge of the building, at least 2 ft beyond the edge of the Wayfinding Sign, and at least 2 ft beyond the edge of the pavement, if the owner chooses to preload the pavement areas, too. The layer of uncompacted fill will act as a surcharge to accelerate the settlements associated with elastic recompression of the existing sands and consolidation of the clays. If the pavement areas are not preloaded, bird bath dip areas and poor alignment of drainage ditches and pipes are possible due to excess settlement that would occur over time. By the time the fill materials are placed to achieve final site grade, we anticipate that a portion of the settlement of these soils will have occurred. We expect that the preload fill will need to remain in place for a period of up to 90 days. However, the exact length of time needed is difficult to predict, so we suggest settlement plates be used for monitoring. If grade increases in the building area of less than 5 ft will be necessary to achieve finished grades, we should be contacted to comment on the surcharge thickness and monitoring period.

Settlement plates should be placed within the proposed building and Wayfinding Sign structure footprint areas. We recommend that at least three (3) plates be installed in the building area and one (1) plate be installed in the Wayfinding Sign area. The settlement plates should be installed and immediately read after stripping and prior to any placement of fill. Survey readings of the plates relative to a nearby benchmark should be made by the contractor immediately prior to fill placement and reported to the geotechnical engineer. Then readings should be taken every day while the fill material is being placed, and every two days after the pad has been constructed in its entirety until directed otherwise by the geotechnical engineer. As the settlement period increases, the frequency of readings may be lengthened. The square settlement plates should be 2 ft to 3 ft wide by ¼-in. to 1-in. thick and rest on a thin layer of stable leveling sand. A repeatable reference survey point should be established on the single steel riser welded to the plate to

determine the elevation of the top of the steel plate. The riser can consist of 1.5-in. diameter steel pipe or similar stiffness angle iron or other iron/steel bar. The riser should be well marked and adequately protected from earthwork and other construction equipment. Each settlement plate will be surveyed to measure the total settlement of the plate and to determine the time rate of settlement. The elevation at the top of each plate should be reported to the geotechnical engineer at the frequencies noted.

Each time a new segment of riser pipe is added to the settlement plate, the top of the riser pipe should be measured prior to placing the new pipe segment. The top of the new segment should also be measured immediately after the pipe segment is placed. A schematic of the settlement plate configuration is presented on Figure 22.

6.1.5 Alternative Soil Improvement Elements. As an alternative to preloading the site with surcharge material, the highly compressible site soils may instead be improved through the installation of a series of soil improvement elements such as rammed-aggregate piers or vibratory stone columns. The soil improvement elements can be installed beneath the fill material that will be placed to elevate the site grade. The use of soil improvement elements is advantageous because of the length of time that likely will be required for the surcharge to consolidate the clays. The rammed-aggregate piers and vibratory stone columns are both proprietary improvement technologies and vary in their applications and results. They generally will reduce the compressibility of the site soils so surcharging is not needed in foundation areas and shallow foundations can be designed for increased bearing capacity. The result of aggregate pier installation is a reinforced, stiffened zone of soil that allows for the use of spread footings sized for a relatively high bearing pressure, generally in the range of about 4,000 to 6,000 lbs per sq ft with the criteria of 1 in. total allowable settlement.

Aggregate piers should be designed by an experienced specialty contractor and constructed by a licensed installer. The designer should provide detailed design calculations sealed by a professional engineer in the State of Mississippi. The design calculations should demonstrate that the soil reinforcement will control long-term settlement.

6.2 Groundwater Control

Although not encountered in our borings for the short period that the boreholes were left open, the level of the groundwater table may be a consideration during construction. Water may

be encountered in the footing excavations and any utility and similar excavations. Water may also become perched within the surficial silty sands (SM). The groundwater levels may need to be lowered prior to construction and/or adequately controlled during construction. We recommend that the specifications require the contractor to maintain the excavations in a relatively dry condition. Adequate surface drainage will also be required to minimize the amount of surface water entering the excavations.

6.3 Fill Materials and Placement

6.3.1 Fill Beneath Structural Areas. After removing any unstable natural soils and compaction/densification and proofrolling have been performed as recommended in the preceding paragraphs, fill materials can be placed to achieve planned grades. Recommendations for fill materials beneath the building and Wayfinding Sign are shown in Table 5. Properties for other soils that can be imported, as well as where the existing onsite soils may be reused are also included in Table 5.

6.3.2 Fill Beneath Pavements. Imported fill materials for pavement areas should consist of silty clays (CL), sandy clays (CL), or clayey sands (SC) that meet the requirements for MDOT Class B7-6 borrow as indicated in Table 5.

6.3.3 Fill Material Selection. Fill materials should meet the requirements presented in Table 5:

Table 5: Fill Material Properties

Fill Type	Properties	Acceptable Location for Use
Imported silty clays (CL) and sandy clays (CL)	Plasticity Index (PI) within range of 10 to 24 and liquid limit less than 45	All locations and elevations below structures and pavements
Imported clayey sands (SC)	Plasticity Index (PI) within range of 7 to 15 and liquid limit less than 35	
Bridge lift sands (SP and SP-SM) (1)	Less than 10 percent passing the No. 200 Sieve (MDOT Borrow Excavation Class B3)	Only in 18 in.-thick lift used to bridge over unstable soils
Onsite silty clays (CL)	Plasticity Index (PI) within range of 10 to 24 and liquid limit less than 45	All locations and elevations below structures

Fill Type	Properties	Acceptable Location for Use
Onsite silty sands (SM) (2)	Plasticity Index (PI) less than 24 and liquid limit less than 45	
Any Soils	Clean of Debris	Surcharge Material to Preload the Site

(1) Bridge lift may also be a thickened initial lift of typical fill material for marginally unstable soils.
(2) Other materials such as silts (ML) and sands (SM, SP, and SP-SM) may be used under some conditions as described subsequently.

Even if the existing silty sands (SM) encountered in several borings across the site do not meet the requirements of select fill, they can be acceptable to the owner as a cost-savings measure to eliminate the need of importing new fill with the understanding that these soils are sometimes difficult to place and may require a more-strict moisture placement allowance. Drying of any soils excavated from the site should be anticipated prior to use as select fill.

All fill soils should be free of organic matter, debris and any other deleterious material. Any overexcavated soils which have been temporarily stockpiled can be utilized as fill providing the soils are non-organic, debris-free, and meet the requirements for select fill. Any of the fill soils borrowed from the other areas of the site and placed within structures and pavement areas should be properly compacted.

6.3.3 Fill Placement. The fill materials in *structural areas* should be compacted from lifts not exceeding 9 in. in loose thickness to not less than **95** percent of standard Proctor (ASTM D 698) maximum dry density with stability present. Fill materials in *pavement areas* should be compacted to not less than **98** percent of standard Proctor maximum dry density (ASTM D 698). Requirements for higher degrees of compaction specified in the project documents provided to us for review are acceptable to BCD.

Fill materials should be placed in horizontal lifts at moisture contents within 3 percentage points of the optimum water content for the Standard Proctor criteria. Stability must be evident during compaction of each lift before any subsequent lifts of fill material are added. All backfill over utilities, storm drains, etc., should be placed in accordance with the preceding recommendations, except the lift thickness should be reduced to about 4 in. to 5 in. where hand-operated compaction equipment is used. Finished site grades should be sloped to promote quick

runoff of storm water away from the constructed areas. Fill slopes should be no steeper than 1V:3H extending down to existing grades.

Increased moisture contents resulting from rainfall can substantially reduce the strength of the on-site and proposed fill soils. In addition, the existing sandy soils are very susceptible to surface erosion. Any sandy soils placed as fill will also be susceptible to surface erosion. Therefore, we recommend that proper surface drainage be provided throughout the site to prevent surface water from percolating into the subsurface sands. The quick establishment of turf or the placement of pavement materials on freshly graded and filled areas will be critical. The quickest and most effective means of establishing turf will be to place sod.

6.3.4 Laboratory and Field Testing. Laboratory classification tests, including Atterberg limit determinations and grain-size analyses, should be performed on the fill soils initially and routinely during earthwork operations to check for compliance with the recommendations provided herein. Field moisture/density tests should be performed frequently in the compacted on-site soils and in each compacted lift of fill material to assist in evaluating whether the recommended moisture contents and dry densities are being achieved. As a guide for earthwork construction, we suggest a minimum of one (1) test per lift per 2,500 sq ft of surface area within the building and Wayfinding Sign areas or portion thereof. A frequency of testing considered to be appropriate for the pavement areas is one test per lift for each 5,000 sq ft of surface area or portion thereof. We recommend at least 2 tests per lift. Testing frequencies should be adjusted as necessary to accommodate Mississippi Department of Transportation (MDOT) requirements.

6.3.5 Granular Sub-Base Fill Below Slabs. Initial project plans provided to us for review during preparation of this report require the placement of a 4-in. layer of clean free draining granular sub-base below interior slabs-on-grade. Granular sub-base soils should meet the gradation requirements of ASTM C-33 Size No. 67 as specified.

6.4 Foundations

Discussions on the design and construction of the building and Coastal Wayfinding sign foundations are provided in this section.

6.4.1 Building Foundation. In conjunction with the recommended earthwork construction, it is our opinion that the planned building can be supported on a shallow foundation system with the floor slab cast on grade. As an alternative to the conventional foundation system, the foundation for the building can consist of a concrete slab connected with perimeter and interior grade beams (can be cast monolithically).

6.4.2 Building Foundation and Slab Design. The foundation for the building can consist of strip footings supporting wall loads, spot footings supporting column loads, and a separate slab-on-grade. Spot footings and exterior strip footings should be brought to bear at a depth of not less than 24 in. below finished outside grades adjacent to the building. Interior grade beams or strip footings should extend to a depth of not less than 18 in. below the bottom of the floor slab. Strip footings should be proportioned for critical combinations of dead, live, and wind loads utilizing a net allowable soil bearing pressure of 1,500 lbs per sq ft. We recommend a minimum width of 18 in. for strip footings. A net allowable soil bearing pressure of 2,000 lbs per sq ft should be used to dimension square footings. We recommend a minimum width of 24 in. for square footings. These allowable bearing pressures include an appropriate factor of safety with respect to soil shear strength.

Spot footings can be connected with grade beams if needed to better accommodate structural loadings. Footings can be designed for lateral loading considering an allowable passive equivalent fluid unit weight of 150 lbs per cu ft per ft and a sliding resistance coefficient against the base of 0.23, where lateral loads against the structure are not accommodated in uplift and compression.

The building floor slab can be supported by properly compacted subgrade soils or by select fill materials placed and compacted in accordance with the recommendations given previously in this report. The floor slab should be adequately reinforced for anticipated loading conditions and deflections and to minimize slab cracking. Stiffening ribs or grade beams added to the slab (can be cast monolithically) could be utilized to provide rigidity if needed from a structural aspect.

Alternatively, the foundations for the building can consist of a stiffened slab-on-grade foundation with perimeter grade beams, or turned down edges, and interior grade beams (can be cast monolithically) with the floor slab. Perimeter grade beams and turned down edges for the monolithic slab and grade beam foundation should also extend to a depth not less than 24 in. below

finished outside grade adjacent to the building. The interior grade beams, or ribs, can be placed beneath all load-bearing walls, or otherwise they can be spaced on intervals determined by the structural engineer to be appropriate for providing a relatively strong and stiff slab and grade beam foundation system, likely on the order of 15 ft to 25 ft. Any columns should be supported by widened portions of the grade beams. Interior grade beams should extend to a depth of not less than 18 in. below the bottom of the floor slab. The grade beams should be proportioned for critical loading conditions using a net allowable soil bearing pressure of 1,500 lbs per sq ft when total dead plus live loads are applied. We recommend a minimum base width of 12 in. for the grade beams. Note that depths and widths of footings and grade beams are provided for guidance to the designers and may be altered as needed by the structural engineer to achieve code requirements and design needs.

6.4.3 Wayfinding Sign Foundation. The wayfinding sign may be supported on a shallow mat foundation as planned. The mat foundation should be proportioned for critical combinations of dead, live, and wind loads utilizing a net allowable soil bearing pressure of 2,000 lbs per sq ft. This allowable bearing pressure includes an appropriate factor of safety with respect to soil shear strength.

The stability of the foundation against overturning should be checked. The uplift capacity of the mat foundation should be computed as the weight of the concrete plus the weight of the backfill immediately above the foundation base, if present. The weight of the backfill soils should be computed using a total density of 115 lbs per cu ft. The unit weight of the concrete should be taken as 150 lbs per cu ft. If necessary, the size of the base or the bearing depth of the foundation should be increased to provide an uplift capacity which will result in an adequate safety factor against overturning as determined by the designer.

The sliding stability of the sign foundation can also be checked during shallow foundation design. Representative soil parameters to assume during the analysis include active and passive pressure equivalent fluid weights of 60 lbs per cu ft and 150 lbs per cu ft, respectively. The site soils and potential fill are assumed to be predominantly clay since clayey soils were encountered at shallow depths in several of the borings. A sliding resistance coefficient between the sign foundation and soil can be assumed as 0.23 in the analysis.

The design of the foundation subjected to overturning moments can consider a trapezoidal distribution of contact pressure between the base of the foundation and the foundation soil such that full soil contact and positive pressure is maintained under the foundation. We recommend the resultant be located in the middle third of the foundation, and the maximum contact pressure should not exceed the net allowable bearing pressure for the foundation soil.

6.4.4 Potential Settlement. Settlement will result from the applied load of footings self-compression within the fill itself, and from the weight of fill required to elevate the site grade for the building and the Wayfinding Sign. If the estimated settlements are considered unacceptable, the post-construction settlement that will occur can be reduced by preloading the site with a surcharge of fill material placed above the planned finished grades.

6.4.4.1 Differential Settlement for Previously Loaded Building Areas**.** The soils beneath the existing building have been subjected to pressures from the existing foundation and slab. Where pressures from the new building do not exceed the pressures previously applied to the soils by the existing building, all of the settlement that can occur has already occurred. Differential settlements between areas previously loaded and areas that have not been subjected to slab and foundation pressures from the existing building may be on the order of the estimated total settlement.

6.4.4.2 Settlement Resulting from Mass Fill. We understand that the finished floor elevation has been set at 21 ft, which will require a maximum of about 1 ft of fill within the building area. Earlier grading plans considered that up to 5 ft of fill might be required. Analyses were performed to estimate settlement resulting from a range of fill thicknesses. Analyses were performed for the conditions encountered in Borings 10 and 11. The results of the analyses are summarized in Table 6.

Table 6: Estimated Settlement from Grade Increase

Fill Thickness	Estimated Settlement, in.	
	Boring 10	Boring 11
0 ft	0	0
1 ft	0.2	0.4
2 ft	0.4	0.8

Fill Thickness	Estimated Settlement, in.	
	Boring 10	Boring 11
3 ft	0.7	1.4
4 ft	1.0	2.2
5 ft	1.5	3.0

Geofoam or similar lightweight material can be used to elevate the site grade without placing a significant additional pressure on the compressible soils. We should be contacted for comment if lightweight materials are used instead of select fill material.

6.4.4.3 Settlement Resulting from Structural Loads. Analyses were performed to estimate the settlement of footings considering the structural loads presented in Table 1. Analyses were performed for the conditions encountered in Boring 11. The estimated settlement considering the maximum strip and spot footing loads range from 0.5 in. to 0.75 in.

6.4.4.4 Settlement of Sign Foundation. Analyses were performed to estimate the settlement of footing supporting the Coastal Mississippi Wayfinding Sign. Details of the sign were provided in a report prepared by Southern Earth Sciences (SESI) dated March 8, 2024 (SESI Project No. M24-022). A copy of the SESI report is included as Appendix A to this report. The location of the sign was shifted to the north subsequent to the SESI report, but it is our understanding the details of the sign have not changed. The total deadload, including the weight of the sign, pedestal and footing, will be 193 kips. The sign will be supported on a footing having minimum plan dimensions of 30 ft by 13 ft. The footing will bear at El 11 ft, and the finished grade adjacent to the footing will be El. 16.5 ft. The analyses were based on subsurface conditions encountered at Boring 14. The estimated settlement resulting from the dead load is 0.6 in.

The existing ground surface at the sign location slopes down towards the south, and the thickness of fill will vary from no fill at the north edge of the foundation to about 3 ft at the south edge of the foundation. The maximum settlement resulting from fill loading is expected to be in the range of 0.5 in to 1.0 in., which could result in a differential settlement of about 1 in between the north and south ends of the sign foundation.

6.4.4.5 Surcharge Loading of the Structural Areas**.** If the estimated settlements are unacceptable, placing a surcharge as discussed previously in Section **6.1.4 Preloading and**

Settlement Monitoring can be used to reduce post-construction settlement of the structure to limits that the structure can tolerate. A surcharge would also reduce the potential differential settlement between previously loaded areas and areas that have not been subjected to pressures from the previous building. Once surcharging and delay have been accomplished, differential settlements between adjacent building footings should be no greater than 3/4 in. and differential settlements are not expected to be more than 3/4 in. over a horizontal distance of 25 ft to 30 ft for the building or the Wayfinding Sign. Ground improvement through aggregate piers should result in similar settlements.

6.4.4.6 Settlement Time. The amount of time necessary for the settlement to occur is controlled by many variables including the amount of time it takes to apply the load, the soil type, the thickness of the consolidating soil stratum, and the depth to groundwater. The sands and the unsaturated clays above the water table are expected to consolidate relatively quickly. The rate of consolidation of the clays below the water table is a function of the rate at which pore water drains from the clay during consolidation and will occur relatively slowly.

Based on the relative thickness of the layers and assumed depth to water, we estimate about 25 percent to 50 percent of the settlement will occur during construction and within a few weeks of the final placement of the fill. The remaining settlement is predicted to occur at a decreasing rate over a period of 6 to 12 months.

If a surcharge load is utilized to reduce post-construction settlement, we recommend at least three (3) settlement plate-poles for the building and one (1) settlement plate-pole for the Wayfinding Sign to monitor consolidation settlement.

It should be understood that the estimated settlements and the time rate of settlement described in the preceding paragraphs are approximate. The actual magnitude of settlement and the time rate of settlement cannot be precisely predicted because of variability in soil properties and the uncertainty of assumptions that are inherent to the calculations. A variation of 30 percent is suggested for consideration during construction planning.

6.4.5 Foundation Installation. A pump may be needed during excavation and installation to remove any water that accumulates in foundation excavations. Ponded water in the foundation excavations can weaken the exposed soils. All foundation excavations should be

carefully inspected by a knowledgeable soil technician or engineer to verify bearing on generally strong soils. Foundation elements should be promptly poured after completion of the excavations. Drainage should be maintained away from the foundation excavations during construction. Foundation soils exposed in the bottom of the foundation excavations should be inspected prior to concrete placement. If these materials are found to be weak or loose, over-excavation and backfilling will be required to provide strong foundation soils immediately beneath the grade beams and foundations.

6.5 Other Design Considerations

The site for the proposed building in Jackson County, Mississippi lies within a relatively low seismic activity region according to the seismic zone mapping referenced in the International Building Code. Given the site soil profile as revealed by the borings and anticipated for the area based on our experience, a site class D could be used in a seismic load evaluation.

It should be noted that utility trench and foundation excavations made through on-site low- to nonplastic silty sands (SM) could slough. The contractor should be made aware of this issue. Nonplastic sands will also be susceptible to erosion and surface protection will need to be provided. The best method for protecting the surface is plating the sands with about 12 in. to 18 in. of silty clays (CL), sandy clays (CL) or clayey sands (SC). This plating material along with some topsoil will also be necessary to facilitate growth of grass.

6.6 Guideline Pavement Recommendations

Recommendations for construction of new pavements and the milling and overlay of existing asphalt pavements are provided in this section.

6.6.1 New Construction. In areas to be paved, there is often some delay between completion of earthwork operations and placement of the pavement structure materials, possibly resulting in deterioration of subgrade conditions. Thus, **we recommend that the density and stability of the subgrade soils be confirmed or reestablished immediately prior to construction of the asphalt pavement for the parking area.**

Pavement design analyses were performed using MDOT pavement design procedures. MDOT provided traffic information including projected ADT (year 2028 – 740 ADT and year

2048 – 1,000 ADT) and 23 percent trucks. The design analyses were performed utilizing a subgrade CBR value of 5. The resulting structural numbers (SN) for the heavy-duty pavements and light-duty pavements are 4.04 and 2.41, respectively. The recommended flexible pavement sections are presented below.

Table 7: Recommended Pavement Thicknesses

Heavy Duty Pavement	Light Duty Pavement
1.5 in. Asphalt Surface Course, MT 9.5mm	1.5 in. Asphalt Surface Course, MT 9.5mm
6.0 in. Asphalt Base Course, MT 19mm	2.5 in. Asphalt Base Course, MT 19mm
12.0 in. Granular Subbase	8.0 in. Granular Subbase
19.5 in. Structure Thickness	12.0 in. Structure Thickness

For pavements subjected to relatively heavy truck traffic, it is our opinion that the pavement section be constructed as a traditional asphalt pavement structure consisting of at least 12 in. of crushed limestone (No. 610) or crushed concrete granular subbase material, 6 in. of asphalt base (MT 19mm) placed in two approximately equal layers and 1.5 in. of asphalt surface (MT 9.5mm). For pavements subjected to light passenger vehicles only, the traditional asphalt pavement structure should consist of at least 8 in. of crushed limestone (No. 610) or crushed concrete granular subbase material, 2.5 in. of asphalt base (MT 19mm) and 1.5 in. of asphalt surface (MT 9.5mm). We recommend that a Type V woven geotextile fabric be placed on top of the prepared subgrade to serve as a separator between the fine-grained subgrade soils and the granular subbase material. The fabric should comply with MDOT Specifications for Road and Bridge Construction Section 714.13. The granular subbase material should meet the applicable requirement of Section 703 in the 2017 Edition of the MDOT specifications. The asphalt base and surface materials should conform to all applicable specifications for MT 19mm and MT 9.5mm, respectively, presented in the 2017 Edition of the MDOT specifications.

6.6.2 Mill and Overlay. In areas where existing asphalt pavements will remain, we recommend milling and resurfacing. Before overlaying the existing asphalt pavement surface with new asphalt pavement, the existing asphalt surface should be carefully inspected to evaluate its integrity. **We do not recommend the placement of a new asphalt concrete overlay over any damaged or structurally distressed pavement. Any existing damaged pavement and**

underlying weak subgrade soils should be completely removed as the initial step in pavement improvement. The preferred backfill for repair of random, isolated pavement failures generally consists of asphalt base course mix (MT 19mm). The repair should range between 6 in. and 12 in. deep measured from the bottom of the existing pavement.

We recommend milling approximately 1.5 in. of existing asphalt surface to remove some of the cracking and correct slope and smoothness. Following milling operations, the pavement surface should be carefully inspected for failed areas. We do not recommend the placement of a new hot mix asphalt overlay over any failed or severely cracked pavement.

After milling and repairs are complete, a minimum 1.5 in. thick new asphalt overlay (MT 9.5mm) should be placed. Overlaying the existing pavements will improve surface conditions and provide an opportunity to correct grade and smoothness where required. The asphalt surface course should conform to all applicable specifications for MT 9.5mm, presented in the 2017 Edition of MDOT specifications. **It should be noted that where portions of the existing pavement are overlain with new asphalt concrete, reflective cracks could propagate upward through the new pavement from cracks in the underlying old pavement.**

6.6.3 Construction Practices to Minimize Damage Due to Construction Traffic. Care should be taken to avoid unnecessary damage to the existing pavement by heavy construction equipment during any stage of construction. Certain construction practices can reduce damage to existing pavement layers by construction equipment. These include but are not limited to:

1) Begin pavement operations at the furthest point from a construction entrance.
2) Use the smallest milling machine, construction equipment, and trucks practical.
3) Keep trucks on unmilled pavement as much as possible.
4) If possible, do not route repeated trucks over the same section of pavement.
5) Expect pavement failures during pavement rehabilitation.

7.0 REPORT LIMITATIONS

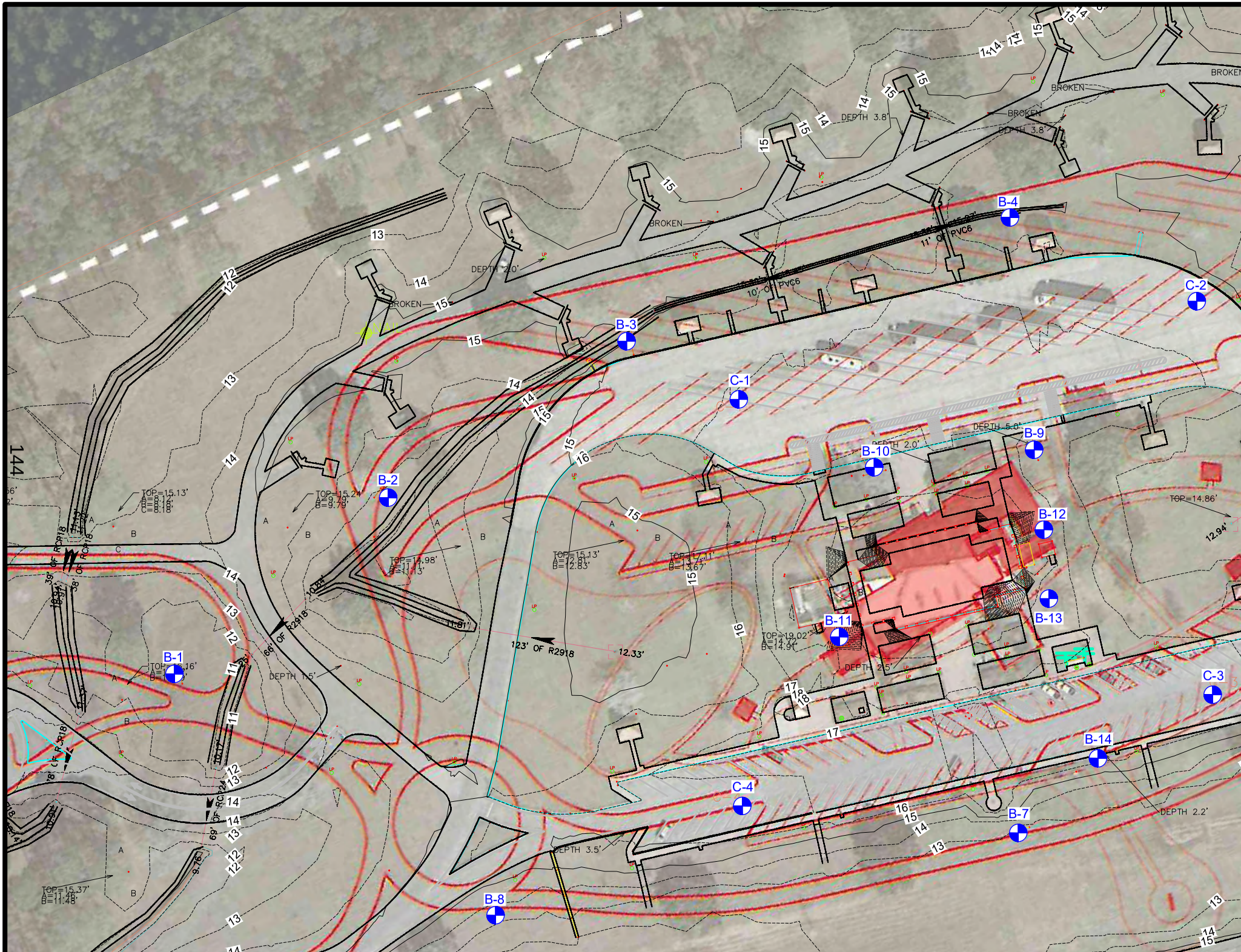
The analyses, conclusions, and recommendations discussed in this report are based on conditions as they existed at the time of our field investigation and further on the assumption that the exploratory borings are representative of subsurface conditions throughout the area explored.

It should be noted that actual subsurface conditions between and beyond the borings might differ from those encountered at the boring locations. If subsurface conditions are encountered during construction that vary from those discussed in this report, Burns Cooley Dennis, Inc., should be notified immediately in order that we may evaluate the effects, if any, on design and construction.

Burns Cooley Dennis, Inc. should be retained for a general review of project plans and specifications. It is advised that we be retained to observe earthwork, foundation, and pavement construction for the project in order to help confirm that our recommendations are valid or to modify them accordingly. Burns Cooley Dennis, Inc. cannot assume responsibility or liability for the adequacy of recommendations if we do not observe construction.

This report has been prepared for the exclusive use of the Mississippi Department of Transportation for specific application to the geotechnical aspects of design and construction for the proposed I-10 Welcome Center in Jackson County, Mississippi. The only warranty made by us in connection with the services provided is we have used that degree of care and skill ordinarily exercised under similar conditions by reputable members of our profession practicing in the same or similar locality. No other warranty, express or implied, is made or intended.

FIGURES

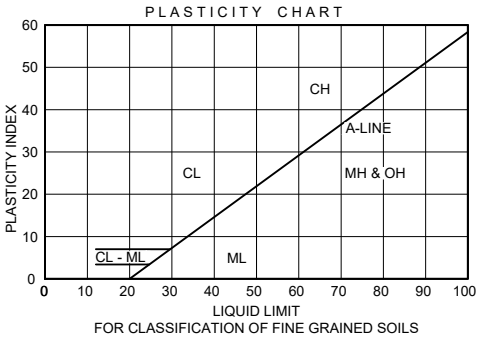

B-1
B-2
B-3
B-4
B-7
B-8
B-9
B-10
B-11
B-12
B-13
B-14
C-1
C-2
C-3
C-4
DEPTH 3.8'
DEPTH 2.0'
DEPTH 5.0'
DEPTH 2.5'
DEPTH 3.5'
DEPTH 2.2'
BROKEN
11' OF PVC6
10' OF PVC6
123' OF R2918
66' OF R2918
69' OF RCP24
39' OF RCP18
38' OF RCP18
18' CLR R 2918
TOP=15.13'
TOP=15.24'
TOP=14.98'
TOP=15.16'
TOP=15.37'
TOP=19.02'
TOP=14.86'
144

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			SYMBOL & LETTER	DESCRIPTION
COARSE-GRAINED SOILS More than half of material larger than No. 200 sieve size	GRAVELS More than half of coarse fraction larger than No.4 sieve size	Clean Gravels (Little or no fines)	GW	WELL GRADED GRAVEL, GRAVEL-SAND MIXTURE
			GP	POORLY GRADED GRAVEL, GRAVEL-SAND MIXTURE
		Gravels with fines (Appreciable amount of fines)	GM	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURE
			GC	CLAYEY GRAVEL, GRAVEL-SAND-CLAY MIXTURE
	SANDS More than half of coarse fraction smaller than No.4 sieve size	Clean Sands (Little or no fines)	SW	WELL GRADED SAND, GRAVELLY SAND
			SP	POORLY GRADED SAND, GRAVELLY SAND
		Sands with fines (Appreciable amount of fines)	SM	SILTY SAND, SAND-SILT MIXTURE
			SP-SM	SLIGHTLY SILTY SAND
			SC	CLAYEY SAND, SAND-CLAY MIXTURE
FINE-GRAINED SOILS More than half of material smaller than No. 200 sieve size	SILTS AND CLAYS	Liquid limit less than 50	ML	SILT WITH LITTLE OR NO PLASTICITY
			ML	CLAYEY SILT, SILT WITH SLIGHT TO MEDIUM PLASTICITY
			ML	SANDY SILT
			CL	SILTY CLAY, LOW TO MEDIUM PLASTICITY
			CL	SANDY CLAY, LOW TO MEDIUM PLASTICITY (30% TO 50% SAND)
	SILTS AND CLAYS	Liquid limit greater than 50	MH	SILT, FINE SANDY OR SILTY SOIL WITH HIGH PLASTICITY
			CH	CLAY, HIGH PLASTICITY
			OH	ORGANIC CLAY OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOIL
SEDEMENTARY ROCK TYPES:			LS	LIMESTONE
			MARL	MARL

TERMS CHARACTERIZING SOIL STRUCTURE

Slickensided	- Clays with polished and striated planes created as a result of volume changes related to shrinking, swelling and/or changes in overburden pressure.
Fissured	- Clays with a blocky or jointed structure generally created by seasonal shrinking and swelling.
Laminated	- Composed of thin alternating layers of varying color and texture.
Calcareous	- Containing appreciable quantities of calcium carbonate.
Parting	- Paper thin (less than 1/8 inch).
Seam	- 1/8 inch to 3 inch thickness.
Layer	- Greater than 3 inches in thickness.



DENSITY AND CONSISTENCY

COARSE-GRAINED SOILS

DENSITY	PENETRATION RESISTANCE, N Blows per Foot
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	>50

FINE-GRAINED SOILS

CONSISTENCY	COHESION Kips/Sq. Ft	PENETRATION RESISTANCE, N Blows per Foot
Very Soft	<0.25	0 - 1
Soft	0.25 - 0.50	2 - 4
Medium Stiff	0.50 - 1.00	5 - 8
Stiff	1.00 - 2.00	9 - 15
Very Stiff	2.00 - 4.00	16 - 30
Hard	>4.00	>30

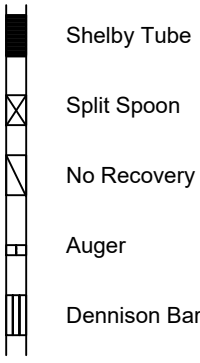
PARTICLE SIZE IDENTIFICATION

Cobbles	- Greater than 3 inches
Gravel	- Coarse - 3/4 inch to 3 inches Fine - 4.76 mm to 3/4 inch
Sand	- Coarse - 2 mm to 4.76 mm Medium - 0.42 mm to 2 mm Fine - 0.074 mm to 0.42 mm
Silt & Clay	- Less than 0.074 mm

RELATIVE COMPOSITION

Slightly	5 - 15%
With	16 - 29%
Sandy	30 - 50%
(or gravelly)	

SAMPLE TYPES
(Shown in Sample Column)



CLASSIFICATION, SYMBOLS AND TERMS USED ON GRAPHICAL BORING LOGS

BURNS COOLEY DENNIS, INC.

FIGURE 2

LOG OF BORING NO. 1

I-10 WELCOME CENTER
PROJ. NO. STGB-0010-01(180)/109171-101000
JACKSON COUNTY, MISSISSIPPI

TYPE: 6" Short-flight auger

LOCATION: See Figure 1

DEPTH, ft	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	FIELD SPT DATA	DRY DENSITY LBS/CU FT	○ - UC, Cohesion, kips/sq ft (1 2 3 4), △ - UU; SPT (N_{60}) ⊗; PLASTIC LIMIT; WATER CONTENT % (20 40 60 80); LIQUID LIMIT	% PASSING NO. 200 SIEVE
			SURFACE EL: 11.7 ±ft				
			Stiff dark gray sandy clay (CL-ML)			15.4	64.3
						17 21	
						13.6	
			- gray and tan below 4'				
						18.5	
5							
10							

BORING DEPTH: 5 ft

DATE: 10/11/24

COMMENTS:
GPS Coordinates
N 30° 27' 43.6"
W 88° 26' 10.9"

GROUNDWATER DATA: No free water encountered during auger drilling.

220107-9.GPJ

BURNS COOLEY DENNIS, INC.
GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

FIGURE 3

LOG OF BORING NO. 2

I-10 WELCOME CENTER
PROJ. NO. STGB-0010-01(180)/109171-101000
JACKSON COUNTY, MISSISSIPPI

TYPE: 6" Short-flight auger

LOCATION: See Figure 1

DEPTH, ft	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	FIELD SPT DATA	DRY DENSITY LBS/CU FT	○ - UC, Cohesion, kips/sq ft, △ - UU (1 2 3 4) / SPT (N_{60}) ⊗ / PLASTIC LIMIT / WATER CONTENT % / LIQUID LIMIT (20 40 60 80)	% PASSING NO. 200 SIEVE
			SURFACE EL: 13.1 ±ft				
			Very stiff tan and light gray very silty clay (CL-ML), slightly sandy			11.3	
						15 20	
						13.2	
			- light gray and tan below 4'			18.9	
5							
10							

BORING DEPTH: 5 ft

DATE: 10/11/24

COMMENTS:
GPS Coordinates
N 30° 27' 45.1"
W 88° 26' 9.0"

GROUNDWATER DATA: No free water encountered during auger drilling.

220107-9.GPJ

BURNS COOLEY DENNIS, INC.
GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

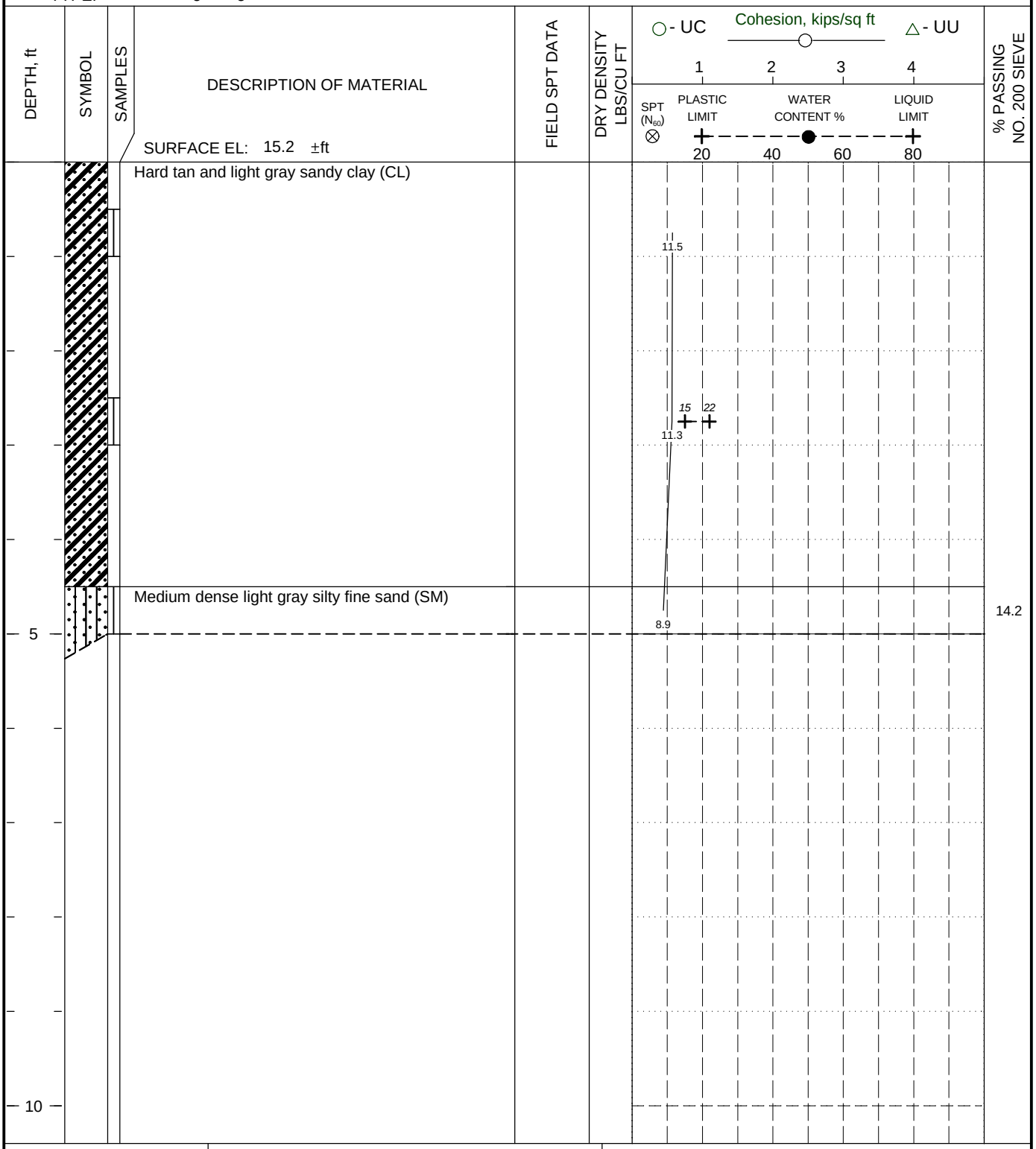
FIGURE 4

LOG OF BORING NO. 3

I-10 WELCOME CENTER
PROJ. NO. STGB-0010-01(180)/109171-101000
JACKSON COUNTY, MISSISSIPPI

TYPE: 6" Short-flight auger

LOCATION: See Figure 1



BORING DEPTH: 5 ft

DATE: 10/11/24

COMMENTS:
GPS Coordinates
N 30° 27' 46.7"
W 88° 26' 2.7"

GROUNDWATER DATA: No free water encountered during auger drilling.

220107-9.GPJ

BURNS COOLEY DENNIS, INC.
GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

FIGURE 5

LOG OF BORING NO. 4

I-10 WELCOME CENTER
PROJ. NO. STGB-0010-01(180)/109171-101000
JACKSON COUNTY, MISSISSIPPI

TYPE: 6" Short-flight auger

LOCATION: See Figure 1

DEPTH, ft	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	FIELD SPT DATA	DRY DENSITY LBS/CU FT	○ - UC, Cohesion, kips/sq ft (1 2 3 4), △ - UU; SPT (N_{60}) ⊗; PLASTIC LIMIT; WATER CONTENT % (20 40 60 80); LIQUID LIMIT	% PASSING NO. 200 SIEVE
			SURFACE EL: 15.7 ±ft				
			Hard tan and light gray sandy clay (CL-ML)			10.7; 16 20; 12.8	
5			Medium dense light gray silty fine sand (SM)			9.1	14.6
10							

BORING DEPTH: 5 ft

DATE: 10/11/24

COMMENTS:
GPS Coordinates
N 30° 27' 47.4"
W 88° 26' 2.7"

GROUNDWATER DATA: No free water encountered during auger drilling.

220107-9.GPJ

BURNS COOLEY DENNIS, INC.
GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

FIGURE 6

LOG OF BORING NO. 5

I-10 WELCOME CENTER
PROJ. NO. STGB-0010-01(180)/109171-101000
JACKSON COUNTY, MISSISSIPPI

TYPE: 6" Short-flight auger

LOCATION: See Figure 1

DEPTH, ft	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	FIELD SPT DATA	DRY DENSITY LBS/CU FT	○ - UC, Cohesion, kips/sq ft (1 2 3 4), △ - UU; SPT (N_{60}) ⊗; PLASTIC LIMIT; WATER CONTENT % (20 40 60 80); LIQUID LIMIT	% PASSING NO. 200 SIEVE
			SURFACE EL: 13.8 ±ft				
			Very stiff tan and light gray sandy clay (CL)			12.3; 16.8	54.6
			Stiff tan silty clay (CL)			18 33; 19.1	
5							
10							

BORING DEPTH: 5 ft

DATE: 10/11/24

COMMENTS:
GPS Coordinates
N 30° 27' 47.4"
W 88° 25' 59.9"

GROUNDWATER DATA: No free water encountered during auger drilling.

220107-9.GPJ

BURNS COOLEY DENNIS, INC.
GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

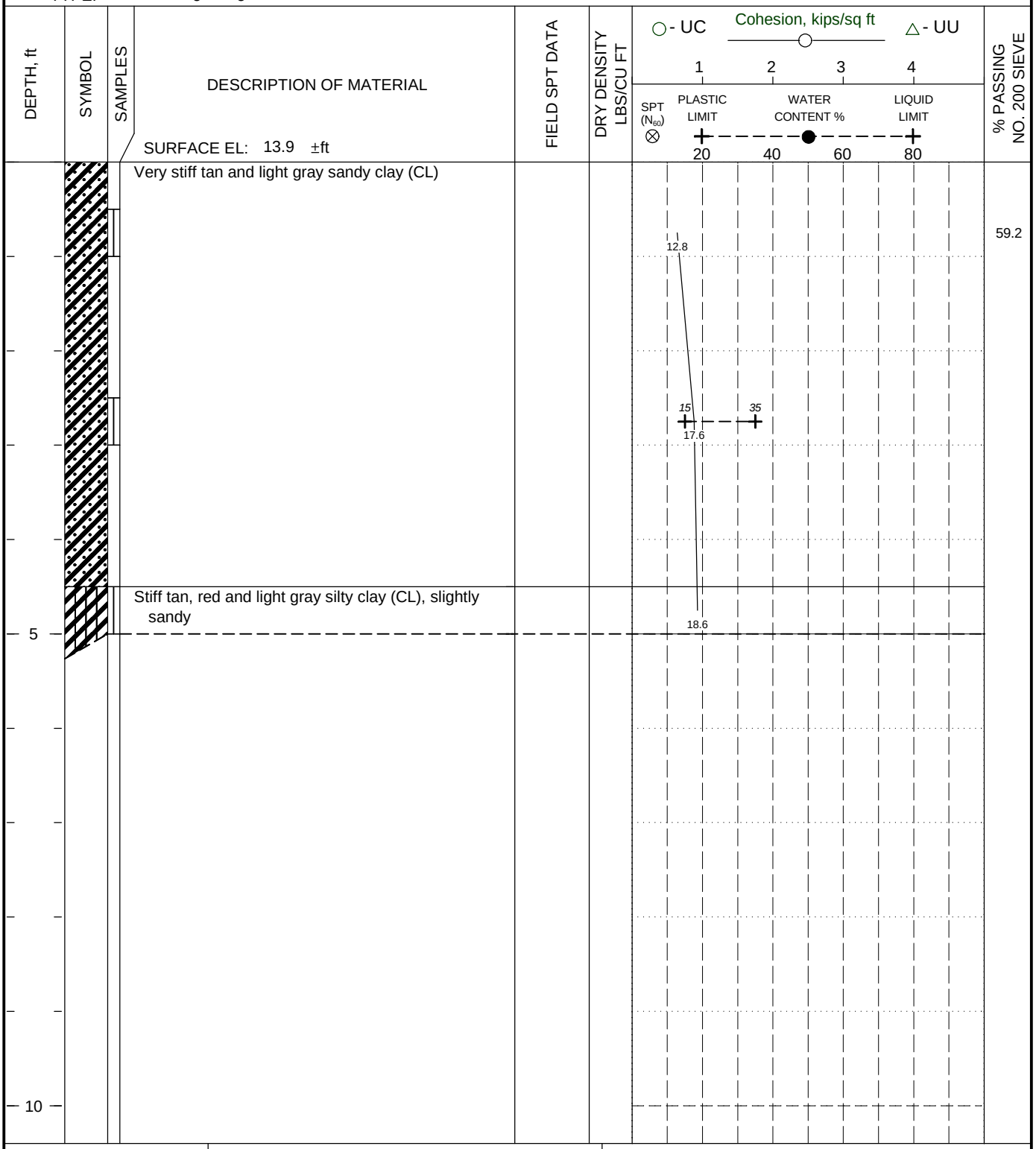
FIGURE 7

LOG OF BORING NO. 6

I-10 WELCOME CENTER
PROJ. NO. STGB-0010-01(180)/109171-101000
JACKSON COUNTY, MISSISSIPPI

TYPE: 6" Short-flight auger

LOCATION: See Figure 1



BORING DEPTH: 5 ft

DATE: 10/11/24

COMMENTS:
GPS Coordinates
N 30° 27' 44.8"
W 88° 25' 57.2"

GROUNDWATER DATA: No free water encountered during auger drilling.

220107-9.GPJ

BURNS COOLEY DENNIS, INC.
GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

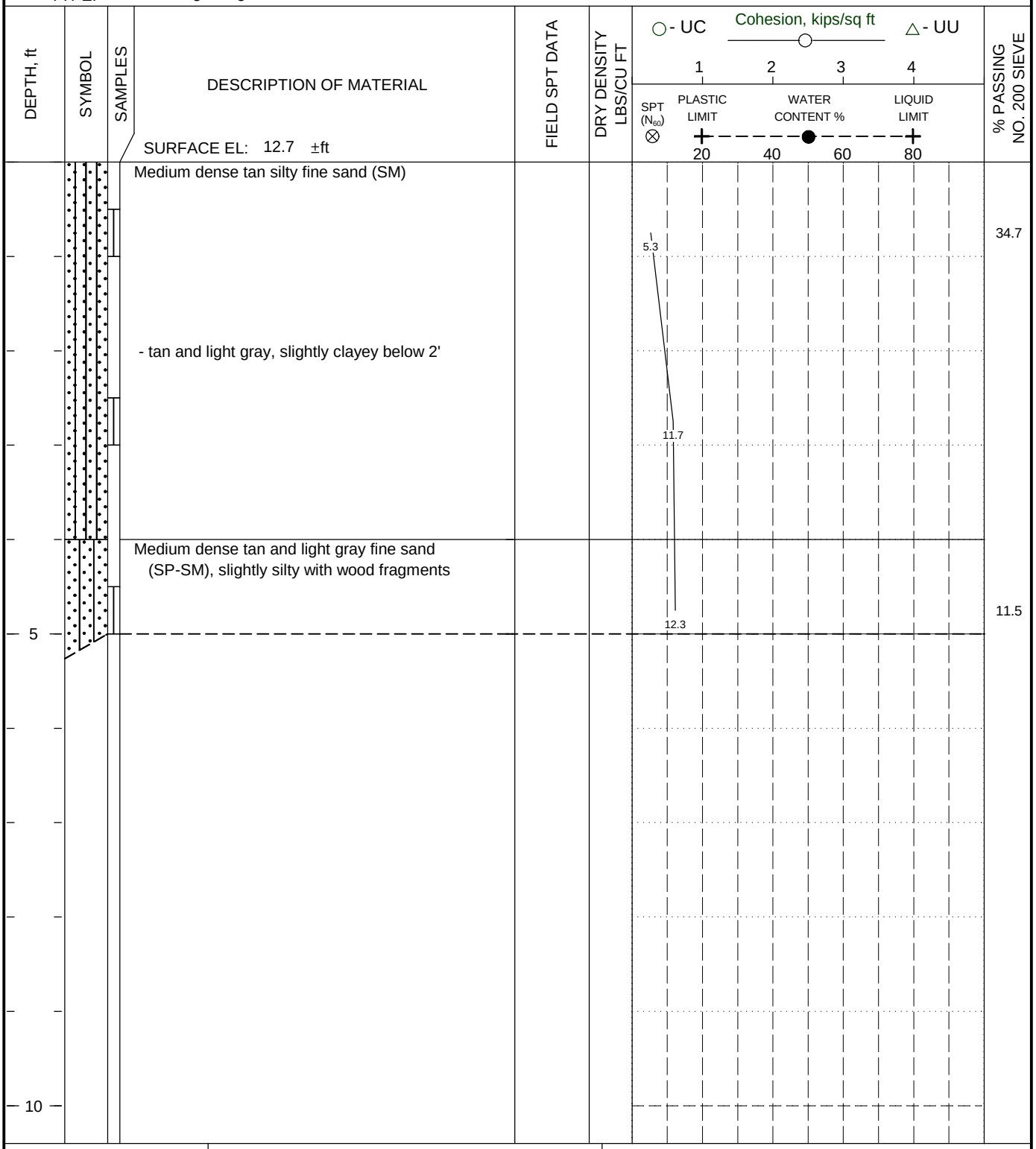
FIGURE 8

LOG OF BORING NO. 7

I-10 WELCOME CENTER
PROJ. NO. STGB-0010-01(180)/109171-101000
JACKSON COUNTY, MISSISSIPPI

TYPE: 6" Short-flight auger

LOCATION: See Figure 1



BORING DEPTH: 5 ft

DATE: 10/11/24

COMMENTS:
GPS Coordinates
N 30° 27' 42.5"
W 88° 26' 2.6"

GROUNDWATER DATA: No free water encountered during auger drilling.

220107-9.GPJ

BURNS COOLEY DENNIS, INC.
GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

FIGURE 9

LOG OF BORING NO. 8

I-10 WELCOME CENTER
PROJ. NO. STGB-0010-01(180)/109171-101000
JACKSON COUNTY, MISSISSIPPI

TYPE: 6" Short-flight auger

LOCATION: See Figure 1

DEPTH, ft	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	FIELD SPT DATA	DRY DENSITY LBS/CU FT	○ - UC, Cohesion, kips/sq ft, △ - UU (1 2 3 4); SPT (N_{60}) ⊗; PLASTIC LIMIT; WATER CONTENT %; LIQUID LIMIT (20 40 60 80)	% PASSING NO. 200 SIEVE
			SURFACE EL: 13.6 ±ft				
			Medium dense tan silty fine sand (SM)			8.6	
						18	47.6
						9.7	
			Medium dense light gray fine sand (SP-SM), slightly silty				
5						9.6	11.0
10							

BORING DEPTH: 5 ft

DATE: 10/11/24

COMMENTS:
GPS Coordinates
N 30° 27' 42.0"
W 88° 26' 7.6"

GROUNDWATER DATA: No free water encountered during auger drilling.

220107-9.GPJ

BURNS COOLEY DENNIS, INC.
GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

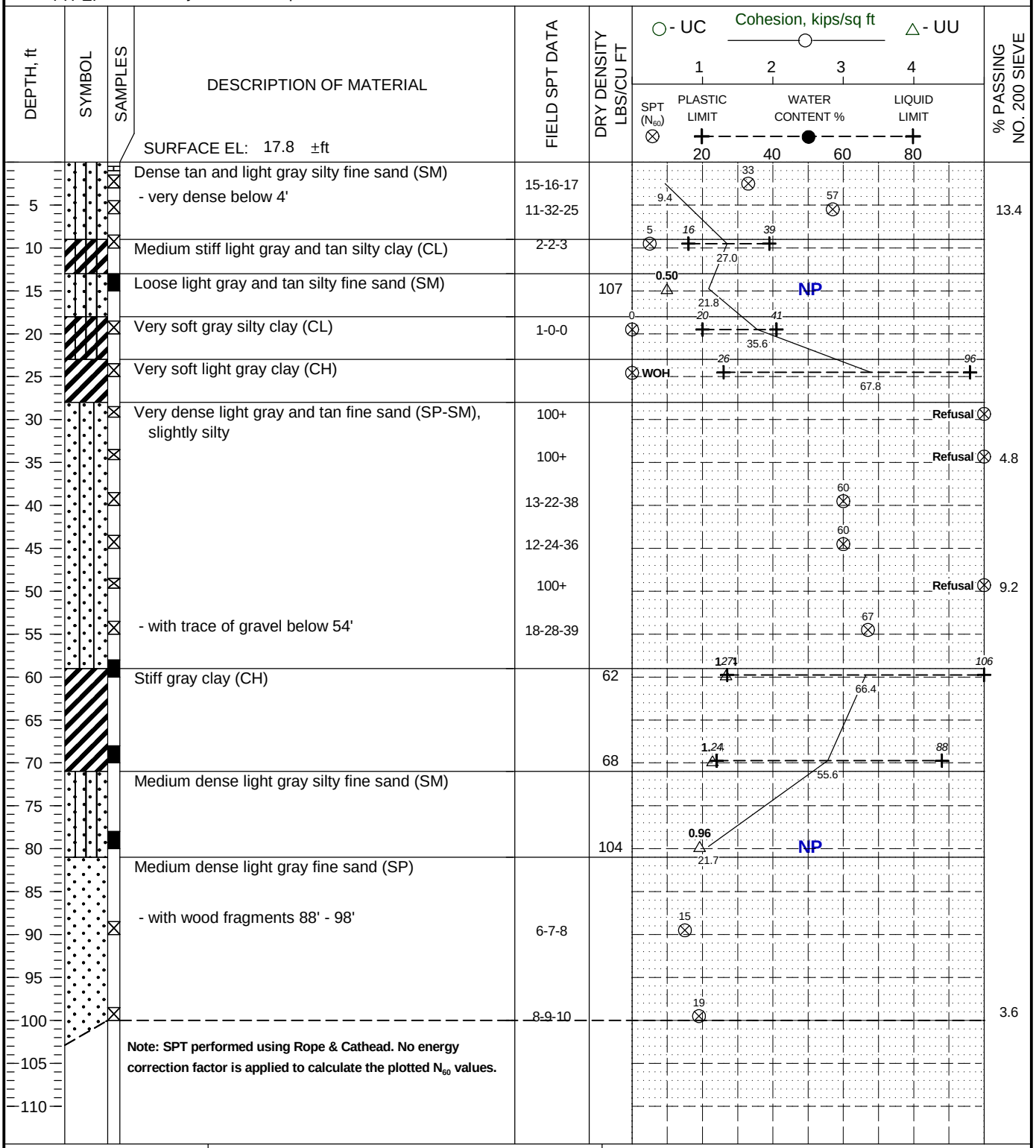
FIGURE 10

LOG OF BORING NO. 9

I-10 WELCOME CENTER
PROJ. NO. STGB-0010-01(180)/109171-101000
JACKSON COUNTY, MISSISSIPPI

TYPE: 6" Short-flight auger to 15', then rotary wash to completion.

LOCATION: See Figure 1



BORING DEPTH: 100 ft

DATE: 10/09/24

COMMENTS: Borehole filled with cement-bentonite grout after completion of drilling and sampling.
GPS Coordinates
N 30° 27' 45.4"
W 88° 26' 2.8"

GROUNDWATER DATA: No free water encountered during auger drilling.

220107-9.GPJ

BURNS COOLEY DENNIS, INC.
GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

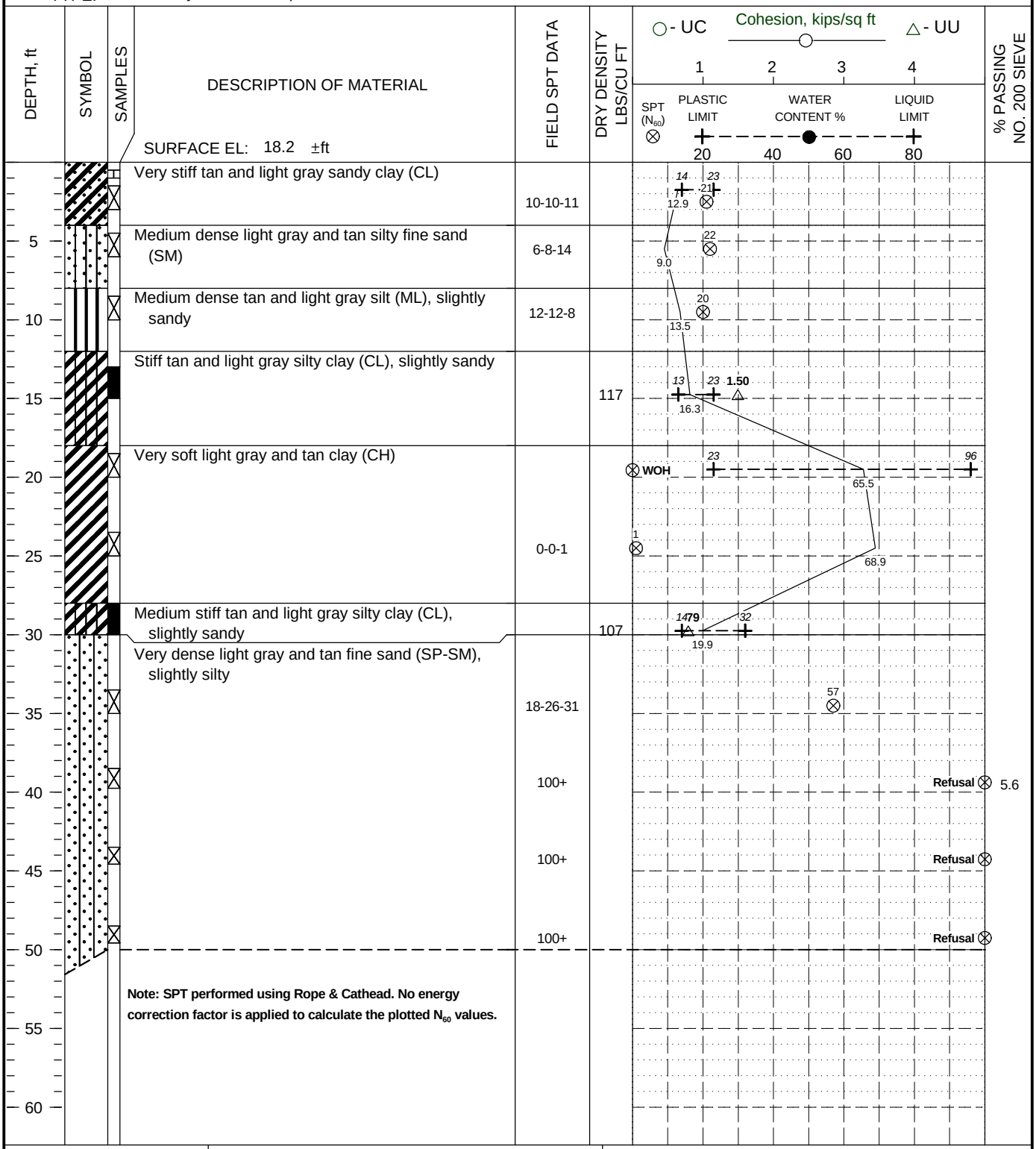
FIGURE 11

LOG OF BORING NO. 10

I-10 WELCOME CENTER
PROJ. NO. STGB-0010-01(180)/109171-101000
JACKSON COUNTY, MISSISSIPPI

TYPE: 6" Short-flight auger to 10', then rotary wash to completion.

LOCATION: See Figure 1



BORING DEPTH: 50 ft

DATE: 10/11/24

COMMENTS: Borehole filled with cement-bentonite grout after completion of drilling and sampling.
GPS Coordinates
N 30° 27' 45.5"
W 88° 26' 4.0"

GROUNDWATER DATA: No free water encountered during auger drilling.

220107-9.GPJ

BURNS COOLEY DENNIS, INC.
GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

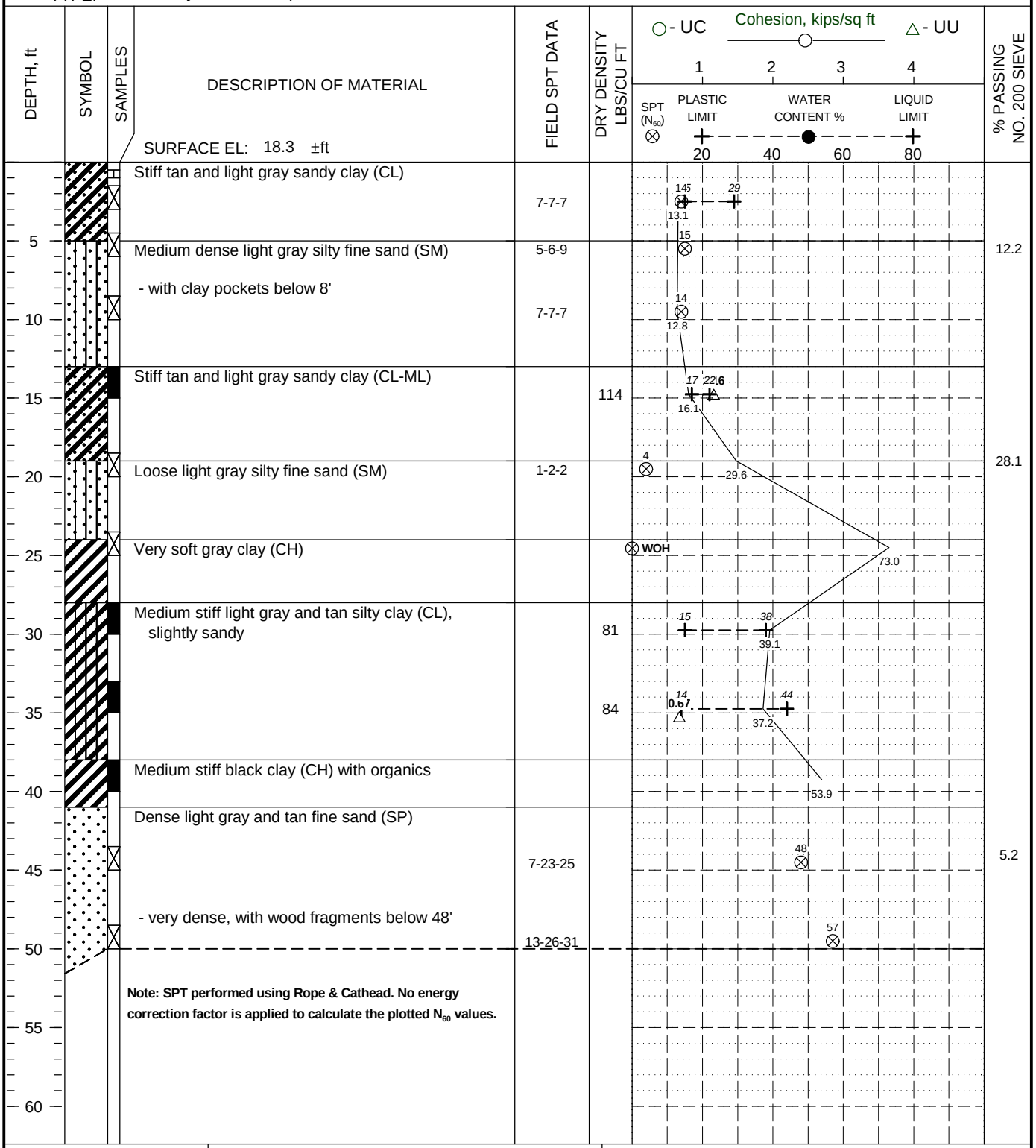
FIGURE 12

LOG OF BORING NO. 11

I-10 WELCOME CENTER
PROJ. NO. STGB-0010-01(180)/109171-101000
JACKSON COUNTY, MISSISSIPPI

TYPE: 6" Short-flight auger to 10', then rotary wash to completion.

LOCATION: See Figure 1



BORING DEPTH: 50 ft

DATE: 10/10/24

COMMENTS: Borehole filled with cement-bentonite grout after completion of drilling and sampling.
GPS Coordinates
N 30° 27' 44.0"
W 88° 25' 4.4"

GROUNDWATER DATA: No free water encountered during auger drilling.

220107-9.GPJ

BURNS COOLEY DENNIS, INC.
GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

FIGURE 13

LOG OF BORING NO. 12

I-10 WELCOME CENTER
PROJ. NO. STGB-0010-01(180)/109171-101000
JACKSON COUNTY, MISSISSIPPI

TYPE: 6" Short-flight auger to 7', then rotary wash to completion.

LOCATION: See Figure 1

SURFACE EL: 19.0 ±ft

DEPTH, ft	DESCRIPTION OF MATERIAL	FIELD SPT DATA	DRY DENSITY LBS/CU FT	% PASSING NO. 200 SIEVE
0	Hard tan sandy clay (CL)	13-16-18		
5	Dense tan and light gray silty fine sand (SM)	4-13-21		27.3
10	Medium dense tan and light gray clayey fine sand (SC)	13-12-7		
15				
20	Stiff gray and tan silty clay (CL), slightly sandy	5-6-8		
25	- medium stiff below 23'		92	
30	Loose light gray silty fine sand (SM) with clay layers		115	
35	Dense light gray and tan fine sand (SP) - with wood fragments to 38'	13-20-22		
40	- very dense, tan and light gray below 38'	11-26-30		4.6
45		100+		
50		100+		
55				
60				

Cohesion, kips/sq ft: ○ - UC, △ - UU; scale 1, 2, 3, 4

SPT (N_{60}) ⊗; PLASTIC LIMIT; WATER CONTENT %; LIQUID LIMIT; scale 20, 40, 60, 80

Refusal

NP

Note: SPT performed using Rope & Cathead. No energy correction factor is applied to calculate the plotted N_{60} values.

BORING DEPTH: 50 ft

DATE: 10/10/24

COMMENTS: Borehole filled with cement-bentonite grout after completion of drilling and sampling.
GPS Coordinates
N 30° 27' 44.8"
W 88° 26' 2.4"

GROUNDWATER DATA: No free water encountered during auger drilling.

220107-9.GPJ

BURNS COOLEY DENNIS, INC.
GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

FIGURE 14

LOG OF BORING NO. 13

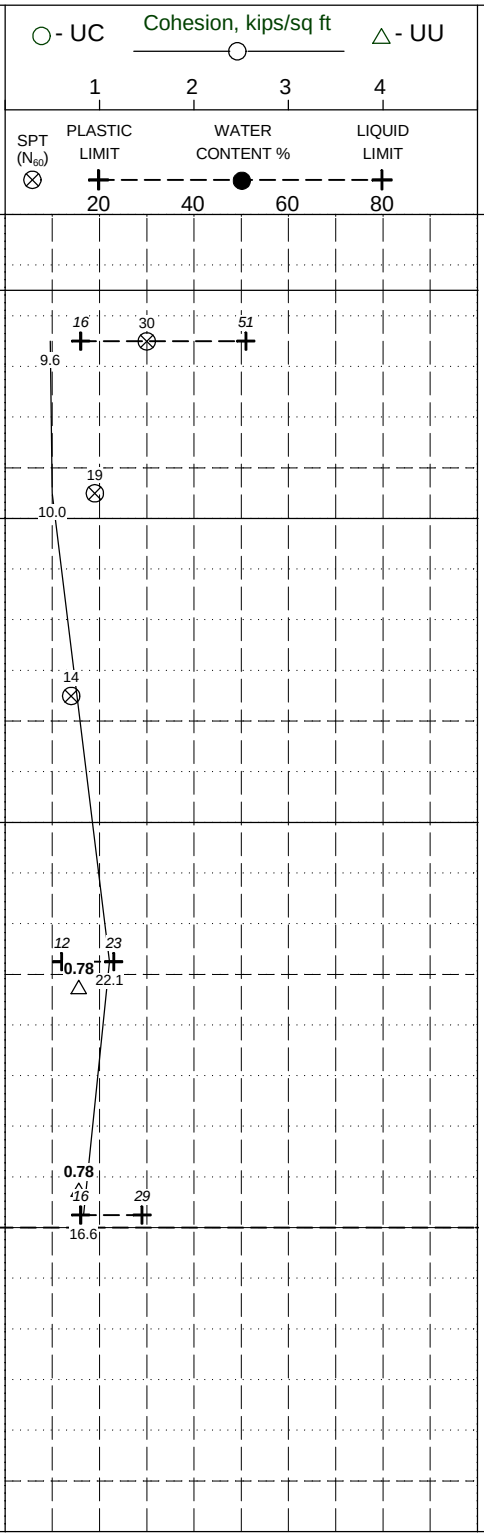
I-10 WELCOME CENTER
PROJ. NO. STGB-0010-01(180)/109171-101000
JACKSON COUNTY, MISSISSIPPI

TYPE: 6" Short-flight auger to 10', then rotary wash to completion.

LOCATION: See Figure 1

SURFACE EL: 18.6 ±ft

DEPTH, ft	DESCRIPTION OF MATERIAL	FIELD SPT DATA	DRY DENSITY LBS/CU FT
	Medium dense tan silty fine sand (SM), slightly clayey		
	Very stiff tan and light gray clay (CH), slightly sandy	8-14-16	
5		5-8-11	
	Medium dense light gray and tan fine sand (SP-SM), slightly silty	5-6-8	
10			
	Medium stiff light gray and tan silty clay (CL), slightly sandy		110
15			
	- with trace of organics below 18'		
20			104
	Note: SPT performed using Rope & Cathead. No energy correction factor is applied to calculate the plotted N_{60} values.		
25			



% PASSING NO. 200 SIEVE: 7.9

BORING DEPTH: 20 ft

DATE: 10/11/24

COMMENTS: Borehole filled with cement-bentonite grout after completion of drilling and sampling.
GPS Coordinates
N 30° 27' 44.0"
W 88° 26' 2.6"

GROUNDWATER DATA: No free water encountered during auger drilling.

220107-9.GPJ

BURNS COOLEY DENNIS, INC.
GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

FIGURE 15

LOG OF BORING NO. 14

I-10 WELCOME CENTER
PROJ. NO. STGB-0010-01(180)/109171-101000
JACKSON COUNTY, MISSISSIPPI

TYPE: 6" Short-flight auger to 10', then rotary wash to completion.

LOCATION: See Figure 1

DEPTH, ft	DESCRIPTION OF MATERIAL	FIELD SPT DATA	DRY DENSITY LBS/CU FT	% PASSING NO. 200 SIEVE
	SURFACE EL: 16.4 ±ft			
	Stiff tan and light gray sandy clay (CL)			
	Medium dense tan and light gray fine sand (SP-SM), slightly silty	8-13-15		11.3
5	Stiff tan, light gray and gray silty clay (CL), slightly sandy		113	
10	Medium dense light gray and tan silty fine sand (SM), slightly clayey	6-8-11		
15	Very soft light gray silty clay (CL), slightly sandy	0-0-1		
20	Very soft light gray and tan clay (CH)			
25	Soft light gray and tan silty clay (CL), slightly sandy		94	
30	- medium stiff, with trace of organics below 28'		98	
35			104	
40	Medium dense light gray fine sand (SP) with trace of organics			
45	- very dense below 43'	27-34-38		4.8
50				
55				
60				

○ - UC Cohesion, kips/sq ft △ - UU

1 2 3 4

SPT (N_{60}) ⊗ PLASTIC LIMIT WATER CONTENT % LIQUID LIMIT

20 40 60 80

28
13 — 1.07 — 28
16.6
19
17.4
1 — 23 — 36
34.3
WOH
80.7
0.43 — 16 — 30
28.8
17 — 47
26.9
0.8 — 21 — 39
21.1
72

Note: SPT performed using Rope & Cathead. No energy correction factor is applied to calculate the plotted N_{60} values.

BORING DEPTH: 50 ft

DATE: 10/10/24

COMMENTS: Borehole filled with cement-bentonite grout after completion of drilling and sampling.
GPS Coordinates
N 30° 27' 42.9"
W 88° 26' 2.0"

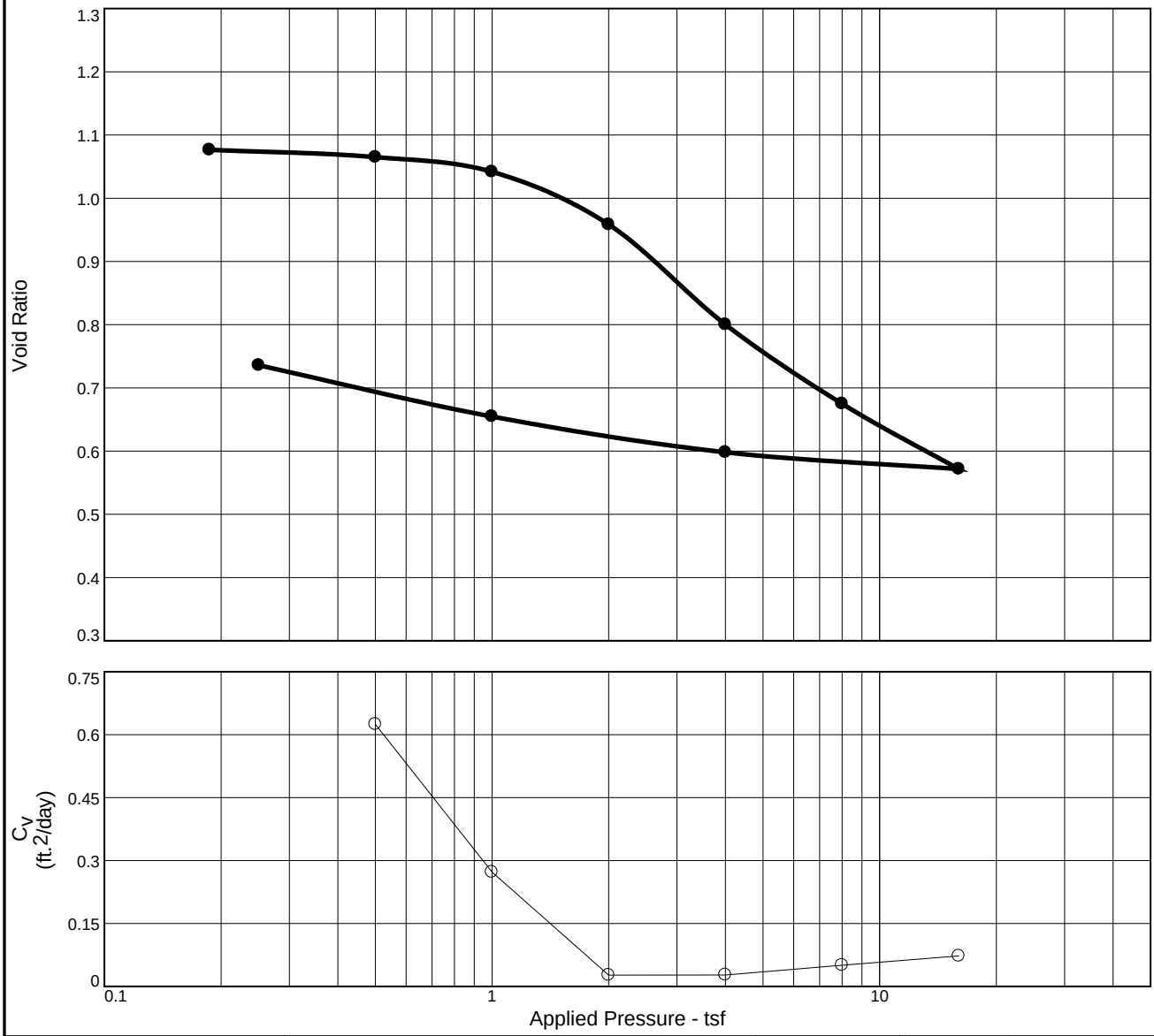
GROUNDWATER DATA: No free water encountered during auger drilling.

220107-9.GPJ

BURNS COOLEY DENNIS, INC.
GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

FIGURE 16

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
97.9 %	39.1 %	81.1	38	23	2.70	1.5	0.53	1.079

MATERIAL DESCRIPTION	USCS	AASHTO
Medium stiff light gray and tan silty clay (CL), slightly sandy	CL	

Project No. 220107-9 **Client:** Mississippi Department of Transportation

Project: I-10 Welcome Center, Jackson County

Source of Sample: B-11 **Depth:** 30.0' **Sample Number:** 10

BURNS COOLEY DENNIS, INC.

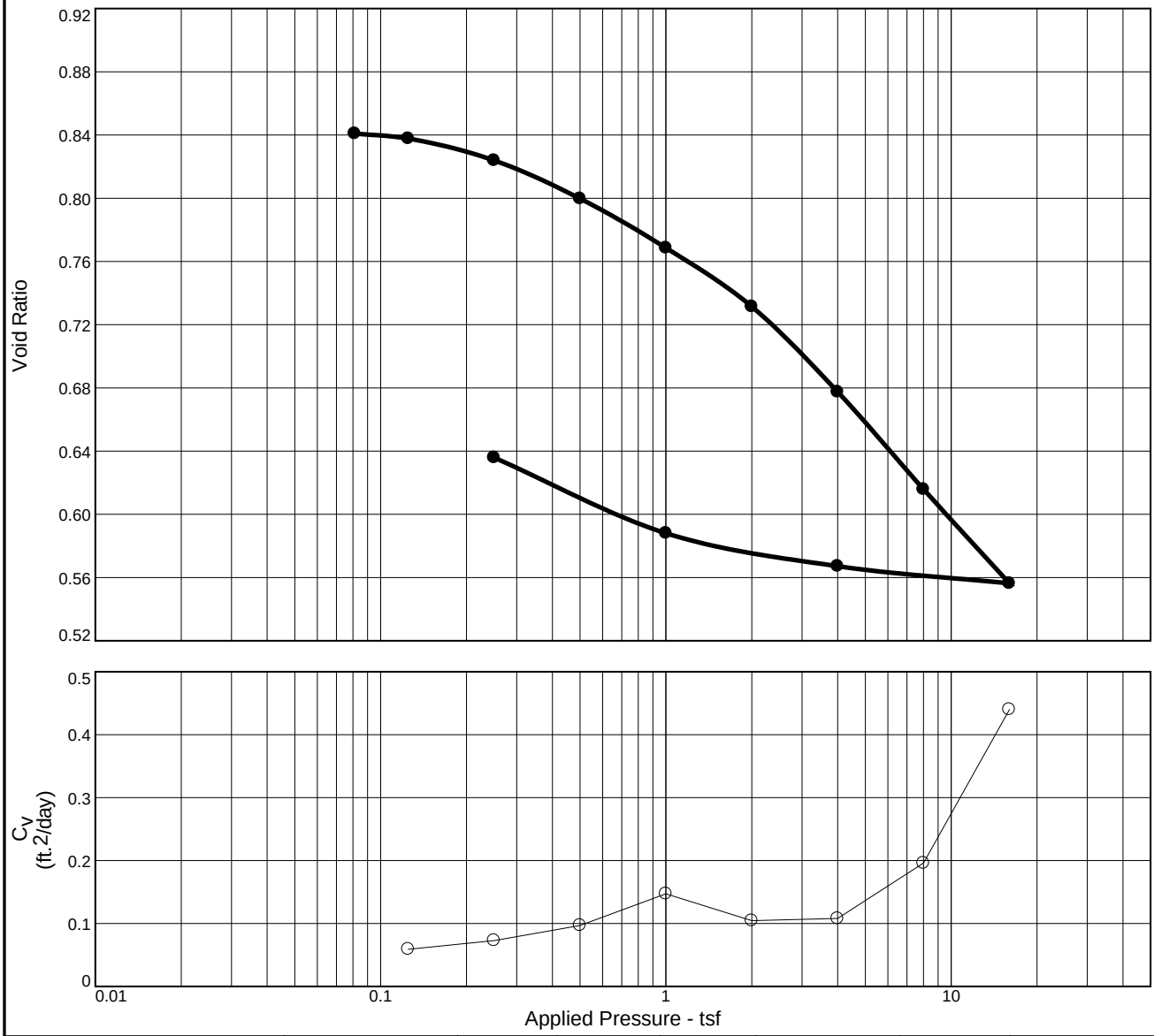
Ridgeland, Mississippi

Remarks:

Figure 17

Tested By: ah **Checked By:** _____

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
94.6 %	29.5 %	91.5	40	25	2.70			0.841

MATERIAL DESCRIPTION	USCS	AASHTO
Medium stiff gray and tan silty clay (CL), slightly sandy with wood fragments	CL	

Project No. 220107-9 **Client:** Mississippi Department of Transportation

Project: I-10 Welcome Center, Jackson County

Source of Sample: B-12 **Depth:** 25.0' **Sample Number:** 9

BURNS COOLEY DENNIS, INC.

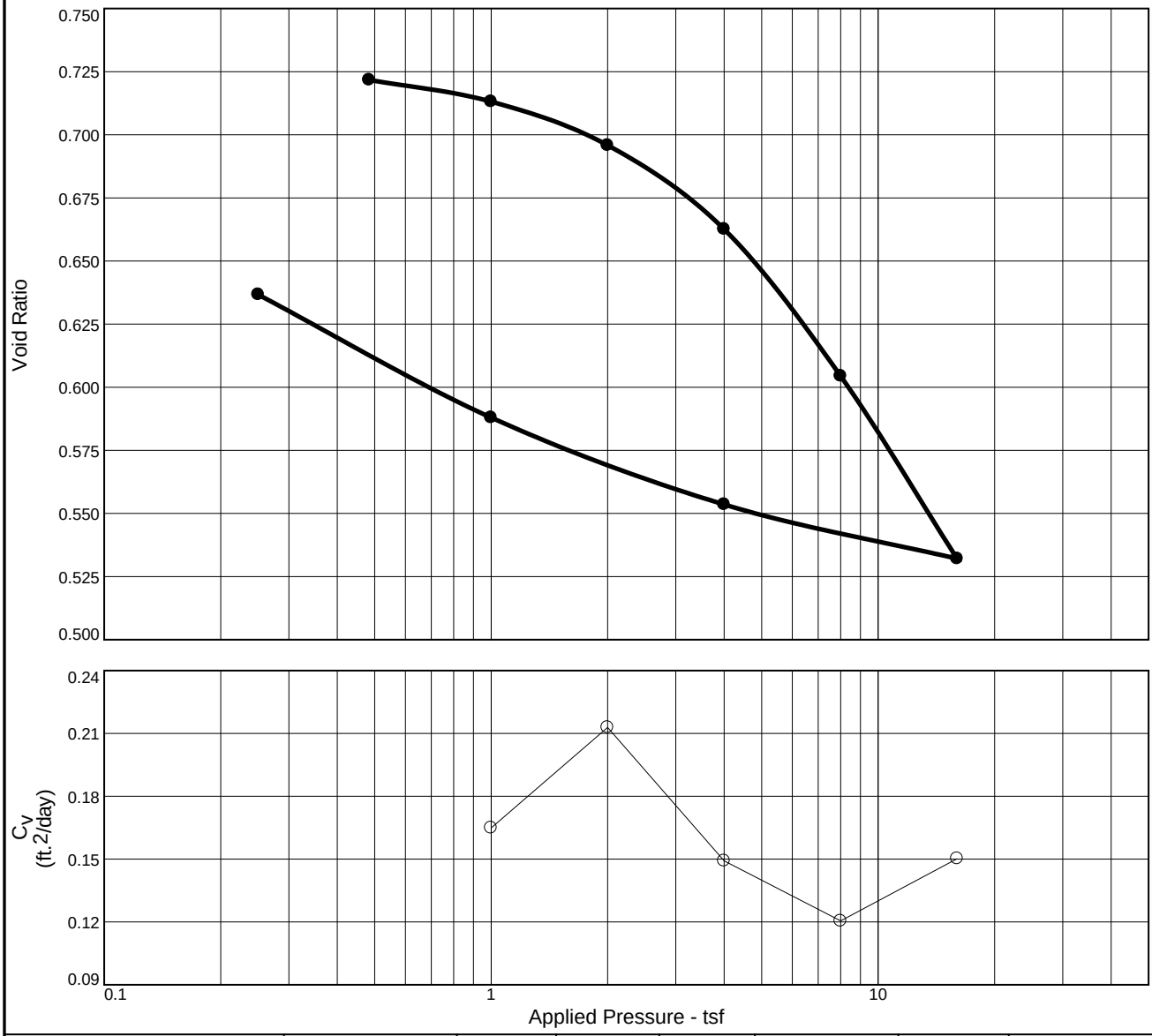
Ridgeland, Mississippi

Remarks:

Figure 18

Tested By: ah **Checked By:** _____

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
100.1 %	26.9 %	97.7	47	30	2.70			0.725

MATERIAL DESCRIPTION	USCS	AASHTO
Medium stiff light gray and tan silty clay (CL), slightly sandy with trace of organics	CL	

Project No. 220107-9 **Client:** Mississippi Department of Transportation

Project: I-10 Welcome Center, Jackson County

Source of Sample: B-14 **Depth:** 30.0' **Sample Number:** 11

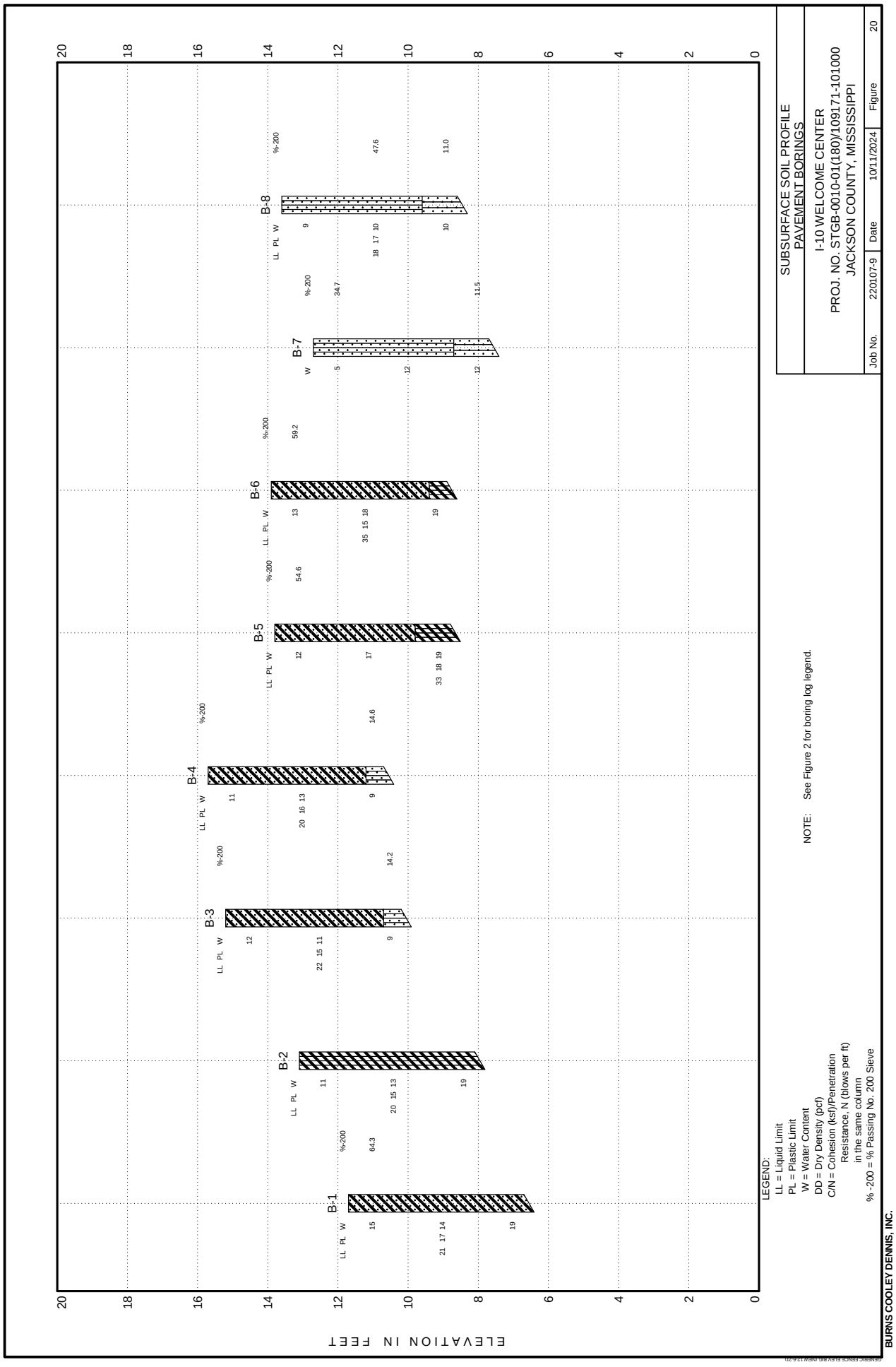
BURNS COOLEY DENNIS, INC.

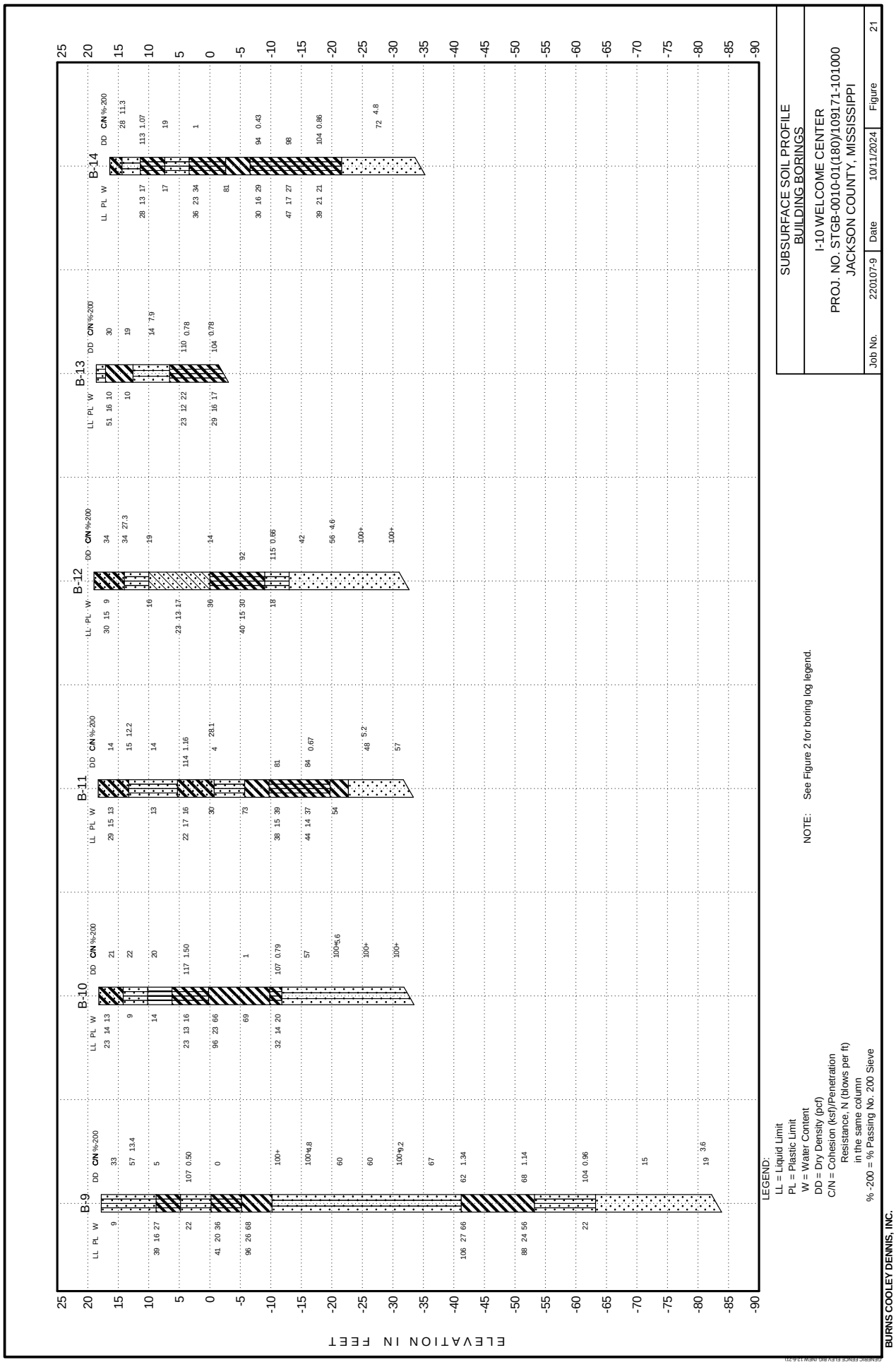
Ridgeland, Mississippi

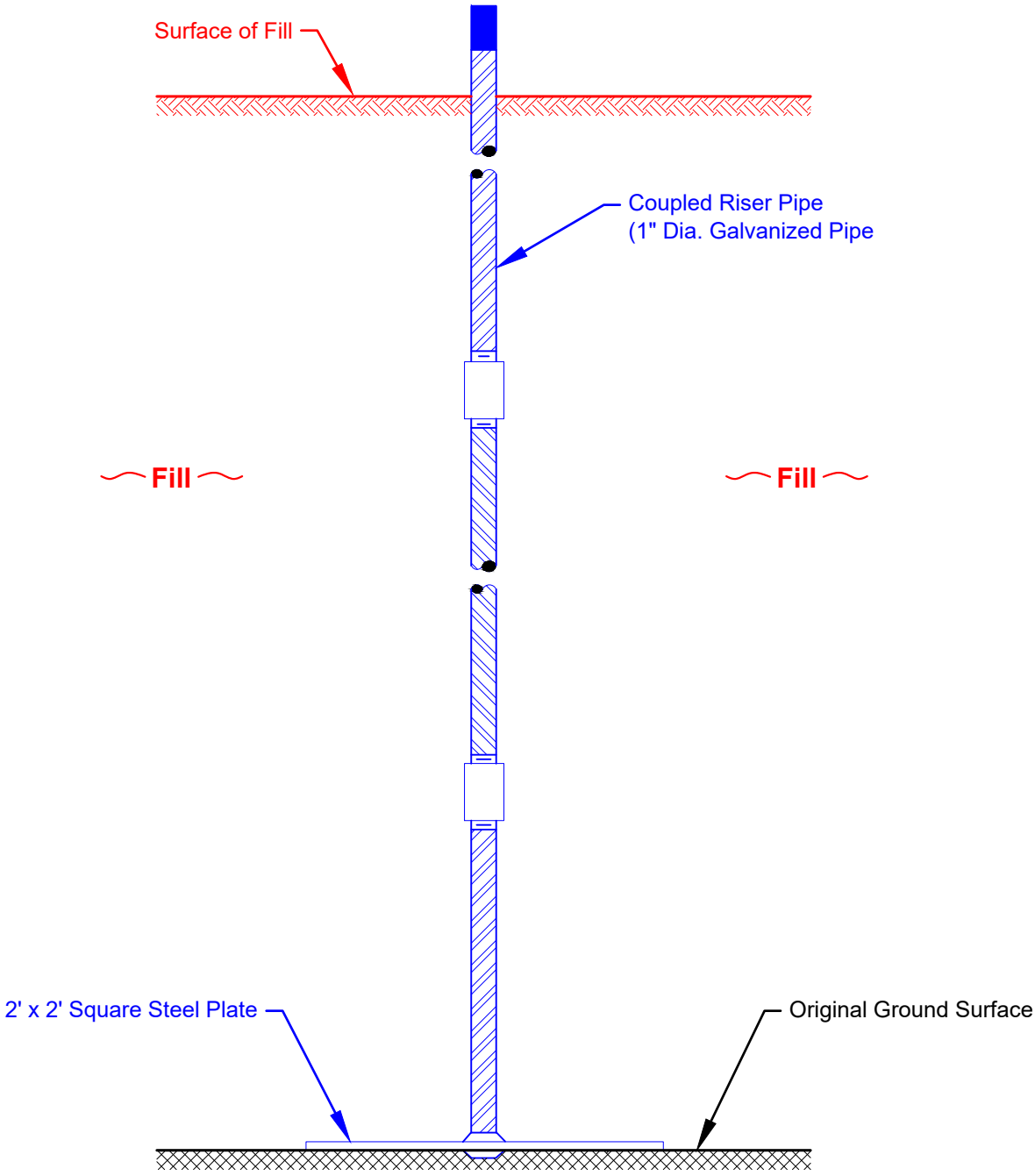
Remarks:

Figure 19

Tested By: ah **Checked By:** _____


ELEVATION IN FEET
20
18
16
14
12
10
8
6
4
2
0
B-1
B-2
B-3
B-4
B-5
B-6
B-7
B-8
LL PL W
%-200
NOTE: See Figure 2 for boring log legend.
LEGEND:
LL = Liquid Limit
PL = Plastic Limit
W = Water Content
DD = Dry Density (pcf)
C/N = Cohesion (ksf)/Penetration Resistance, N (blows per ft) in the same column
% -200 = % Passing No. 200 Sieve
SUBSURFACE SOIL PROFILE
PAVEMENT BORINGS
I-10 WELCOME CENTER
PROJ. NO. STGB-0010-01(180)/109171-101000
JACKSON COUNTY, MISSISSIPPI
Job No. 220107-9
Date 10/11/2024
Figure 20
BURNS COOLEY DENNIS, INC.


ELEVATION IN FEET
B-9
B-10
B-11
B-12
B-13
B-14
LL PL W DD C/N %-200
LEGEND:
LL = Liquid Limit
PL = Plastic Limit
W = Water Content
DD = Dry Density (pcf)
C/N = Cohesion (ksf)/Penetration Resistance, N (blows per ft) in the same column
% -200 = % Passing No. 200 Sieve
NOTE: See Figure 2 for boring log legend.
SUBSURFACE SOIL PROFILE
BUILDING BORINGS
I-10 WELCOME CENTER
PROJ. NO. STGB-0010-01(180)/109171-101000
JACKSON COUNTY, MISSISSIPPI
Job No. 220107-9
Date 10/11/2024
Figure 21
BURNS COOLEY DENNIS, INC.



Settlement Plate Details

I-10 WELCOME CENTER
PROJ. NO. STGB-0010-01(180)109171-10100
JACKSON COUNTY, MISSISSIPPI

BURNS COOLEY DENNIS, INC.
551 SUNNYBROOK ROAD
RIDGELAND, MISSISSIPPI 39157

JOB NO. 220107-9	SCALE: N.T.S.	FIGURE 22

APPENDIX A

SOUTHERN EARTH SCIENCES
(Project No. M24-022, March 8, 2024))

SOUTHERN EARTH SCIENCES
Geotechnical | Environmental | Materials Testing

Jackson County Wayfinding Sign

Jackson County, MS

Report of Subsurface Investigation and Geotechnical Engineering Evaluation

Prepared for:
ELEY GUILD HARDY ARCHITECTS
SESI Project No: M24-022
March 8, 2024

March 8, 2024

ELEY GUILD HARDY ARCHITECTS
1091 Tommy Munro Drive
Biloxi, MS 39532

ATTENTION: Mr. David Hardy, AIA
Principal

REFERENCE: Report of Subsurface Investigation and Geotechnical Engineering Evaluation
Jackson County Wayfinding Sign
Jackson County, MS
SESI Project No: M24-022

Dear Mr. Hardy,

Southern Earth Sciences, Inc. (SESI) has completed the authorized scope of subsurface investigation and geotechnical engineering evaluation for the referenced project. This report presents our understanding of the available project information and outlines our soil related recommendations and comments regarding construction and foundation support for the proposed structure.

We appreciate this opportunity to be of service and look forward to our continued involvement throughout construction phases of the project. Please do not hesitate to contact us if you have any questions.

Sincerely,

SOUTHERN EARTH SCIENCES, INC.



Curran Nicholas, E.I.
Project Manager

Matt Coaker, P.E.
Vice President
Registered, Mississippi 20350

CN/mc

Attachments

1.0 Project Information ..... - 1 -
2.0 Field Investigation ..... - 1 -
3.0 Generalized Subsurface Conditions ..... - 2 -
3.1 Groundwater ..... - 2 -
4.0 Foundation Consideration and Recommendations ..... - 3 -
4.1 Sub-Grade Preparation Recommendations ..... - 3 -
4.2 Impacts of Groundwater on Shallow Foundation Construction ..... - 5 -
4.3 Shallow Foundations ..... - 5 -
4.4 Settlement ..... - 5 -
5.0 General Comments and Limitations ..... - 6 -

APPENDIX 1
Test Location Plans
APPENDIX 2
CPT Sounding Log
Soil Boring Log
APPENDIX 3
Provided Plans

1.0 PROJECT INFORMATION

Based on our understanding of the provided information, the project will consist of a new "Welcome to Coastal Mississippi" wayfinding sign in Jackson County. The proposed location of the sign is between I-10 and the Jackson County rest area. Based on the provided conceptual plans provided to us, we understand the footing width will be on the order of approximately 13 feet and will bear approximately 5.5 feet below final grade. Final grade is set at approximately elevation (EL) +16.5. The existing grade at this location is approximately EL +12.5, requiring approximately 4 feet of fill to achieve final grade. The footing is planned to bear at EL +11 or approximately 1.5 feet below existing grade. Based on the structural loading information provided by Mr. Michael Costelli, P.E. with Simpkins & Costelli, Inc., we understand the structural loads of the proposed sign are as follows:

- Sign - 75 kips
- Pedestal - 30 kips
- Footing - 88 kips

Our understanding of the provided information is that soil pressures during the design wind load condition, neglecting the anticipated 4 feet of fill, are approximately 1,350 psf at the toe and near 0 psf at the heel. No additional project information was available at the writing of this report. The provided plans are attached for reference in **Appendix 3**.

2.0 FIELD INVESTIGATION

One (1) Cone Penetration Test (CPT) sounding and one (1) manual auger boring were performed within the proposed location of the structure. The test location was staked in the field by a surveying crew prior to our subsurface exploration. The CPT Sounding and manual auger boring were performed by SES field crews at the approximate location shown on the test location plans included in **Appendix 1.**

The CPT_u sounding was performed in accordance with ASTM Specification D-5778 using a Geoprobe rig with a Hogentogler electronic CPT system. The CPT sounding was advanced to a depth of approximately 65 feet below existing ground surface. CPT Log sheet graphically showing the cone tip resistance, friction, equivalent N-value and interpreted soil type at the sounding location is attached in **Appendix 2**. Soil classifications were interpreted from methods recommended by Robertson and Campanella. Correlations between Cone Resistance values and Standard Penetration Testing "N" values were performed according to the methods developed by Robertson, Campanella and Wightman. The soil types and stratigraphy shown on the CPT Log sheet are based upon material parameters measured and evaluated as the cone is advanced.

The manual auger boring was advanced to a depth of approximately 8 feet below existing grade by manually twisting a steel hand auger tool into the ground. The materials encountered were logged based on visual inspection. Representative portions of soil samples obtained during the investigation were transported to our laboratory for visual classification by an engineer in accordance with the AASHTO Soil Classification System. Soil descriptions are shown on the Soil Boring Log sheet attached in **Appendix 2**.

3.0 GENERALIZED SUBSURFACE CONDITIONS

The subsurface descriptions below are generalized to highlight the major subsurface stratigraphy encountered across the site. The CPT Sounding Log attached in **Appendix 2** present specific information at individual sounding location including soil description, stratification, ground water level and soil strength. This information is representative of conditions encountered at the sounding location. Variations may occur and should be expected throughout the project site.

Soils at this location generally consist of medium stiff sandy silts and clays and medium dense silty sands to approximately 3 feet followed by soft clays to approximately 5 feet below existing ground surface. Below approximately 5 feet, stiff clay was encountered to approximately 8 feet below existing ground surface. Below approximately 8 feet, medium dense to dense sands were encountered to approximately 12 feet followed by medium stiff silts and clays to approximately 25 feet below existing ground surface. Below approximately 25 feet, medium dense to very dense sands were encountered to approximately 58 feet below the ground surface. Stiff clays were encountered to approximately 63 feet before terminating in the dense sands approximately 65 feet below existing ground surface. Detailed descriptions of soils encountered at the test location are shown on the CPT Sounding log included in **Appendix 2**.

3.1 Groundwater

The manual auger boring encountered groundwater approximately 6 feet below existing ground surface at the time of our investigation. Direct groundwater measurement was not possible at the CPT location at the time of our investigation due to the CPT sounding hole collapsing upon rod removal. The CPT sounding caved just below the ground surface. A hole collapse often occurs at or slightly above the groundwater or saturated soil level but can also occur due to the presence of loose soils without the presence of groundwater. Depth to sounding collapse at the time of our investigation is shown on the CPT sounding sheet attached in **Appendix 2**.

The upper fine grained silty and clayey soils encountered across the site will retain moisture and will create shallow perched water conditions after periods of wet weather. Perched water development will be dependent on the season and recent rainfall patterns.

Groundwater depths should be verified at the time of construction for cases where groundwater variations are potentially significant for construction. Fluctuation in the groundwater table will occur due to variances in rainfall, elevation, drainage, types of soil encountered and other factors not evident at the time measurements were made. Reference to depth has been made with respect to the existing ground surface encountered at the time of our field investigation.

4.0 FOUNDATION CONSIDERATION AND RECOMMENDATIONS

Our evaluation of foundation conditions has been based on the project information previously described in this report and subsurface data obtained during the investigation. In evaluating the soil boring and CPT sounding, we have used empirical correlations previously established between standard penetration resistances, cone tip and side resistance values, soil index properties and foundation stability. Soil parameters used in the evaluation were derived from the CPT sounding data using the interpretation software RAPID CPT® by Dataforensics.

Subsurface conditions at the proposed sign location between approximately 3 and 5 feet consist of soft clays that will not provide uniform support for foundation loads. Overexcavating the soft, clayey soils to 5 feet and replacing with Clean Sand/Select Structural Fill is recommended to reduce foundation settlement, to improve bearing capacity, and to provide a stable construction surface to facilitate fill placement and compaction.

Soils encountered between depths of approximately 12 and 25 feet consist of medium stiff clays that are compressible and when stressed by foundation loads and the weight of fill soils planned to be placed to achieve design final grade (up to approximately 4 feet), will be susceptible to settlement. Our settlement estimates identify the potential for settlements of up to 1 inch due to the anticipated fill placed above existing grade and approximately 1.5 inches of settlement due to the anticipated foundation loads. Settlement will include short term strain-type settlements that occur rapidly during and shortly after fill placement and long-term consolidation settlements that will occur slowly over the course of several months to years. Outlined in the following sections are subgrade improvement and foundation design recommendations provided based on the premise that the estimated settlements are acceptable.

4.1 Sub-Grade Preparation Recommendations

Prior to site stripping and beginning undercutting, the contractor should establish effective site drainage. It is imperative that positive site drainage be maintained at all times during construction. Groundwater and saturated soil conditions will likely be encountered during excavations at this site. The contractor should be prepared to work in wet, unstable soil conditions. Once adequate site

drainage is in place, the initial step in site preparation should be the complete removal of all topsoil and surface organics extending laterally to at least 5 feet outside the construction area.

Excavations after site stripping should continue to approximately 5 feet below original ground surface, or as needed to remove soft, loose, unstable or otherwise unsuitable soils. The planned footing bearing elevation is approximately 1.5 feet below original ground surface; therefore, approximately an additional 3.5 feet of overexcavation and replacement with Clean Sand/Select Structural Fill is recommended below foundation subgrade elevation. The 3.5 feet of Clean Sand/Select Structural Fill placed below foundation bearing elevation is to ensure development of adequate foundation bearing capacity and to reduce foundation settlement. Exposed surfaces should be leveled and compacted as much as conditions at the time of construction will allow. Continuous oversight and guidance should be provided by the Geotechnical Engineer of Record throughout undercutting and backfilling operations to ensure that foundation bearing conditions are satisfactory and to help improve the efficiency of undercutting and backfilling operations.

Groundwater or shallow perched water may be encountered at this site. Deep excavations extending near or below the groundwater level will require the use of Clean Sand backfill and limited dewatering of the excavation to allow for controlled backfill placement and compaction. The initial lifts of fill soil should consist of imported Clean Sand fill with less than 10 percent passing the No. 200 sieve and less than 80 percent passing the No. 40 sieve. This material should be placed to 18 inches above the groundwater or saturated soil level or to within 12 inches of foundation bearing elevation, whichever is lower. Clean sand should be placed in one (1) 24-inch-thick lift and tracked into place with heavy tracked equipment. Additional 1-foot-thick lifts may be tracked in as required until measured compaction of subsequent lifts of fill material is feasible. Above saturated soil conditions, clean sands should be compacted to at least 95 percent of the soil's Standard Proctor maximum dry density as determined by ASTM D 698 with moisture content between 1 percentage points below and 3 percentage points above the optimum moisture content.

Imported Select Structural Fill soil placed in dry conditions above the clean sand fill and within 12 inches of foundation bearing elevation should consist of sand or silty sand with less than 30 percent of the soil particles (by weight) passing the No. 200 mesh sieve, less than 80 percent passing the No. 40 sieve, and a Liquid Limit less than 25. Fill material should be compacted in 12-inch (maximum) lifts to at least 95 percent of the soil's Modified Proctor maximum dry density as determined by ASTM D 1557 with moisture content between 1 percentage points below and 3 percentage points above the optimum moisture content. In place density tests should be made at frequent intervals to measure the effectiveness of the compaction operations.

4.2 Impacts of Groundwater on Shallow Foundation Construction

The manual auger boring encountered water approximately 6 feet below existing grade. However, the CPT Sounding collapsed just below the ground surface likely indicating proximity to shallow perched water or saturated soil conditions a few feet below ground surface. Design and construction of the foundation (designed to bear up to 1.5 feet below existing grade) may be affected by groundwater. Consideration of buoyancy forces should be accounted for in uplift and overturning resistance computations. Dewatering should be conducted as needed by pumping from a gravel filled sump in the excavation bottom.

Saturated conditions may be encountered even after dewatering. Placement of 6 to 12 inches of aggregate may be considered at foundation bearing elevation if necessary to provide a stable working surface to facilitate installation of foundation reinforcement and to allow construction of the foundation forms.

4.3 Shallow Foundations

After completion of the recommended subgrade improvements as outlined in the previous sections, the proposed shallow foundation may be designed for an allowable soil bearing pressure of up to 1,850 psf (including a Factor of Safety of 3). The bottom of all footing excavations should be observed by an experienced soil technician and compacted to the above specifications.

The bottom of the foundation excavations must be dry, clean and free of loose, soft materials and construction debris prior to placement of steel or concrete. Excavations should be observed by a qualified inspector prior to steel or concrete placement. Concrete shall be poured as quickly as possible to avoid exposure of the footing materials to moisture changes (wetting or drying). Surface run-off water should be channeled away from the excavation and not be allowed to pond. If for any reason foundation excavations are required to be open for an extended period or if inclement weather is imminent, excavations shall be protected to minimize moisture loss/gain. The bottom of all footing excavations should be stable, free of water, debris and should be compacted 98 percent of the Standard Proctor maximum dry density as determined by ASTM D698 with moisture content between 1 percentage points below and 3 percentage points above the optimum moisture content.

4.4 Settlement

Assuming that the site will be prepared as previously outlined and that final grades and structural loads will be consistent with our stated assumptions, estimated settlements are outlined below:

- Fill induced settlement from the planned 4 feet of fill above original grade is estimated to be approximately 1 inch.
- Foundation settlement due to approximate 500 psf sustained dead load is estimated to be approximately 0.5 inches.
- Differential foundation settlement due to transient loads (assumed to be wind) is estimated to be approximately 1 inch.

SES will be available to consult with the design team as needed to evaluate alternatives to reduce settlement if anticipated settlement of the currently planned foundation concept will not be acceptable for the project.

5.0 GENERAL COMMENTS AND LIMITATIONS

While the CPT sounding is representative of subsurface conditions at their respective locations and for the respective vertical reaches, local variations characteristic of the subsurface materials of the region are anticipated and may be encountered. The delineation between soil types shown on the log is approximate and the description represents our interpretation of subsurface conditions at the designated test location and on the particular date explored.

This report has been prepared in order to aid in the evaluation of this project and to assist the engineers in the project planning and structural design. At the time of writing, changes were still being considered to foundations, site grading, and other aspects of the project that could have a significant impact on the applicability or relevance of the recommendations provided in this report. SESI should be consulted as the design process continues to ensure that the recommendations provided in this report are still applicable, and that they are being properly interpreted.

This report is intended for use with regard to the specific project discussed herein as we understand it at this time, and any substantial changes in the project, loads, locations, or assumed grades should be brought to our attention so that we may determine how such changes may affect our conclusions and recommendations. We would appreciate the opportunity to review the plans and specifications for construction to ensure that our conclusions and recommendations are interpreted correctly.

Professional judgments on design alternatives and criteria are presented in this report. These are based partly on our evaluations of technical information gathered, partly on our understanding of the characteristics of the project being planned, and partly on our general experience with subsurface conditions in the area. We do not guarantee performance of the project in any respect, only that our engineering work and judgments rendered meet the standard of care of our profession.

The Geotechnical Engineer of Record should be retained by the Owner in the construction phase of the project so they can observe subsurface conditions revealed during construction, confirm that design assumptions are still applicable or provide revised recommendations based on conditions encountered during construction, and to help ensure that our recommendations are properly interpreted. We recommend that Southern Earth Sciences, Inc. be retained to perform observation and field-testing services during the site preparation and foundation construction.

APPENDIX 1

Test Location Plans



NOT TO SCALE

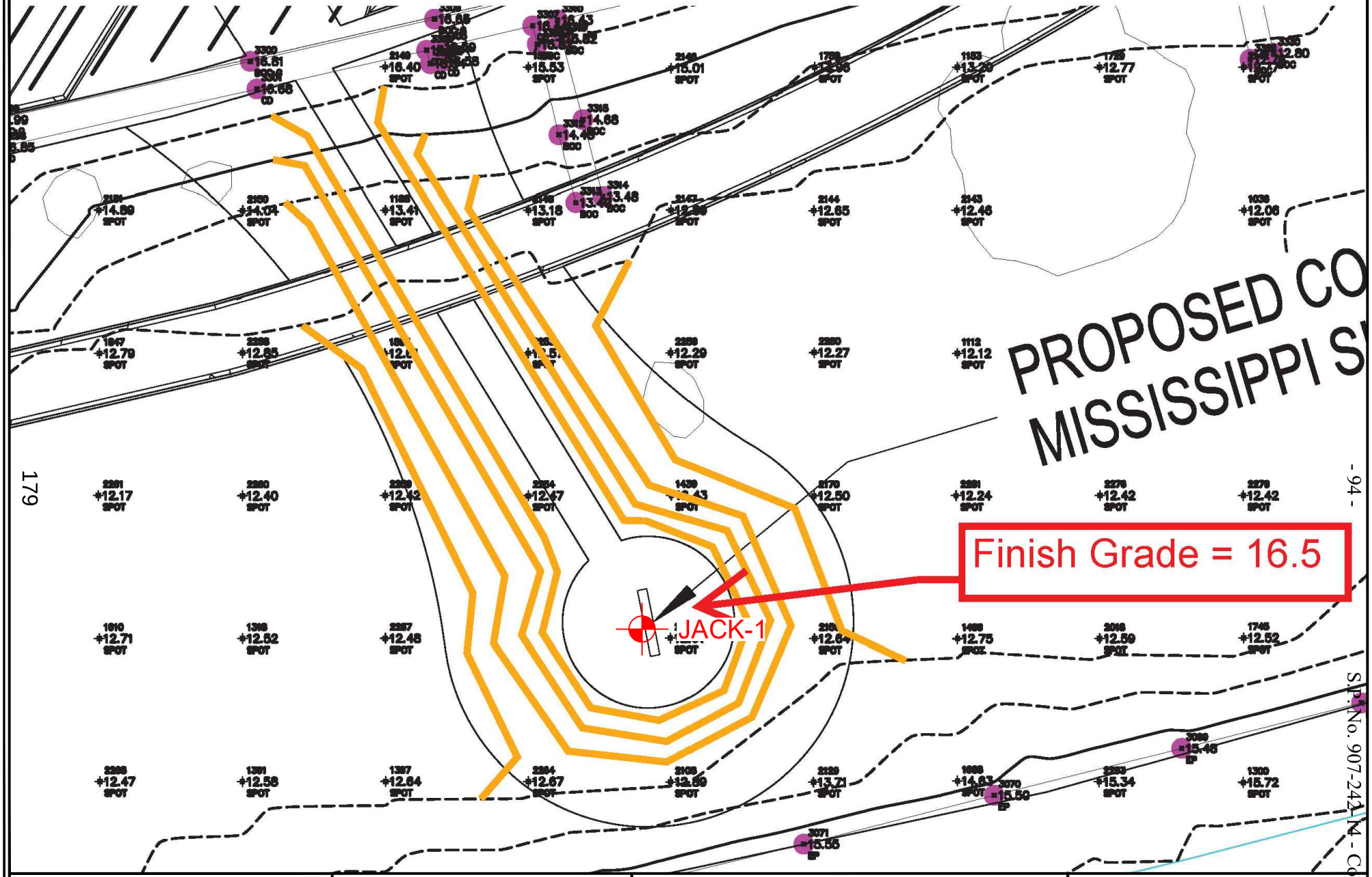
CPT SOUNDING/
HAND AUGER

COASTAL MS WAYFINDING SIGNS
JACKSON COUNTY SITE
MOSS POINT, MS

SOUTHERN EARTH SCIENCES
Geotechnical | Environmental | Materials Testing

TEST LOCATION PLAN
SESI JOB #: M24-022

S.P. No. 907.242.14 Cont'd.



NOT TO SCALE

CPT SOUNDING/
HAND AUGER

COASTAL MS WAYFINDING SIGNS
JACKSON COUNTY SITE
MOSS POINT, MS

SOUTHERN EARTH SCIENCES
Geotechnical | Environmental | Materials Testing

TEST LOCATION PLAN
SESI JOB #: M24-022

APPENDIX 2

CPT Sounding Log

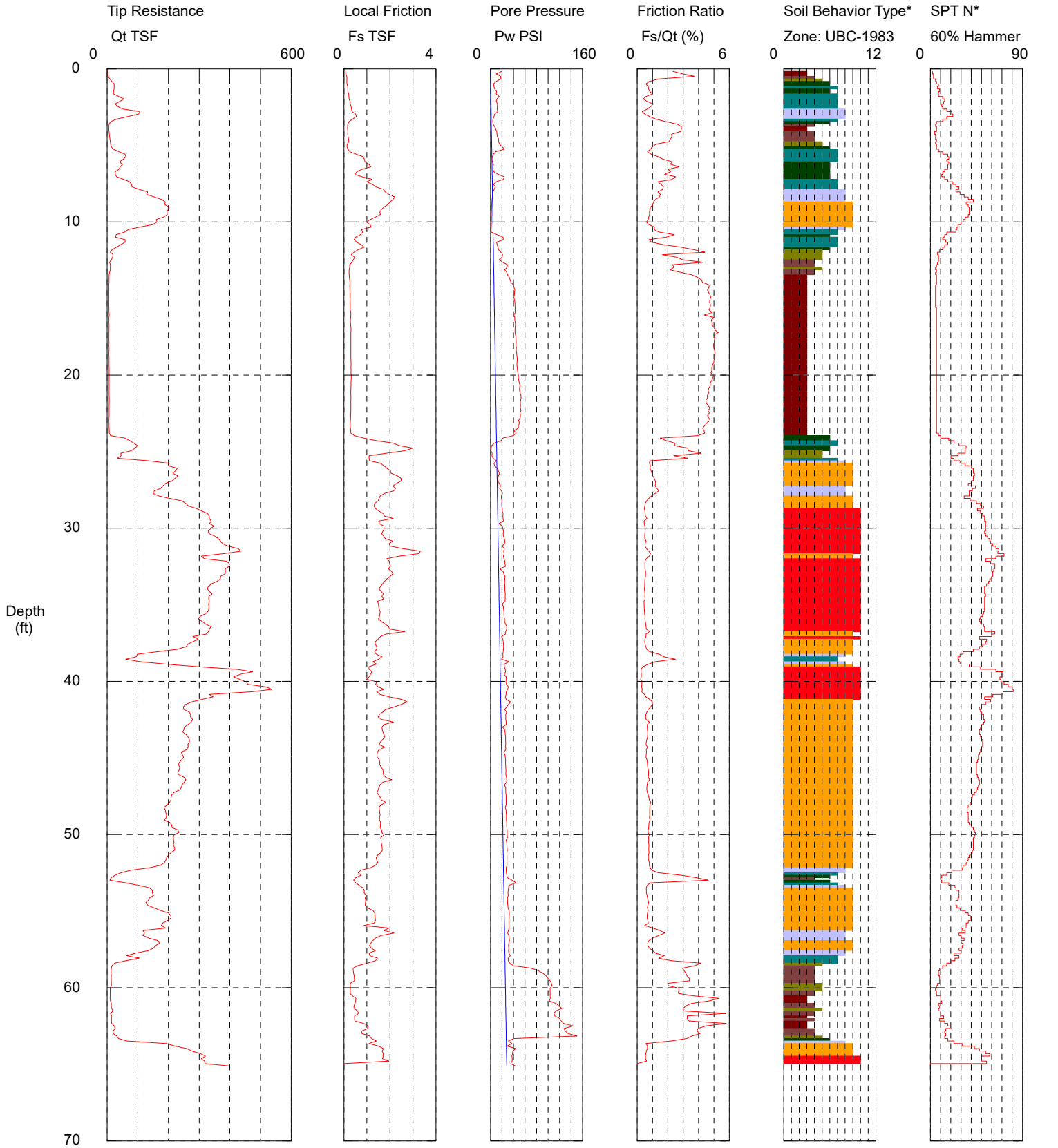
Soil Boring Log

SOUTHERN EARTH SCIENCES

S.P. No. 907-242-14 - Cont'd.

Operator: JOSH LEE
Sounding: JACK-1
Cone Used: DSG1034
GPS Data: N30.46162 W88.433365

CPT Date/Time: 1/17/2024 9:43:00 AM
Location: MS WAYFINDINGS SIGNS
Job Number: M24-022
Groundwater: collapsed at 0.2-ft.



Maximum Depth = 65.12 feet

Depth Increment = 0.164 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

181

*Soil behavior type and SPT based on data from UBC-1983

SOIL BORING LOG

S.P. No. 907-242-14 - Cont'd.

BORING NO.: JACK-1
PROJECT: MISSISSIPPI WAYFINDING SIGNS
PROJECT NO.: M24-022
PROJECT LOCATION: MOSS POINT, MS
METHOD: HAND AUGER
BORING LOCATION: SEE TEST LOCATION PLAN
BORING ELEVATION: EXISTING GROUND
DATE DRILLED: 01/16/24
DATE COMPLETED: 01/16/24
WATER LEVEL: 6.1 ft
WATER LEVEL DATE: 01/16/24
GEOL / ENGR: C. NICHOLAS
DRILLER: J. LEE

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description
0		CL	Dark Brown CLAY
2		CL	Tan and Dark Brown CLAY
4		CL	Tan and Medium Brown CLAY
6		CL	Tan, Gray and Medium Brown CLAY
8			
9			

Remarks: N30.46162° W88.433365°

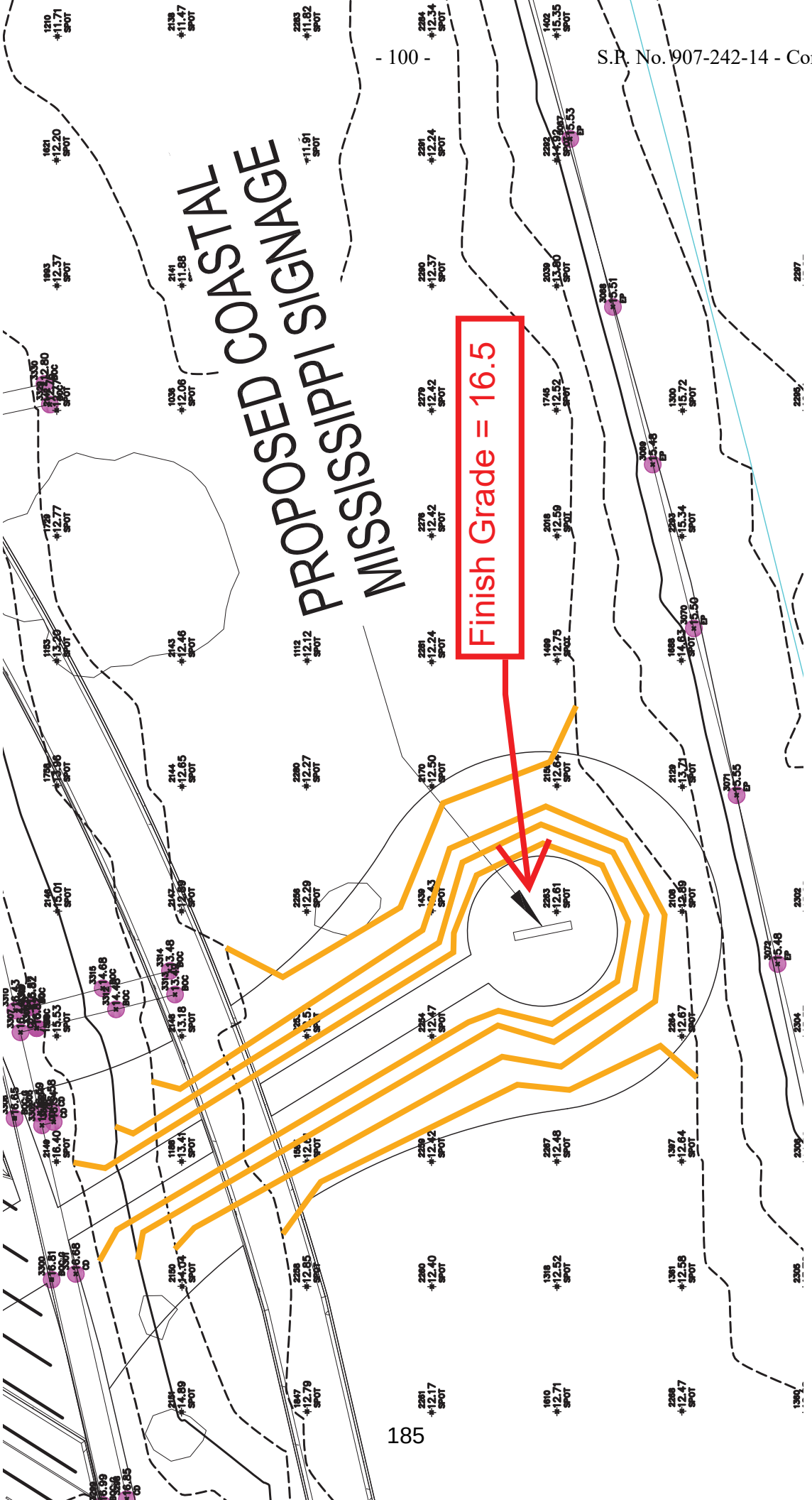
SOUTHERN EARTH SCIENCES

GEOLOG WITH PI 40SIEVE GFLIBRARY DSM REV7-6-21.GLB SO_EARTH.GDT F:\PROJECTS\JOB FOLDERS\2024\24-022 COASTAL MS WAYFINDING SIGNS\GINT\M24-022 GINT - JACKSON.GPJ 1/30/24

APPENDIX 3

Provided Plans

HANCOCK COU
WEST ELEVA


PROPOSED COASTAL
MISSISSIPPI SIGNAGE
Finish Grade = 16.5

DOCUMENT 00 72 00 GENERAL CONDITIONS

1.01 DESCRIPTION.

A. The American Institute of Architects AIA DOCUMENT A201- 2007, “General Conditions of the Contract for Construction”, 2007, Seventeenth Edition, Articles 1 through 15 inclusive, except as may be added to or modified herein, is hereby made a part of the Contract Documents. For brevity, AIA DOCUMENT A201- 2007 is also referred to in the Contract documents as the “General Conditions”.

B. All persons intending to provide goods or services in connection with this Work are required to read and understand the referenced document prior to proceeding.

END OF DOCUMENT

AIA® Document A201® – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
I-10 JACKSON COUNTY WELCOME CENTER
I-10 WESTBOUND JACKSON COUNTY, MS
STBG-0010-01(180) / 109171-301000

THE OWNER:
MISSISSIPPI TRANSPORTATION COMMISSION
P O BOX 1850
JACKSON, MISSISSIPPI 39215-1850

THE ARCHITECT:
J. RUSSELL PERKINS, ARCHITECT
MDOT ARCHITECTURAL SERVICES UNIT

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

TABLE OF ARTICLES

1 GENERAL PROVISIONS

2 OWNER

3 CONTRACTOR

4 ARCHITECT

5 SUBCONTRACTORS

6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

7 CHANGES IN THE WORK

8 TIME

9 PAYMENTS AND COMPLETION

10 PROTECTION OF PERSONS AND PROPERTY

11 INSURANCE AND BONDS

12 UNCOVERING AND CORRECTION OF WORK

13 MISCELLANEOUS PROVISIONS

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14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES

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User Notes: (3B9ADA3E)

INDEX
(Topics and numbers in bold are section headings.)

Acceptance of Nonconforming Work
9.6.6, 9.9.3, 12.3
Acceptance of Work
9.6.6, 9.8.2, 9.9.3, 9.10.1, 9.10.3, 12.3
Access to Work
3.16, 6.2.1, 12.1
Accident Prevention
10
Acts and Omissions
3.2, 3.3.2, 3.12.8, 3.18, 4.2.3, 8.3.1, 9.5.1, 10.2.5, 10.2.8, 13.4.2, 13.7, 14.1, 15.2
Addenda
1.1.1, 3.11.1
Additional Costs, Claims for
3.7.4, 3.7.5, 6.1.1, 7.3.7.5, 10.3, 15.1.4
Additional Inspections and Testing
9.4.2, 9.8.3, 12.2.1, 13.5
Additional Insured
11.1.4
Additional Time, Claims for
3.2.4, 3.7.4, 3.7.5, 3.10.2, 8.3.2, 15.1.5
Administration of the Contract
3.1.3, 4.2, 9.4, 9.5
Advertisement or Invitation to Bid
1.1.1
Aesthetic Effect
4.2.13
Allowances
3.8, 7.3.8
All-risk Insurance
11.3.1, 11.3.1.1
Applications for Payment
4.2.5, 7.3.9, 9.2, 9.3, 9.4, 9.5.1, 9.6.3, 9.7, 9.10, 11.1.3
Approvals
2.1.1, 2.2.2, 2.4, 3.1.3, 3.10.2, 3.12.8, 3.12.9, 3.12.10, 4.2.7, 9.3.2, 13.5.1
Arbitration
8.3.1, 11.3.10, 13.1.1, 15.3.2, 15.4
ARCHITECT
4
Architect, Definition of
4.1.1
Architect, Extent of Authority
2.4.1, 3.12.7, 4.1, 4.2, 5.2, 6.3, 7.1.2, 7.3.7, 7.4, 9.2, 9.3.1, 9.4, 9.5, 9.6.3, 9.8, 9.10.1, 9.10.3, 12.1, 12.2.1, 13.5.1, 13.5.2, 14.2.2, 14.2.4, 15.1.3, 15.2.1
Architect, Limitations of Authority and Responsibility
2.1.1, 3.12.4, 3.12.8, 3.12.10, 4.1.2, 4.2.1, 4.2.2, 4.2.3, 4.2.6, 4.2.7, 4.2.10, 4.2.12, 4.2.13, 5.2.1, 7.4, 9.4.2, 9.5.3, 9.6.4, 15.1.3, 15.2
Architect's Additional Services and Expenses
2.4.1, 11.3.1.1, 12.2.1, 13.5.2, 13.5.3, 14.2.4
Architect's Administration of the Contract
3.1.3, 4.2, 3.7.4, 15.2, 9.4.1, 9.5
Architect's Approvals
2.4.1, 3.1.3, 3.5, 3.10.2, 4.2.7
Architect's Authority to Reject Work
3.5, 4.2.6, 12.1.2, 12.2.1
Architect's Copyright
1.1.7, 1.5
Architect's Decisions
3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 4.2.14, 6.3, 7.3.7, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4.1, 9.5, 9.8.4, 9.9.1, 13.5.2, 15.2, 15.3
Architect's Inspections
3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 13.5
Architect's Instructions
3.2.4, 3.3.1, 4.2.6, 4.2.7, 13.5.2
Architect's Interpretations
4.2.11, 4.2.12
Architect's Project Representative
4.2.10
Architect's Relationship with Contractor
1.1.2, 1.5, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5, 3.7.4, 3.7.5, 3.9.2, 3.9.3, 3.10, 3.11, 3.12, 3.16, 3.18, 4.1.2, 4.1.3, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3.7, 12, 13.4.2, 13.5, 15.2
Architect's Relationship with Subcontractors
1.1.2, 4.2.3, 4.2.4, 4.2.6, 9.6.3, 9.6.4, 11.3.7
Architect's Representations
9.4.2, 9.5.1, 9.10.1
Architect's Site Visits
3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.5
Asbestos
10.3.1
Attorneys' Fees
3.18.1, 9.10.2, 10.3.3
Award of Separate Contracts
6.1.1, 6.1.2
Award of Subcontracts and Other Contracts for Portions of the Work
5.2
Basic Definitions
1.1
Bidding Requirements
1.1.1, 5.2.1, 11.4.1
Binding Dispute Resolution
9.7, 11.3.9, 11.3.10, 13.1.1, 15.2.5, 15.2.6.1, 15.3.1, 15.3.2, 15.4.1
Boiler and Machinery Insurance
11.3.2
Bonds, Lien
7.3.7.4, 9.10.2, 9.10.3
Bonds, Performance, and Payment
7.3.7.4, 9.6.7, 9.10.3, 11.3.9, 11.4

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Building Permit
3.7.1
Capitalization
1.3
Certificate of Substantial Completion
9.8.3, 9.8.4, 9.8.5
Certificates for Payment
4.2.1, 4.2.5, 4.2.9, 9.3.3, 9.4, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4, 15.1.3
Certificates of Inspection, Testing or Approval
13.5.4
Certificates of Insurance
9.10.2, 11.1.3
Change Orders
1.1.1, 2.4.1, 3.4.2, 3.7.4, 3.8.2.3, 3.11.1, 3.12.8, 4.2.8, 5.2.3, 7.1.2, 7.1.3, 7.2, 7.3.2, 7.3.6, 7.3.9, 7.3.10, 8.3.1, 9.3.1.1, 9.10.3, 10.3.2, 11.3.1.2, 11.3.4, 11.3.9, 12.1.2, 15.1.3
Change Orders, Definition of
7.2.1
CHANGES IN THE WORK
2.2.1, 3.11, 4.2.8, 7, 7.2.1, 7.3.1, 7.4, 8.3.1, 9.3.1.1, 11.3.9
Claims, Definition of
15.1.1
CLAIMS AND DISPUTES
3.2.4, 6.1.1, 6.3, 7.3.9, 9.3.3, 9.10.4, 10.3.3, 15, 15.4
Claims and Timely Assertion of Claims
15.4.1
Claims for Additional Cost
3.2.4, 3.7.4, 6.1.1, 7.3.9, 10.3.2, 15.1.4
Claims for Additional Time
3.2.4, 3.7.46.1.1, 8.3.2, 10.3.2, 15.1.5
Concealed or Unknown Conditions, Claims for
3.7.4
Claims for Damages
3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.1.1, 11.3.5, 11.3.7, 14.1.3, 14.2.4, 15.1.6
Claims Subject to Arbitration
15.3.1, 15.4.1
Cleaning Up
3.15, 6.3
Commencement of the Work, Conditions Relating to
2.2.1, 3.2.2, 3.4.1, 3.7.1, 3.10.1, 3.12.6, 5.2.1, 5.2.3, 6.2.2, 8.1.2, 8.2.2, 8.3.1, 11.1, 11.3.1, 11.3.6, 11.4.1, 15.1.4
Commencement of the Work, Definition of
8.1.2
Communications Facilitating Contract Administration
3.9.1, 4.2.4
Completion, Conditions Relating to
3.4.1, 3.11, 3.15, 4.2.2, 4.2.9, 8.2, 9.4.2, 9.8, 9.9.1, 9.10, 12.2, 13.7, 14.1.2
COMPLETION, PAYMENTS AND
9
Completion, Substantial
4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2, 13.7
Compliance with Laws
1.6.1, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 4.1.1, 9.6.4, 10.2.2, 11.1, 11.3, 13.1, 13.4, 13.5.1, 13.5.2, 13.6, 14.1.1, 14.2.1.3, 15.2.8, 15.4.2, 15.4.3
Concealed or Unknown Conditions
3.7.4, 4.2.8, 8.3.1, 10.3
Conditions of the Contract
1.1.1, 6.1.1, 6.1.4
Consent, Written
3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 11.3.1, 13.2, 13.4.2, 15.4.4.2
Consolidation or Joinder
15.4.4
CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
1.1.4, 6
Construction Change Directive, Definition of
7.3.1
Construction Change Directives
1.1.1, 3.4.2, 3.12.8, 4.2.8, 7.1.1, 7.1.2, 7.1.3, 7.3, 9.3.1.1
Construction Schedules, Contractor's
3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2
Contingent Assignment of Subcontracts
5.4, 14.2.2.2
Continuing Contract Performance
15.1.3
Contract, Definition of
1.1.2
CONTRACT, TERMINATION OR SUSPENSION OF THE
5.4.1.1, 11.3.9, 14
Contract Administration
3.1.3, 4, 9.4, 9.5
Contract Award and Execution, Conditions Relating to
3.7.1, 3.10, 5.2, 6.1, 11.1.3, 11.3.6, 11.4.1
Contract Documents, Copies Furnished and Use of
1.5.2, 2.2.5, 5.3
Contract Documents, Definition of
1.1.1
Contract Sum
3.7.4, 3.8, 5.2.3, 7.2, 7.3, 7.4, 9.1, 9.4.2, 9.5.1.4, 9.6.7, 9.7, 10.3.2, 11.3.1, 14.2.4, 14.3.2, 15.1.4, 15.2.5
Contract Sum, Definition of
9.1
Contract Time
3.7.4, 3.7.5, 3.10.2, 5.2.3, 7.2.1.3, 7.3.1, 7.3.5, 7.4, 8.1.1, 8.2.1, 8.3.1, 9.5.1, 9.7, 10.3.2, 12.1.1, 14.3.2, 15.1.5.1, 15.2.5
Contract Time, Definition of
8.1.1
CONTRACTOR
3

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Contractor, Definition of
3.1, 6.1.2
Contractor's Construction Schedules
3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2
Contractor's Employees
3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3, 11.1.1, 11.3.7, 14.1, 14.2.1.1
Contractor's Liability Insurance
11.1
Contractor's Relationship with Separate Contractors and Owner's Forces
3.12.5, 3.14.2, 4.2.4, 6, 11.3.7, 12.1.2, 12.2.4
Contractor's Relationship with Subcontractors
1.2.2, 3.3.2, 3.18.1, 3.18.2, 5, 9.6.2, 9.6.7, 9.10.2, 11.3.1.2, 11.3.7, 11.3.8
Contractor's Relationship with the Architect
1.1.2, 1.5, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5, 3.7.4, 3.10, 3.11, 3.12, 3.16, 3.18, 4.1.3, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3.7, 12, 13.5, 15.1.2, 15.2.1
Contractor's Representations
3.2.1, 3.2.2, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.8.2
Contractor's Responsibility for Those Performing the Work
3.3.2, 3.18, 5.3.1, 6.1.3, 6.2, 9.5.1, 10.2.8
Contractor's Review of Contract Documents
3.2
Contractor's Right to Stop the Work
9.7
Contractor's Right to Terminate the Contract
14.1, 15.1.6
Contractor's Submittals
3.10, 3.11, 3.12.4, 4.2.7, 5.2.1, 5.2.3, 9.2, 9.3, 9.8.2, 9.8.3, 9.9.1, 9.10.2, 9.10.3, 11.1.3, 11.4.2
Contractor's Superintendent
3.9, 10.2.6
Contractor's Supervision and Construction Procedures
1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.5, 7.3.7, 8.2, 10, 12, 14, 15.1.3
Contractual Liability Insurance
11.1.1.8, 11.2
Coordination and Correlation
1.2, 3.2.1, 3.3.1, 3.10, 3.12.6, 6.1.3, 6.2.1
Copies Furnished of Drawings and Specifications
1.5, 2.2.5, 3.11
Copyrights
1.5, 3.17
Correction of Work
2.3, 2.4, 3.7.3, 9.4.2, 9.8.2, 9.8.3, 9.9.1, 12.1.2, 12.2
Correlation and Intent of the Contract Documents
1.2
Cost, Definition of
7.3.7
Costs
2.4.1, 3.2.4, 3.7.3, 3.8.2, 3.15.2, 5.4.2, 6.1.1, 6.2.3, 7.3.3.3, 7.3.7, 7.3.8, 7.3.9, 9.10.2, 10.3.2, 10.3.6, 11.3, 12.1.2, 12.2.1, 12.2.4, 13.5, 14
Cutting and Patching
3.14, 6.2.5
Damage to Construction of Owner or Separate Contractors
3.14.2, 6.2.4, 10.2.1.2, 10.2.5, 10.4, 11.1.1, 11.3, 12.2.4
Damage to the Work
3.14.2, 9.9.1, 10.2.1.2, 10.2.5, 10.4.1, 11.3.1, 12.2.4
Damages, Claims for
3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.1.1, 11.3.5, 11.3.7, 14.1.3, 14.2.4, 15.1.6
Damages for Delay
6.1.1, 8.3.3, 9.5.1.6, 9.7, 10.3.2
Date of Commencement of the Work, Definition of
8.1.2
Date of Substantial Completion, Definition of
8.1.3
Day, Definition of
8.1.4
Decisions of the Architect
3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 15.2, 6.3, 7.3.7, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4, 9.5.1, 9.8.4, 9.9.1, 13.5.2, 14.2.2, 14.2.4, 15.1, 15.2
Decisions to Withhold Certification
9.4.1, 9.5, 9.7, 14.1.1.3
Defective or Nonconforming Work, Acceptance, Rejection and Correction of
2.3.1, 2.4.1, 3.5, 4.2.6, 6.2.5, 9.5.1, 9.5.2, 9.6.6, 9.8.2, 9.9.3, 9.10.4, 12.2.1
Definitions
1.1, 2.1.1, 3.1.1, 3.5, 3.12.1, 3.12.2, 3.12.3, 4.1.1, 15.1.1, 5.1, 6.1.2, 7.2.1, 7.3.1, 8.1, 9.1, 9.8.1
Delays and Extensions of Time
3.2, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, 8.3, 9.5.1, 9.7, 10.3.2, 10.4.1, 14.3.2, 15.1.5, 15.2.5
Disputes
6.3, 7.3.9, 15.1, 15.2
Documents and Samples at the Site
3.11
Drawings, Definition of
1.1.5
Drawings and Specifications, Use and Ownership of
3.11
Effective Date of Insurance
8.2.2, 11.1.2
Emergencies
10.4, 14.1.1.2, 15.1.4
Employees, Contractor's
3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3.3, 11.1.1, 11.3.7, 14.1, 14.2.1.1
Equipment, Labor, Materials or
1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13.1, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2

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Execution and Progress of the Work
1.1.3, 1.2.1, 1.2.2, 2.2.3, 2.2.5, 3.1, 3.3.1, 3.4.1, 3.5, 3.7.1, 3.10.1, 3.12, 3.14, 4.2, 6.2.2, 7.1.3, 7.3.5, 8.2, 9.5.1, 9.9.1, 10.2, 10.3, 12.2, 14.2, 14.3.1, 15.1.3
Extensions of Time
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3, 7.4, 9.5.1, 9.7, 10.3.2, 10.4.1, 14.3, 15.1.5, 15.2.5
Failure of Payment
9.5.1.3, 9.7, 9.10.2, 13.6, 14.1.1.3, 14.2.1.2
Faulty Work
(See Defective or Nonconforming Work)
Final Completion and Final Payment
4.2.1, 4.2.9, 9.8.2, 9.10, 11.1.2, 11.1.3, 11.3.1, 11.3.5, 12.3.1, 14.2.4, 14.4.3
Financial Arrangements, Owner's
2.2.1, 13.2.2, 14.1.1.4
Fire and Extended Coverage Insurance
11.3.1.1
GENERAL PROVISIONS
1
Governing Law
13.1
Guarantees (See Warranty)
Hazardous Materials
10.2.4, 10.3
Identification of Subcontractors and Suppliers
5.2.1
Indemnification
3.17, 3.18, 9.10.2, 10.3.3, 10.3.5, 10.3.6, 11.3.1.2, 11.3.7
Information and Services Required of the Owner
2.1.2, 2.2, 3.2.2, 3.12.4, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 11.4, 13.5.1, 13.5.2, 14.1.1.4, 14.1.4, 15.1.3
Initial Decision
15.2
Initial Decision Maker, Definition of
1.1.8
Initial Decision Maker, Decisions
14.2.2, 14.2.4, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5
Initial Decision Maker, Extent of Authority
14.2.2, 14.2.4, 15.1.3, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5
Injury or Damage to Person or Property
10.2.8, 10.4.1
Inspections
3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 12.2.1, 13.5
Instructions to Bidders
1.1.1
Instructions to the Contractor
3.2.4, 3.3.1, 3.8.1, 5.2.1, 7, 8.2.2, 12, 13.5.2
Instruments of Service, Definition of
1.1.7
Insurance
3.18.1, 6.1.1, 7.3.7, 9.3.2, 9.8.4, 9.9.1, 9.10.2, 11
Insurance, Boiler and Machinery
11.3.2
Insurance, Contractor's Liability
11.1
Insurance, Effective Date of
8.2.2, 11.1.2
Insurance, Loss of Use
11.3.3
Insurance, Owner's Liability
11.2
Insurance, Property
10.2.5, 11.3
Insurance, Stored Materials
9.3.2
INSURANCE AND BONDS
11
Insurance Companies, Consent to Partial Occupancy
9.9.1
Intent of the Contract Documents
1.2.1, 4.2.7, 4.2.12, 4.2.13, 7.4
Interest
13.6
Interpretation
1.2.3, 1.4, 4.1.1, 5.1, 6.1.2, 15.1.1
Interpretations, Written
4.2.11, 4.2.12, 15.1.4
Judgment on Final Award
15.4.2
Labor and Materials, Equipment
1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2
Labor Disputes
8.3.1
Laws and Regulations
1.5, 3.2.3, 3.6, 3.7, 3.12.10, 3.13.1, 4.1.1, 9.6.4, 9.9.1, 10.2.2, 11.1.1, 11.3, 13.1.1, 13.4, 13.5.1, 13.5.2, 13.6.1, 14, 15.2.8, 15.4
Liens
2.1.2, 9.3.3, 9.10.2, 9.10.4, 15.2.8
Limitations, Statutes of
12.2.5, 13.7, 15.4.1.1
Limitations of Liability
2.3.1, 3.2.2, 3.5, 3.12.10, 3.17, 3.18.1, 4.2.6, 4.2.7, 4.2.12, 6.2.2, 9.4.2, 9.6.4, 9.6.7, 10.2.5, 10.3.3, 11.1.2, 11.2, 11.3.7, 12.2.5, 13.4.2
Limitations of Time
2.1.2, 2.2, 2.4, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2.7, 5.2, 5.3.1, 5.4.1, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 11.1.3, 11.3.1.5, 11.3.6, 11.3.10, 12.2, 13.5, 13.7, 14, 15
Loss of Use Insurance
11.3.3
Material Suppliers
1.5, 3.12.1, 4.2.4, 4.2.6, 5.2.1, 9.3, 9.4.2, 9.6, 9.10.5
Materials, Hazardous
10.2.4, 10.3
Materials, Labor, Equipment and

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Means, Methods, Techniques, Sequences and Procedures of Construction
3.3.1, 3.12.10, 4.2.2, 4.2.7, 9.4.2
Mechanic's Lien
2.1.2, 15.2.8
Mediation
8.3.1, 10.3.5, 10.3.6, 15.2.1, 15.2.5, 15.2.6, 15.3, 15.4.1
Minor Changes in the Work
1.1.1, 3.12.8, 4.2.8, 7.1, 7.4
MISCELLANEOUS PROVISIONS
13
Modifications, Definition of
1.1.1
Modifications to the Contract
1.1.1, 1.1.2, 3.11, 4.1.2, 4.2.1, 5.2.3, 7, 8.3.1, 9.7, 10.3.2, 11.3.1
Mutual Responsibility
6.2
Nonconforming Work, Acceptance of
9.6.6, 9.9.3, 12.3
Nonconforming Work, Rejection and Correction of
2.3.1, 2.4.1, 3.5, 4.2.6, 6.2.4, 9.5.1, 9.8.2, 9.9.3, 9.10.4, 12.2.1
Notice
2.2.1, 2.3.1, 2.4.1, 3.2.4, 3.3.1, 3.7.2, 3.12.9, 5.2.1, 9.7, 9.10, 10.2.2, 11.1.3, 12.2.2.1, 13.3, 13.5.1, 13.5.2, 14.1, 14.2, 15.2.8, 15.4.1
Notice, Written
2.3.1, 2.4.1, 3.3.1, 3.9.2, 3.12.9, 3.12.10, 5.2.1, 9.7, 9.10, 10.2.2, 10.3, 11.1.3, 11.3.6, 12.2.2.1, 13.3, 14, 15.2.8, 15.4.1
Notice of Claims
3.7.4, 10.2.8, 15.1.2, 15.4
Notice of Testing and Inspections
13.5.1, 13.5.2
Observations, Contractor's
3.2, 3.7.4
Occupancy
2.2.2, 9.6.6, 9.8, 11.3.1.5
Orders, Written
1.1.1, 2.3, 3.9.2, 7, 8.2.2, 11.3.9, 12.1, 12.2.2.1, 13.5.2, 14.3.1
OWNER
2
Owner, Definition of
2.1.1
Owner, Information and Services Required of the
2.1.2, 2.2, 3.2.2, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.3.2, 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 11.3, 13.5.1, 13.5.2, 14.1.1.4, 14.1.4, 15.1.3
Owner's Authority
1.5, 2.1.1, 2.3.1, 2.4.1, 3.4.2, 3.8.1, 3.12.10, 3.14.2, 4.1.2, 4.1.3, 4.2.4, 4.2.9, 5.2.1, 5.2.4, 5.4.1, 6.1, 6.3, 7.2.1, 7.3.1, 8.2.2, 8.3.1, 9.3.1, 9.3.2, 9.5.1, 9.6.4, 9.9.1, 9.10.2, 10.3.2, 11.1.3, 11.3.3, 11.3.10, 12.2.2, 12.3.1, 13.2.2, 14.3, 14.4, 15.2.7
Owner's Financial Capability
2.2.1, 13.2.2, 14.1.1.4
Owner's Liability Insurance
11.2
Owner's Relationship with Subcontractors
1.1.2, 5.2, 5.3, 5.4, 9.6.4, 9.10.2, 14.2.2
Owner's Right to Carry Out the Work
2.4, 14.2.2
Owner's Right to Clean Up
6.3
Owner's Right to Perform Construction and to Award Separate Contracts
6.1
Owner's Right to Stop the Work
2.3
Owner's Right to Suspend the Work
14.3
Owner's Right to Terminate the Contract
14.2
Ownership and Use of Drawings, Specifications and Other Instruments of Service
1.1.1, 1.1.6, 1.1.7, 1.5, 2.2.5, 3.2.2, 3.11.1, 3.17, 4.2.12, 5.3.1
Partial Occupancy or Use
9.6.6, 9.9, 11.3.1.5
Patching, Cutting and
3.14, 6.2.5
Patents
3.17
Payment, Applications for
4.2.5, 7.3.9, 9.2, 9.3, 9.4, 9.5, 9.6.3, 9.7, 9.8.5, 9.10.1, 14.2.3, 14.2.4, 14.4.3
Payment, Certificates for
4.2.5, 4.2.9, 9.3.3, 9.4, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 13.7, 14.1.1.3, 14.2.4
Payment, Failure of
9.5.1.3, 9.7, 9.10.2, 13.6, 14.1.1.3, 14.2.1.2
Payment, Final
4.2.1, 4.2.9, 9.8.2, 9.10, 11.1.2, 11.1.3, 11.4.1, 12.3.1, 13.7, 14.2.4, 14.4.3
Payment Bond, Performance Bond and
7.3.7.4, 9.6.7, 9.10.3, 11.4
Payments, Progress
9.3, 9.6, 9.8.5, 9.10.3, 13.6, 14.2.3, 15.1.3
PAYMENTS AND COMPLETION
9
Payments to Subcontractors
5.4.2, 9.5.1.3, 9.6.2, 9.6.3, 9.6.4, 9.6.7, 14.2.1.2
PCB
10.3.1
Performance Bond and Payment Bond
7.3.7.4, 9.6.7, 9.10.3, 11.4

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Permits, Fees, Notices and Compliance with Laws
2.2.2, 3.7, 3.13, 7.3.7.4, 10.2.2
PERSONS AND PROPERTY, PROTECTION OF
10
Polychlorinated Biphenyl
10.3.1
Product Data, Definition of
3.12.2
Product Data and Samples, Shop Drawings
3.11, 3.12, 4.2.7
Progress and Completion
4.2.2, 8.2, 9.8, 9.9.1, 14.1.4, 15.1.3
Progress Payments
9.3, 9.6, 9.8.5, 9.10.3, 13.6, 14.2.3, 15.1.3
Project, Definition of
1.1.4
Project Representatives
4.2.10
Property Insurance
10.2.5, 11.3
PROTECTION OF PERSONS AND PROPERTY
10
Regulations and Laws
1.5, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 4.1.1, 9.6.4, 9.9.1, 10.2.2, 11.1, 11.4, 13.1, 13.4, 13.5.1, 13.5.2, 13.6, 14, 15.2.8, 15.4
Rejection of Work
3.5, 4.2.6, 12.2.1
Releases and Waivers of Liens
9.10.2
Representations
3.2.1, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.4.2, 9.5.1, 9.8.2, 9.10.1
Representatives
2.1.1, 3.1.1, 3.9, 4.1.1, 4.2.1, 4.2.2, 4.2.10, 5.1.1, 5.1.2, 13.2.1
Responsibility for Those Performing the Work
3.3.2, 3.18, 4.2.3, 5.3.1, 6.1.3, 6.2, 6.3, 9.5.1, 10
Retainage
9.3.1, 9.6.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3
Review of Contract Documents and Field Conditions by Contractor
3.2, 3.12.7, 6.1.3
Review of Contractor's Submittals by Owner and Architect
3.10.1, 3.10.2, 3.11, 3.12, 4.2, 5.2, 6.1.3, 9.2, 9.8.2
Review of Shop Drawings, Product Data and Samples by Contractor
3.12
Rights and Remedies
1.1.2, 2.3, 2.4, 3.5, 3.7.4, 3.15.2, 4.2.6, 5.3, 5.4, 6.1, 6.3, 7.3.1, 8.3, 9.5.1, 9.7, 10.2.5, 10.3, 12.2.2, 12.2.4, 13.4, 14, 15.4
Royalties, Patents and Copyrights
3.17
Rules and Notices for Arbitration
15.4.1
Safety of Persons and Property
10.2, 10.4
Safety Precautions and Programs
3.3.1, 4.2.2, 4.2.7, 5.3.1, 10.1, 10.2, 10.4
Samples, Definition of
3.12.3
Samples, Shop Drawings, Product Data and
3.11, 3.12, 4.2.7
Samples at the Site, Documents and
3.11
Schedule of Values
9.2, 9.3.1
Schedules, Construction
3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2
Separate Contracts and Contractors
1.1.4, 3.12.5, 3.14.2, 4.2.4, 4.2.7, 6, 8.3.1, 12.1.2
Shop Drawings, Definition of
3.12.1
Shop Drawings, Product Data and Samples
3.11, 3.12, 4.2.7
Site, Use of
3.13, 6.1.1, 6.2.1
Site Inspections
3.2.2, 3.3.3, 3.7.1, 3.7.4, 4.2, 9.4.2, 9.10.1, 13.5
Site Visits, Architect's
3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.5
Special Inspections and Testing
4.2.6, 12.2.1, 13.5
Specifications, Definition of
1.1.6
Specifications
1.1.1, 1.1.6, 1.2.2, 1.5, 3.11, 3.12.10, 3.17, 4.2.14
Statute of Limitations
13.7, 15.4.1.1
Stopping the Work
2.3, 9.7, 10.3, 14.1
Stored Materials
6.2.1, 9.3.2, 10.2.1.2, 10.2.4
Subcontractor, Definition of
5.1.1
SUBCONTRACTORS
5
Subcontractors, Work by
1.2.2, 3.3.2, 3.12.1, 4.2.3, 5.2.3, 5.3, 5.4, 9.3.1.2, 9.6.7
Subcontractual Relations
5.3, 5.4, 9.3.1.2, 9.6, 9.10, 10.2.1, 14.1, 14.2.1
Submittals
3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 7.3.7, 9.2, 9.3, 9.8, 9.9.1, 9.10.2, 9.10.3, 11.1.3
Submittal Schedule
3.10.2, 3.12.5, 4.2.7
Subrogation, Waivers of
6.1.1, 11.3.7
Substantial Completion
4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2, 13.7

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User Notes: (3B9ADA3E)

Substantial Completion, Definition of
9.8.1
Substitution of Subcontractors
5.2.3, 5.2.4
Substitution of Architect
4.1.3
Substitutions of Materials
3.4.2, 3.5, 7.3.8
Sub-subcontractor, Definition of
5.1.2
Subsurface Conditions
3.7.4
Successors and Assigns
13.2
Superintendent
3.9, 10.2.6
Supervision and Construction Procedures
1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.7, 8.2, 8.3.1, 9.4.2, 10, 12, 14, 15.1.3
Surety
5.4.1.2, 9.8.5, 9.10.2, 9.10.3, 14.2.2, 15.2.7
Surety, Consent of
9.10.2, 9.10.3
Surveys
2.2.3
Suspension by the Owner for Convenience
14.3
Suspension of the Work
5.4.2, 14.3
Suspension or Termination of the Contract
5.4.1.1, 14
Taxes
3.6, 3.8.2.1, 7.3.7.4
Termination by the Contractor
14.1, 15.1.6
Termination by the Owner for Cause
5.4.1.1, 14.2, 15.1.6
Termination by the Owner for Convenience
14.4
Termination of the Architect
4.1.3
Termination of the Contractor
14.2.2
TERMINATION OR SUSPENSION OF THE CONTRACT
14
Tests and Inspections
3.1.3, 3.3.3, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 10.3.2, 11.4.1.1, 12.2.1, 13.5
TIME
8
Time, Delays and Extensions of
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, 8.3, 9.5.1, 9.7, 10.3.2, 10.4.1, 14.3.2, 15.1.5, 15.2.5
Time Limits
2.1.2, 2.2, 2.4, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2, 5.2, 5.3, 5.4, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 11.1.3, 12.2, 13.5, 13.7, 14, 15.1.2, 15.4
Time Limits on Claims
3.7.4, 10.2.8, 13.7, 15.1.2
Title to Work
9.3.2, 9.3.3
Transmission of Data in Digital Form
1.6
UNCOVERING AND CORRECTION OF WORK
12
Uncovering of Work
12.1
Unforeseen Conditions, Concealed or Unknown
3.7.4, 8.3.1, 10.3
Unit Prices
7.3.3.2, 7.3.4
Use of Documents
1.1.1, 1.5, 2.2.5, 3.12.6, 5.3
Use of Site
3.13, 6.1.1, 6.2.1
Values, Schedule of
9.2, 9.3.1
Waiver of Claims by the Architect
13.4.2
Waiver of Claims by the Contractor
9.10.5, 13.4.2, 15.1.6
Waiver of Claims by the Owner
9.9.3, 9.10.3, 9.10.4, 12.2.2.1, 13.4.2, 14.2.4, 15.1.6
Waiver of Consequential Damages
14.2.4, 15.1.6
Waiver of Liens
9.10.2, 9.10.4
Waivers of Subrogation
6.1.1, 11.3.7
Warranty
3.5, 4.2.9, 9.3.3, 9.8.4, 9.9.1, 9.10.4, 12.2.2, 13.7
Weather Delays
15.1.5.2
Work, Definition of
1.1.3
Written Consent
1.5.2, 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 11.4.1, 13.2, 13.4.2, 15.4.4.2
Written Interpretations
4.2.11, 4.2.12
Written Notice
2.3, 2.4, 3.3.1, 3.9, 3.12.9, 3.12.10, 5.2.1, 8.2.2, 9.7, 9.10, 10.2.2, 10.3, 11.1.3, 12.2.2, 12.2.4, 13.3, 14, 15.4.1
Written Orders
1.1.1, 2.3, 3.9, 7, 8.2.2, 12.1, 12.2, 13.5.2, 14.3.1, 15.1.2

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. .

The Contract Documents include the Advertisement for Bids, Instructions to Bidders, Notice to Bidders, Proposal Form, sample forms and all portions of addenda issued prior to execution of the Contract.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials. The Project Manual is a volume assembled for the Work which may include the bidding requirements, sample forms, Conditions of the Contract and Specifications

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the

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indicated results. In the event of a conflict between or among the Contract Documents, Contractor shall perform Work and obligations of the higher quality, larger quantity, greater expense, tighter schedule and more stringent requirements, unless otherwise directed in writing by the Owner.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as “all” and “any” and articles such as “the” and “an,” but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Architect and the Architect’s consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect’s or Architect’s consultants’ reserved rights. This Paragraph in no way supersedes the Owner’s document rights set forth in the “Engineering Services Contract" Agreement Between the Owner and the Professional.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect’s consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

§ 1.7 EXECUTION OF THE WORK

Sections of Division 01 General Requirements govern the execution of the Work of all Sections in Divisions 02-49 of the Specifications.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner, as used in these Documents, refers to the Mississippi Transportation Commission, a body Corporate of the State of Mississippi, acting by and through the duly authorized Executive Director of the Mississippi Department of Transportation for the benefit of the Department for which the Work under this Contract is being performed. The Owner is the entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner’s representative, who shall have express authority to bind the Owner with respect to all matters requiring the Owner’s approval or authorization, is the individual who signed the Construction Contract for the Owner. The term “Owner” means the Owner or the Owner’s authorized representative.

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§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 After the Contract is executed by the Executive Director, the Contractor will receive free of charge two bound copies of the Project Manual (Proposal and Contract Documents) (one executed and one blank), and five full-scale copies of the Drawings and two half-scale copies. The Contractor shall have available on the Project Site at all times one copy each of the Contract Drawings and the Project Manual (Proposal).

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

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ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary and any Work or material called for by either shall be provided as if called for by both, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques,

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sequences or procedures without acceptance of changes proposed by the Contractor, the Owner and Professional shall be responsible for any resulting loss or damage.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work. The Owner will furnish utilities for construction (electricity and water). Contractor must use "as- is" or pay for any necessary modifications.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.4.4 All Work as described or required shall be executed in a neat, skillful manner, in accordance with the best-recognized trade practice. Only competent workmen (including the superintendent), who work and perform their duties satisfactorily shall be employed on the Project. When requested by the Project Engineer, the Contractor shall discharge and shall not re-employ on the Project, any person who commits trespass or who is, in the opinion of the Project Engineer, dangerous, disorderly, insubordinate, incompetent, or otherwise objectionable.

§ 3.4.5 All materials and each part or detail of the Work are subject to inspection by the Project Engineer. Work performed or materials used by the Contractor without supervision, inspection, or written approval by an authorized Department representative may be ordered removed and replaced, at Contractor's expense, if found to be defective or noncompliant with the Contract Documents. No Work shall be performed on Legal Holidays, Sundays or after 5:00 P.M. on week days without prior written approval from the Project Engineer.

§ 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper

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execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- **.1** Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- **.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- **.3** Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Supplemental Agreement (Change Order). The amount of the Supplemental Agreement (Change Order) shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

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§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

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§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment. The Contractor shall not allow tradesman, technicians and laborers to enter other portions of existing facilities except as predetermined and approved by the Project Engineer. Existing utilities shall not be interrupted unless pre-approved by the Project Engineer. Parking for construction vehicles shall be in areas designated by the Owner at the Pre-construction Conference.

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§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18. The Contractor agrees to defend, hold harmless and indemnify the Owner against all claims or demands caused by the Contractor's acts or omissions.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

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ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 4.1.4 The term "Architect," "Engineer," "Professional", or "Consultant" as used in these Documents refers to the Professional firm who has been directed by the Owner to design, provide Construction Documents and Construction Administration for this Project. These Consultants are advisors to the Project Engineer and MDOT Architect.

§ 4.1.5 The term "Project Engineer" as used in these Documents refers to the Mississippi Department of Transportation Executive Director's authorized representative. The Project Engineer shall be the Initial Decision Maker referenced in Article 15. The term "MDOT Architect" is the representative for the MDOT Architectural Services Unit and is an advisor to the Project Engineer.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Architect will provide assistance to the Project Engineer and MDOT Architect for administration of the Contract as described in the Contract Documents and will be the Project Engineer's representative during construction until the date the Project Engineer issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Project Engineer only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Project Engineer, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Project Engineer reasonably informed about the progress and quality of the portion of the Work completed, and report to the Project Engineer (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Architect and Contractor shall endeavor to communicate with each other through the Project Engineer about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect to the MDOT Architect and Project Engineer. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Project Engineer.

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§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and the Project Engineer will prepare State Estimates for Payment in such amounts.

§ 4.2.6 The Architect shall advise the Project Engineer to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will advise the Project Engineer to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this recommendation of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Project Engineer, with recommendations from the Architect, will prepare Supplemental Agreements (Change Orders) and Advanced Authority (Construction Change Directives), and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Project Engineer, MDOT Architect, and Architect will conduct inspections to determine the date or dates of Completion; determine Final Acceptance; receive and forward to the Project Engineer, for review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Project Engineer and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and recommend matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

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ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

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.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces and to award separate Contracts either in connection with other portions of the Project or other construction or operation on the site. In such event, the Contractor shall coordinate its activities with those of the Owner and of other Contractors so as to facilitate the general progress of all work being performed by all parties. Cooperation will be required in the arrangement for the storage of materials, and in the detailed execution of the

work.

(Paragraph Deleted)

§ 6.1.3 The Owner shall provide for coordination of the activities of the separate contractors with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

(Paragraph Deleted)

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

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§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Supplemental Agreement (Change Order), Advance Authority (Construction Change Directive) or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Supplemental Agreement (Change Order) shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Project Engineer.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Supplemental Agreement (Change Order), Advance Authority (Construction Change Directive) or order for a minor change in the Work.

§ 7.2 SUPPLEMENTAL AGREEMENT (CHANGE ORDERS)

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.2.2 The maximum cost included in a Supplemental Agreement (Change Order) for profit and overhead is limited to twenty percent (20%) of the total of the actual cost for materials, labor and subcontracts. Profit and overhead include: all taxes, fees, permits, insurance, bond, job superintendent, job and home office expense. All Subcontractors shall comply passively without protest to the same requirements when participating in a Supplemental Agreement (Change Order).

§ 7.3 ADVANCE AUTHORITY (CONSTRUCTION CHANGE DIRECTIVES)

§ 7.3.1 Advance Authority (Construction Change Directive) is a written order prepared and signed by the Project Engineer, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Project Engineer may by Advance Authority (Construction Change Directive), without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used as Advanced Authority on changes to the Work where agreement has been reached prior to preparation of Supplemental Agreement (Change Order).

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§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

.2 Unit prices stated in the Contract Documents or subsequently agreed upon;

.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

.4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Project Engineer will prepare a Supplemental Agreement (Change Order). Supplemental Agreements (Change Orders) shall be issued for all or any part of an Advance Authority (Construction Change Directive).

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§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Completion is the date certified by the Project Engineer and approved by the Owner in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by any act of neglect of the Owner or Project Engineer, or by any employee or either, or by changes ordered in the Work, or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or any causes beyond the Contractor's control, or by any other causes which the Project Engineer determines may justify the delay, then the Contract time may be extended by Change Order for such reasonable time as the Project Engineer may determine, subject to the Owner's approval. The Contractor's sole and exclusive right and remedy for delay by any cause whatsoever is an extention of the Contract Time but no increase in the Contract Sum. Any claim for loss or any delay occasioned by any separate Contractor, or Subcontractor, shall be settled between the Contractor and such other separate Contractor, or Subcontractors.

§ 8.3.2 No delay, interference, hindrance or disruption, from whatever source or cause, in the progress of the Contractor's Work shall be a basis for an extension of time unless the delay, interference hindrance or disruption is (1) without the fault and not the responsibility of the Contractor, its subcontractors and suppliers and (2) directly affects the overall completion of the Work as reflected on the critical path of the updated Construction Schedule. The contractor expressly agrees that the Owner shall have the benefit of any float in the construction schedule and delay in construction activities which do not affect the overall completion of the work does not entitle the Contractor to any extension in the Contract Time.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

1. The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.
2. The unusually severe weather must actually cause a delay in the completion of the project. The delay must

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be beyond the control and without the fault or negligence of the Contractor.

§ 8.3.5 The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The Contractor's activity durations for inclusion in the progress schedule must reflect these anticipated adverse weather delays in all weather dependent activities.

1. Adverse Weather Evaluation: The table below defines the monthly anticipated adverse weather in days for the project:

Adverse Weather Table

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10	9	9	8	9	8	10	9	7	6	8	9

§ 8.3.6 Monthly anticipated adverse weather delay work days based on five (5) day work week.

§ 8.3.7 Upon acknowledgement of the Notice to Proceed (NTP) and continuing throughout the Contract, the Contractor shall record on the daily report, the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delay days must prevent work on the overall projects' critical activities for 50 percent or more of the Contractor's scheduled workday. The number of actual adverse weather days shall include days impacted by actually adverse weather (even if adverse weather occurred in previous month), be calculated chronologically from the first to the last day of each month and be recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in paragraph 8.3.5 above, the Owner and the Architect will convert any qualifying delays to calendar days giving full consideration for equivalent fair weather work days, and issue a modification in accordance with the Contract.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, MDOT Architect, or Project Engineer, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents. The form of Application for Payment will be AIA Document G702, Application and Certification for Payment, supported by AIA Document G703, Continuation Sheet, or a computer generated form containing similar data.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

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§ 9.3.1.3 The Owner will retain five percent (5%) until the Work is at least fifty percent (50%) complete, on schedule, and satisfactory in the Project Engineer's opinion, at which time fifty percent (50%) of the retainage held to date shall be returned to the Contractor for distribution to the appropriate Sub-Contractors and Suppliers. Future retainage shall be withheld at the rate of two and one half percent (2-1/2%) of the amount due the Contractor on account of progress payments.

§ 9.3.1.4 The Contractor must submit each month with this Application for Payment a separate letter stating that he is requesting an extension of time or that he had no need for an extension for that period of time. No payment on a monthly application will be made until the letter is received. Complete justification such as weather reports or other pertinent correspondence must be included for each day's request for extension. A Contractor's letter, or statement, will not be considered as adequate justification. The receipt of this request and data by the Owner will not be considered as Owner approval in any way.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.2.1 Payment on materials stored at some location other than the building site, may be approved by the Project Engineer and the Owner after the Contractor has submitted the following items:

.1 An acceptable Lease Agreement between the General Contractor and the owner of the land, or building, where the materials are located.
.2 Consent of Surety, or other acceptable Bond, to cover the materials stored off-site.
.3 All Perils Insurance coverage for the full value of the materials stored off-site.
.4 A Bill of Sale from the Manufacturer to the General Contractor for the stored materials.
.5 A complete list and inventory of materials manufactured, stored and delivered to the storage site and of materials removed from the storage site and delivered to the job site.
.6 A review by the Project Engineer of the materials stored off-site prior to release of payment.
.7 Guarantee no storage costs, additional delivery fees, or subsequent costs to the Owner.
.8 List of stored items shall be sent to the Chief Engineer for his approval prior to payment of stored materials.

§ 9.3.2.2 Payment for materials stored at the building site, may be approved by the Project Engineer and the Owner after the Contractor has submitted the following items:

.1 A Bill of Sale from the Manufacturer to the General Contractor for the stored materials.
.2 List of stored items shall be sent to the Chief Engineer for his approval prior to payment of stored materials.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either recommend acceptance or state what portions should be modified to the Project Engineer for such amount as the Architect determines is properly due, or notify the Contractor and Project Engineer in writing of the Architect's reasons for modifications in whole or in part as provided in Section 9.5.1.

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§ 9.4.2 The recommendations for Payment will constitute a representation by the Architect to the Project Engineer, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Date of Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The recommendations for Payment will further constitute a representation that the Contractor is entitled to payment in the amount recommended. However, the recommendations for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may recommend to withhold Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to recommend payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly make recommendation for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also make recommendations to withhold Payment or, because of subsequently discovered evidence, may make recommendations to nullify the whole or a part of a Payment previously made, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

.1 defective Work not remedied;

.2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;

.3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;

.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

.5 damage to the Owner or a separate contractor;

.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or

.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for recommendations to withhold Payment are removed, recommendations will be made for amounts previously withheld.

(Paragraph Deleted)

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has reviewed the Application for Payment and made recommendations to the Project Engineer, the Project Engineer shall make payment in the manner and within the time provided in the Contract Documents.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

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§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 The amount retained by the Contractor from each payment to each Subcontractor and material supplier will not exceed the percentage retained by the Owner from the Contractor

§ 9.7 FAILURE OF PAYMENT

The Contractor and the Owner shall be subject to the remedies as prescribed in Section 31-5-25 of the Mississippi Code 1972, Annotated.

9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion shall not be recognized under this Contract. The Project Engineer shall determine when the building or designated portion is complete to the point it can be used for its intended purpose. This date shall be the Date of Completion. All Warranties and Extended Warranties shall use this date as the starting date of Warranty Period.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

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§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Date of Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and agreement by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work

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fully completed and accepted shall be submitted by the Contractor to the Architect prior to agreement of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

.1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
.2 failure of the Work to comply with the requirements of the Contract Documents; or
.3 terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

§ 9.11 LIQUIDATED DAMAGES

§ 9.11.1 Time being of the essence and a matter of material consideration thereof, a reasonable estimate in advance is established to cover losses incurred by the Owner if the project is not substantially complete on the date set forth in the Contract Documents. The Contractor and his Surety will be liable for and will pay the Owner liquidated damages for each calendar day of delay until the work is substantially complete as follows:

For More Than	To and Including	Per Calendar D
$0	$100,000	$150
100,000	500,000	360
500,000	1,000,000	540
1,000,000	5,000,000	830
5,000,000	10,000,000	1,200
10,000,000	20,000,000	1,800
20,000,000	----------	3,500

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

.1 employees on the Work and other persons who may be affected thereby;
.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

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§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, or the Project Engineer and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY
If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS
§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

(Paragraphs Deleted)

§ 10.4 EMERGENCIES
In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS
§ 11.1 CONTRACTOR'S LIABILITY INSURANCE
§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

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.1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
.4 Claims for damages insured by usual personal injury liability coverage;
.5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
.6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
.7 Claims for bodily injury or property damage arising out of completed operations; and
.8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.1.5 The Contractor's limits of liability shall be written for not less than the following:

.1 GENERAL LIABILITY:

Commercial General Liability (Including XCU)		
General Aggregate	$1,000,000.00	Aggregate
Products & Completed Operations	1,000,000.00	Aggregate
Personal & Advertising Injury	500,000.00	Per Occurrence
Bodily Injury & Property Damage	1,000,000.00	Per Occurrence
Fire Damage Liability	50,000.00	Per Fire
Medical Expense	5,000.00	Per Person

.2 OWNERS & CONTRACTORS PROTECTIVE LIABILITY:

Bodily Injury & Property Damage	$1,000,000.00	Aggregate
Bodily Injury & Property Damage	500,000.00	Per Occurrence

.3 AUTOMOBILE LIABILITY

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Owned, Non-owned & Hired Vehicle	$500,000.00	Per Occurrence
Contractor Insurance Option Number 1: Bodily Injury & Property Damage (Combined Single Limit)		
Contractor Insurance Option Number 2: Bodily Injury	250,000.00	Per Person
Bodily Injury	500,000.00	Per Accident
Property Damage	100,000.00	Per Occurrence

.4 EXCESS LIABILITY:

(Umbrella on projects over $500,000) Bodily Injury & Property Damage (Combined Single Limit)	$1,000,000.00	Aggregate

.5 WORKERS' COMPENSATION:
(As required by Statute)

EMPLOYERS' LIABILITY		
Accident	$100,000.00	Per Occurrence
Disease	500,000.00	Policy Limit
Disease	100,000.00	Per Employee

.6 PROPERTY INSURANCE:

Builder's Risk Or	Equal to Value of Work
Installation Floater	Equal to Value of Work

§ 11.1.6 Furnish one (1) copy of the Standard Construction Contract Certificate of Insurance Form for each copy of the Standard Form of Agreement Between Owner and Contractor specifically setting forth evidence of all coverage required by Subparagraphs 11.1.1, 11.1.2 and 11.1.3. Furnish to the Owner copies of any endorsements that are subsequently issued amending limits of coverage.

§ 11.1.7 If the coverages are provided on a claims-made basis, the policy date or retroactive date shall predate the Contract: the termination date, or the policy, or applicable extended reporting period shall be no earlier than the termination date of coverages required to be maintained after final payment.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Contractor shall purchase and maintain such insurance as will protect the Owner from his contingent liability to others for damages because of bodily injury, including death, and property damage, which may arise from operations under this Contract and other liability for damages which the Contractor is required to insure under any provision of this Contract. Certificate of this insurance will be filed with the Owner and will be the same limits set forth in 11.1.5.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 The Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is

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later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

(Paragraph Deleted)

§ 11.3.1.3 If the property insurance requires deductibles, the Contractor shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

(Paragraphs Deleted)

§ 11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any

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applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five (5) days after occurrence of loss

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND
§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK
§ 12.1 UNCOVERING OF WORK
§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK
§ 12.2.1 BEFORE OR AFTER DATE OF COMPLETION
The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER DATE OFCOMPLETION
§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within

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a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Date of Completion by the period of time between Date of Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the laws of the State of Mississippi except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

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§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

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.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

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§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Time shall be adjusted for increases in the time caused by suspension, delay or interruption as described in Section 14.3.1. No adjustment shall be made to the extent

.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

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.1 The Contractor shall anticipate delays in the progress of the Work, due to adverse weather, during the stipulated Contract Time in the amount of days published in recognized official data. If documented evidence (from recognized official data) indicates weather delays in excess of this amount, then the Contractor may be granted an Extension of Time for each Work Day, in excess of the normal days, in which the weather prevented work on the Project Site for fifty (50) percent or more of the Contractor's "Normal Work Day", but only if such prevented work was critical to the timely completion of the project.

.2 Contractor's "Normal Work Day" shall be defined on the basis of a five (5) Day Work Week. Example: If the "normal" (regular) schedule is a five (5) Day Work Week, meaning Monday through Friday, then a rain on Sunday (since not a scheduled Work Day) will not necessarily delay the Work of the Project. However, site conditions, as a result of the rain, could partially or fully prevent scheduled outside work on Monday (and thereafter) thereby making the Contractor eligible to apply for a Weather Delay Extension of Time on the basis of the conditions stated in the paragraph above.

§ 15.1.5.4 The Contractor shall not be entitled to a separate increase in the Contract Time for each one of the causes of delay which may have concurrent or interrelated affects on the progress of the Work, or for concurrent delays due to the fault of the Contractor

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Project Engineer will serve as the Initial Decision Maker. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a

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response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.5 ARBITRATION PROCEDURES FOR THE MISSISSIPPI TRANSPORTATION COMMISSION

All matters of dispute arising out of any agreement with the Mississippi Transportation Commission for planning, design, engineering, construction, erection, repair, or alteration of any building, structure, fixture, road, highway, utility or any part thereof, or any agreement with the Mississippi Transportation Commission for architectural, engineering, surveying, planning, and related professional services which provides for mediation or arbitration, shall comply with the following course for resolution. No arbitration hearing shall be granted on any claim in excess of One Hundred Thousand Dollars ($100,000.00).

§ 15.5.1 CONDITIONS PRECEDENT TO ARBITRATION The aggrieved party must first notify opposing party in writing in detail of the matter(s) in dispute, the amount involved and the remedy sought. Such writing shall include copies of any documents, writings, plans, or other matter pertinent to the resolution of the dispute. The Chief Engineer of the Mississippi Department of Transportation, or his authorized representative, and a principal of the opposing party shall be the proper parties for

such notice and shall be active parties in any subsequent dispute resolution.

(Paragraph Deleted)

§ 15.5.2 REQUESTS FOR ARBITRATION: Within thirty (30) days of a claim being rejected in writing by the Project Engineer, either party may request arbitration. Notices for requests for arbitration shall be made in writing to the Chief Engineer of the Mississippi Department of Transportation, P. O. Box 1850, Jackson, Mississippi 39215-1850. Such notice shall set forth in detail the matter(s) in dispute, the amount involved, and the remedy sought. A copy of the request shall be mailed to the opposite party. The party requesting arbitration must deposit the sum of two hundred dollars ($200.00) with its request as a deposit against costs incurred by the arbitrators. Each party will be notified in writing in any manner provided by law of certified mail not less than twenty (20) days before the hearing of the date, time and place for the hearing. Appearance at the hearing waives a party's right to notice.

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§ 15.5.3 SELECTION OF ARBITRATORS: Upon request for arbitration, a panel of three (3) arbitrators shall be chosen. The Chief Engineer of the Mississippi Department of Transportation shall appoint one (1) member. One (1) member shall be appointed by the Executive Director of a professional or trade association that represents interests similar to that of the non-state party. The first two shall appoint the third member.

§ 15.5.4 HEARINGS: All hearings shall be open to the public. All hearings will be held in Jackson, Mississippi, unless the parties mutually agree to another location. The hearings shall be conducted as prescribed by **Mississippi Code 1972, Annotated**, Sections 11-15-113, 11-15-115, and 11-15-117. A full and complete record of all proceedings shall be taken by a certified court reporter. The scheduling and cost of retaining the court reporter shall be the responsibility of the party requesting arbitration. The costs of transcription of the record shall be the responsibility of the party requesting such transcript. No arbitration hearing shall be held without a certified court reporter. Deliberations of the arbitrators shall not be part of the record.

§ 15.5.5 AWARDS: Awards shall be made in

writing and signed by the arbitrators joining in the award. A copy of the award shall be delivered to the parties by certified mail.

§ 15.5.6 FEES AND EXPENSES: Reasonable fees and expenses, excluding counsel fees, incurred in the conduct of the arbitration shall be at the discretion of the Arbitrator except each party shall bear its own attorney's fees and costs of expert witnesses.

§ 15.5.7 MODIFICATIONS, CONFIRMATIONS, AND APPEALS: All modifications, confirmations and appeals shall be as prescribed by **Mississippi Code 1972, Annotated**, Section 11-15-123 et seq. All awards shall be reduced to judgment and satisfied in the same manner other judgments against the State are satisfied.

§ 15.5.8 SECRETARY FOR THE ARBITRATORS: All notices, requests, or other correspondence intended for the arbitrators shall be sent to the Chief Engineer, Mississippi Department of Transportation, P. O. Box 1850, Jackson, Mississippi 39215-1850.

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DOCUMENT 00 91 13 ADDENDA

1.01 NOTICE TO BIDDERS

A. Addenda issued on this Project will become part of the Standard Form of the Agreement Between the Owner and the Contractor.

B. Addenda will be indicated on the second sheet of Section 905 (end of the Proposal/Project Manual) as addenda.

END OF DOCUMENT

SECTION 01 10 00 SUMMARY

PART 1 - GENERAL

1.01 CONTRACT DESCRIPTION

A. The I-10 Jackson County Welcome Center includes, but not limited to the construction of a new building consisting of load bearing masonry and clad with metal wall panels and masonry veneer; glu-laminated trusses, standing seam metal room on cross-laminated timber (CLT) roof deck, aluminum curtainwall; interior finishes; mechanical, electrical, communications and fire protection systems all as shown on the final construction documents.

1. Demolition work includes the removal and demolition of the existing welcome center and all related infrastructure, including but not limited to above and below ground utilities, concrete/asphalt pavement, picnic pavilions, demolition of existing parking, sidewalks and site fixtures.

2. New site work includes but not limited to new utilities, asphalt and concrete paving, curbs, sidewalks, fencing, and landscaping.

3. Additional work includes construction of new picnic pavilions and pre-engineered metal storage building, above ground water storage tank and related sitework and utilities.

B. All accessories or incidental items not specifically shown and detailed in the specifications herein, which are necessary and/or required to complete the work within the intent of the specifications, shall be included by the Contractor without additional cost to the Owner.

1.02 WORK BY OTHERS

A. The Owner will have construction projects and tenant relocations occurring during the duration of this project. Those projects will require interfacing with construction of this contract.

B. The Contractor shall, by way of the Owner, become familiar with the work in other contracts, which will progress during the Contract period.

C. The project, GULF COAST TOURIST WAYFINDING AND INFORMATIONAL SIGNAGE PROJECT, as shown on the Contract Documents will be constructed by another contractor during the course of the Welcome Center project. The successful bidder will be expected to fully cooperate with and provide access to the area of construction necessary for the Wayfinding Sign project.

1.03 DEFINITIONS

A. Architect / Project Engineer: For purposes of these Contract Documents, the terms “Architect” and “Project Engineer” are used interchangeably and shall mean the Owner’s designated design professional and its authorized representatives, including the MDOT Architect, unless otherwise specifically stated.

1.04 WORK COVERED BY CONTRACT DOCUMENTS

A. Work covered by the Contract Documents shall be provided by one (1) General Contractor as one (1) Contract to improve the Mississippi Department of Transportation site in constructing the I-10 Jackson County Welcome Center, Jackson County, Mississippi.

B. Time of Completion: The completion of this Work is to be on or before the time indicated on the Owner and Contractor Agreement.

C. Contractor’s Duties:

1. Except as specifically noted, provide and pay for:
   a. Labor, materials, equipment.
   b. Tools, construction equipment, and machinery.
   c. Other facilities and services necessary for proper execution and completion of the Work.
2. Utilities: Coordinate with local utility companies for installation and pay for all costs incurred thereby.
3. Contractor shall include in the Bid all costs required for proper execution and completion of the Work, including the following, as applicable at time of receipt of bids:

   a. Pay legally required sales, consumer, use, payroll, privilege, and other applicable taxes.
   b. Secure and pay for, as necessary for proper execution and completion of the Work:
   c. Permits and Government Fees, including building permits, plan review fees, inspection fees, tap fees, impact fees, right-of-way/encroachment permits, and similar fees.
   d. Licenses required to perform the Work.
   e. Utility Company Fees, including all application fees, deposits, service charges, connection fees, service extension costs, transformer and metering charges, inspections, and other charges assessed by the serving utilities, including Utility Company, required to provide electrical service to the Project site.
   f. Failure of the Contractor to anticipate such taxes, fees, or utility company requirements shall not be grounds for additional compensation or time extension.

4. All costs described above shall be included in the Bid and shall not be paid as separate or reimbursable items unless specifically identified elsewhere in the Contract Documents.
5. Give required notices.
6. Comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities that bear on performance of Work.

7. Promptly submit written notice to Project Engineer of observed variance of Contract Documents from legal requirements. Appropriate modifications to Contract Documents will adjust necessary changes. Assume responsibility for Work known to be contrary to such requirements, without notice.
8. Enforce strict discipline and good order among employees. Do not employ on Work, unfit persons or persons not skilled in assigned task.
9. Schedule of Values: Submit 8 copies to the MDOT Architectural Services Unit a Schedule of Values as described in Section 01 29 00 – Payment Procedures of these Specifications. This submittal will be recorded as submittal number one for this Project. When this submittal is approved, a copy will be transmitted to Construction Administration to be used to review and compare to amounts submitted on the CAD-720 form. Other copies will be kept by Architectural Services Unit and distributed to Project Engineer, MDOT Consultants, and Contractor.
10. Sub-Contractor List: Submit 8 copies of a list, acceptable to the MDOT, of all subcontractors to be used on the Project within seven (7) days after written notice of Contract award by the MDOT. The list shall include the Firm's name, contact person, street address, e-mail address, telephone and fax numbers. Submit original to Contract Administration Division and one copy to the Project Engineer and to the MDOT Architect CAD-720 form - REQUEST FOR PERMISSION TO SUBCONTRACT for each subcontractor before they are allowed to perform any Work.
11. Coordination: The Contractor is responsible for the coordination of the total Project. All subcontractors will cooperate with the Contractor so as to facilitate the general progress of the Work. Each trade shall afford all other trades every reasonable opportunity for the installation of their Work. Refer to Section 01 31 00– Project Management & Coordination.

1.05 CONTRACTOR'S USE OF PREMISES

A. Confine operations at the site to areas permitted by:

1. Law
2. Ordinances
3. Permits
4. Contract Documents
5. Owner

B. Do not unreasonably encumber site with materials or equipment.

C. Do not load structure with weight that will endanger structure.

D. Assume full responsibility for protection and safekeeping of products stored on premises.

E. Move stored products which interfere with operations of MDOT or other Contractors.

F. Obtain and pay for use of additional storage of work areas needed for operations.

G. Limit use of site for work and storage to the area indicated on the Drawings.

1.06 ACCESS TO SITE

A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

B. Use of Site: Contractor may use the full Project site for construction operations, material storage, equipment access, staging, and temporary facilities, except as limited by environmental permit requirements, safety regulations, or Owner-designated protected areas. Maintain access for the Owner, MDOT, utility providers, emergency services, and other agencies having jurisdiction during construction.

1. Limits of Disturbance: Confine construction operations to the limits of disturbance (LOD) shown on the Drawings and defined in the Stormwater Pollution Prevention Plan (SWPPP). Do not disturb areas outside the LOD without prior written approval from the Owner and MDOT. Restore any unauthorized areas disturbed at no additional cost to the Owner.

2. Environmental Protection: Comply with all erosion and sediment control measures; stormwater management requirements; wetland, watercourse, and tree protection zones; and applicable state and federal environmental permits. Prevent discharge of sediments, fuels, chemicals, or debris into storm systems or adjacent properties.

3. Temporary Facilities and Staging:

   a. Locate construction trailers, laydown areas, parking areas, material storage, and haul roads within limits shown on the Contractor’s Site Utilization Plan submitted for approval prior to mobilization.

   b. Maintain safe public separation from construction areas, including barricades, fencing, signage, and controlled access points as required by MDOT Work Zone Safety requirements.

   c. Maintain fire lanes and emergency vehicle access throughout the duration of construction.

4. Smoking and Controlled Substances on Site:

   a. Smoking is prohibited inside new and temporary buildings, trailers, vehicles, or enclosed structures in accordance with the Mississippi Smoke-Free Air Act of 2024 (HB 46).

   b. Smoking is prohibited within designated fuel storage areas, near flammable materials, or where otherwise restricted by safety signage.

   c. If permitted by Contractor’s Site Utilization Plan, designate a single outdoor smoking area equipped with proper waste receptacles and located away from public areas and building entrances.

   d. Alcohol, illegal drugs, and controlled substances are prohibited on the Project site.

5. Driveways, Walkways and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.07 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work to normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Project Engineer not less than two days in advance of proposed utility interruptions.
2. Obtain Project Engineer’s written permission before proceeding with utility interruptions.

D. Retain "Noise, Vibration, and Odors" Paragraph below for work in or near occupied facilities.

E. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Project Engineer not less than two days in advance of proposed disruptive operations.
2. Obtain Project Engineer’s written permission before proceeding with disruptive operations.

F. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.

1.08 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Format: The Specifications are organized into Groups, Subgroups, Divisions and Sections using CSI/CSC's "MasterFormat" 2004 Edition numbering system.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable, as the context of the Contract Documents indicates.

2. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
3. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

C. Division 00 Contracting Requirements: General provisions of the Contract, including General Conditions (Modified), apply to all Sections of the Specifications.

D. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

E. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 21 00 – ALLOWANCES

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements governing lump-sum allowances.

1. Movable Furniture and Fixtures as indicated on the Furniture and Fixture Schedule.

a. Desk chairs
b. Breakroom table
c. Breakroom chairs
d. Rocking chairs
e. Lounge chairs
f. Benches (interior)
g. Desk
h. Guest chairs
i. Pouf split seating (large and small)
j. Waste receptacle (interior)
k. Custom area rugs (including non-slip pads)
l. Conference table
m. Custom vitrines
n. Side tables

B. Conditions:

1. The Contractor shall include in his base bid the cash and/or material allowances as described hereinafter for the purchase of materials as described or as to be determined herein. All costs for overhead, profit, bond, insurance, installation, labor, receiving and handling at the project site, storage off-site if required and equipment rental shall not be included as part of the specified allowances and these overhead amounts shall be carried as an additional cost, where applicable, in a separate line item on the contractor’s bid and subsequent schedule of values.

2. All specified allowances shall appear as a line item amount, matching the amount specified herein, on the contractor’s AIA Document G703, schedule of values.

3. Selections shall be made by the Architect (and MDOT Architect) or as specified herein and the contract price shall be adjusted as per the final price of the materials used.

1.2 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered.**

1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect and MDOT Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Architect's / MDOT Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect from the designated supplier.

1.4 INFORMATIONAL SUBMITTALS

A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.6 LUMP SUM ALLOWANCES

A. General:

1. Purchase products under allowance as directed by Architect or as specified herein.

2. The amount of all specified allowances shall include:

    a. Net cost of product, including taxes
    b. Freight and delivery to site
    c. Installation labor and related construction costs are excluded from the allowance amount and shall be included in the Contractor's base bid.

3. At close-out of Contract, funds remaining in Allowance will be credited to MDOT by Change Order. In addition to the balance of the allowance all applicable costs for overhead, profit, bond, insurance and taxes will be added to the allowance change order credit. Overhead amounts that can be clearly documented as being expended over the course of the project will be excluded from this added amount to the allowance credit.

1.7 SELECTION OF PRODUCTS

A. Architect's Duties:

1. Consult with Contractor in consideration of products and suppliers.

2. Make selection, designate products to be used.

B. Contractor's Duties:

1. Assist Architect in determining qualified suppliers.

2. Obtain proposals from suppliers when requested by Architect.

3. Make appropriate recommendations for consideration of Architect.

4. Notify Architect of any effect anticipated by selection of product or supplier under consideration on:

    a. Construction schedule.

    b. Contract sum.

1.8 DELIVERY

A. Contractor Responsibility:

1. Arrange for delivery and unloading.
2. Promptly inspect products for damage and defects.

3. Submit claims for transportation damage.

1.9 INSTALLATION

A. Comply with requirements of referenced specification section.

1.10 ADJUSTMENT OF ALLOWANCES

A. Should actual purchase cost be more or less than specified amount of allowance, Contract Sum will be adjusted by Change Order equal to amount of difference.

B. For products specified under unit cost allowance:

1. Should quantity used be more or less than that listed in Schedule of Values, unit cost applies to quantity actually used.

2. Submit invoices or other data to substantiate quantity actually used.

3. Submit request for other costs, claimed for additional work caused by increase over amount of allowance, prior to execution of work.

C. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.

2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Allowance for Movable Furniture and Fixtures, as indicated on the Furniture and Equipment Schedule labeled as “Allowance” on Sheet I700 in the Drawings and as indicated in Specification 12 50 00 Furniture.

1. In **addition** to the work shown on the contract documents include in the base bid contract amount the following lump sum contingency cash allowance amount: for movable furniture and fixtures.

a. One Hundred Seventy-Five Thousand Dollars ($175,000).

2. Contractor shall solicit a minimum of three (3) quotes for additional material or work to be performed under this Allowance.

3. Use of allowance shall be specifically authorized in writing upon approval by authorized Owner Representative. A final accounting of all contingency funds used will be made by issuance of a change order at the end of the project. At close-out of Contract, funds remaining in Allowance will be credited to MDOT by Change Order.

END OF SECTION

SECTION 01 25 00 SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 01 33 00 “Submittal Procedures” for submittal requirements.

2. Section 01 60 00 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

C. Build America, Buy America (BABA) Compliance:

1. All substitution requests must demonstrate full compliance with the Build America, Buy America Act (Public Law 117-58) and related FHWA Buy America requirements.

2. Submittals shall include certification of U.S. manufacturing origin for all iron, steel, manufactured products, and construction materials proposed as substitutions.

3. BABA waivers are NOT allowed.

1.02 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.03 ACTION SUBMITTALS

A. Substitution Requests – General:

1. Substitution requests shall be submitted ONLY AFTER award of Contract. Substitution requests submitted during the bidding period will not be reviewed and will be returned without action.

2. Substitution requests shall be submitted in accordance with this Section within sixty (60) calendar days following Notice to Proceed.

3. Substitution requests submitted after this period will not be considered.

4. Approval of a substitution does not relieve the Contractor of responsibility for compliance with the Contract Documents.

B. Substitution Requests: Substitution Requests: Within sixty (60) days after Notice to Proceed, submit four copies (or electronic copies as permitted by MDOT Architect) of each request for consideration. Include Specification Section number and title and Drawing numbers and titles. Substitution requests submitted outside the time period specified above will not be reviewed and will be returned without action.

1. Substitution Request Form: Use facsimile of form provided in this section.

2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

   a. **Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.**
   b. **Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.**
   c. **Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.**
   d. **Product Data, including drawings and descriptions of products and fabrication and installation procedures.**
   e. **Samples, where applicable or requested.**
   f. **Certificates and qualification data, where applicable or requested.**
   g. **List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.**
   h. **Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.**
   i. **Research reports evidencing compliance with building code in effect for Project, from ICC-ES (International Code Council Evaluation Service).**
   j. **Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.**
   k. **Cost information, including a proposal of change, if any, in the Contract Sum.**
   l. **Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.**
   m. **Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.**

3. Where more than one manufacturer's product is specified for one use (and no substitution is proposed), the Drawings have been prepared for the product listed first in the Specifications;

   a. **Contractor will be responsible for any changes in the building construction required because of product selection, and shall make any such changes to the satisfaction of the Architect, at no cost to MDOT.**

4. MDOT Architect's Action: If necessary, MDOT Architect will request additional information or documentation for evaluation within ten days of receipt of a request for substitution. MDOT Architect will notify Contractor through Project Engineer of acceptance or rejection of proposed substitution within fifteen (15) calendar days of receipt of request, or ten (10) calendar days of receipt of additional information or documentation, whichever is later.

   a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
   b. Use product specified if MDOT Architect does not issue a decision on use of a proposed substitution within time allocated.

1.04 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

PART 2 - PRODUCTS

2.01 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals. ONLY ONE REQUEST per product will be allowed.
   1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:
      a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
      b. Contractor has personally investigated proposed product or method, compared the product specified with the proposed substitution, and determined that it is equal or superior in all respects to that specified.
      c. Cost data is complete and includes all related costs under his Contract.
      d. Contractor waives all claims for additional costs related to substitution that consequently becomes apparent.
      e. Requested substitution will not adversely affect Contractor's construction schedule.
      f. Requested substitution has received necessary approvals of authorities having jurisdiction.
      g. Requested substitution is compatible with other portions of the Work.
      h. Requested substitution has been coordinated with other portions of the Work.
      i. Requested substitution provides specified warranty.

B. Substitutions for Convenience: Architect will consider requests for substitution. ONLY ONE REQUEST per product will be allowed.
   1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:
      a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to MDOT Architect's

Consultants for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.

b. Contractor has personally investigated proposed product or method, compared the product specified with the proposed substitution, and determined that it is equal or superior in all respects to that specified.

c. Cost data is complete and includes all related costs under his Contract.

d. Contractor waives all claims for additional costs related to substitution that consequently becomes apparent.

e. Requested substitution does not require extensive revisions to the Contract Documents.

f. Requested substitution is consistent with the Contract Documents and will produce indicated results.

g. Requested substitution will not adversely affect Contractor's construction schedule.

h. Requested substitution has received necessary approvals of authorities having jurisdiction.

i. Requested substitution is compatible with other portions of the Work.

j. Requested substitution has been coordinated with other portions of the Work.

k. Requested substitution provides specified warranty.

PART 3 - EXECUTION

PRODUCT SUBSTITUTION REQUEST FORM

PROJECT:_____ PROJECT NO._____

OWNER: _____

CONTRACTOR:_____

ARCHITECT:_____

_____

CONTRACTOR'S REQUEST, WITH SUPPORTING DATA

1. Section of the Specifications to which this request applies:

   _____

   [ ] Product data for specified item and proposed substitution is attached (description of product, reference standards, performance and test data).

   [ ] Sample is attached

2. Itemized comparison of proposed substitution with product specified.

	ORIGINAL PRODUCT	SUBSTITUTION
Name, brand	_____	_____

Catalog No._____ _____

Manufacturer_____ _____

Significant variations:_____

_____

Reason for Substitution:

_____

_____

3. Proposed change in Contract Sum:

Credit to Owner: $_____

Additional Cost to Owner: $_____

4. Effect of the proposed substitution on the Work:

Contract Time: _____

CONTRACTORS STATEMENT OF CONFORMANCE OF PROPOSED SUBSTITUTION TO CONTRACT REQUIREMENTS

I / We have investigated the proposed substitution. I / We

1. Believe that it is equal or superior in all respects to originally specified product, except as stated in 2. above;
2. Will provide same warranty as required in Contract Documents;
3. Have included all cost data and cost implications of proposed substitution; including, if required, costs to other contractors, and redesign and special inspection costs caused by use of proposed substitution;
4. Will coordinate incorporation of proposed substitution in the Work;
5. Will modify other parts of the Work as may be needed, to make all parts of the Work complete and functioning;
6. Have verified that use of this substitution conforms to all applicable codes.
7. Waive future claims for added cost to Owner caused by proposed substitution.

CONTRACTOR_____DATE:_____
Signature

MDOT ARCHITECT'S REVIEW AND ACTION

___ Accepted

___ Not Accepted

___ Provide more information in the following categories and resubmit _____

___ Sign Contractor's Statement of Conformance and resubmit

___ Proposed substitution is accepted, with the following conditions:

_____

_____

Change Order (Supplemental Agreements) will make the following changes:

(Add to) (Deduct from) Contract Sum: $_____

(Add to) (Deduct from) Contract Time: _____days

ARCHITECT:_____DATE_____

OWNER: _____DATE_____

___Accepted ___Not accepted

END OF SECTION

SECTION 01 26 00 CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications (Supplemental Agreements) by the Project Engineer and the Contractor.

1.02 CHANGE ORDER (SUPPLEMENTAL AGREEMENT) PROCEDURES

A. Change Proposed by the Project Engineer: The Project Engineer may issue a Proposal Request to the Contractor which includes a detailed description of a proposed change with supplementary or revised Drawings and Specifications and a change in Contract Time for executing the change. The Contractor shall prepare and submit an estimate within 10 days.

B. Change Proposed by the Contractor: The Contractor may propose a change by submitting a request for change to the Project Engineer, describing the proposed change and it's full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on Work by separate or other Contractors. Document requested substitutions in accordance with Section 01 25 00 Substitution Procedures and Section 01 60 00 Product Requirements.

C. Contractor's Documentation:

1. Maintain detailed records of Work completed on a time and material basis. Provide full information required for evaluation of proposed changes, and substantiate costs of changes in the Work.
2. Document each quotation for a change in cost or time with sufficient data allowing evaluation of the quotation.
3. On request, provide additional data to support computations:
    a. Quantities of products, labor, and equipment.
    b. Taxes, insurance and bonds.
    c. Overhead and profit.
    d. Justification for change in Contract Time.
    e. Credit for deletions from Contract, similarly documented.
4. Support each claim for additional costs, and for work completed on a time and material basis, with additional information:
    a. Origin and date of claim.
    b. Dates and time work was performed and by whom.
    c. Time records and wage rates paid.
    d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

D. Construction Change Directive: The Project Engineer may issue a document, approved by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order (Supplemental Agreement). The document will describe changes in the Work, and will designate method of determining any change in the Contract Sum or Contract Time. The change in Work will be promptly executed.

E. Format: The Project Engineer will prepare 5 originals of the Change Order (Supplemental Agreement) using the Mississippi Department of Transportation's Change Order (Supplemental Agreement) Form.

F. Types of Change Orders (Supplemental Agreements):

1. Stipulated Sum Change Orders: Based on Proposal Request and Contractor's fixed price quotation, or Contractor's request for a Change Order (Supplemental Agreement) as approved by the Project Engineer and the MDOT Architect.
2. Unit Price Change Order: For pre-determined unit prices and quantities, the Change Order (Supplemental Agreement) will be executed on a fixed unit price basis. For unit costs or quantities of units of work, which are not pre-determined, execute Work under a Construction Change Directive. Changes in Contract Sum or Contract Time will be computed as specified for Time and Material Change Order (Supplemental Agreement).
3. Time and Material Change Order (Supplemental Agreement): Submit itemized account and supporting data after completion of change, within time limits indicated in the Standard Form of Agreement Between the Owner and the Contractor. The Project Engineer will determine the change allowable in Contract Sum and Contract Time as provided in the Contract Documents. The Contractor shall maintain detailed records of Work accomplished on Time and Material basis and shall provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

G. Execution of Change Order (Supplemental Agreement): The Project Engineer will issue Change Orders (Supplemental Agreements) for signatures of parties as provided in the Standard Form of Agreement Between the Owner and the Contractor. Final execution of all Change Orders (Supplemental Agreements) requires approval by the Owner.

H. Correlation of Contractor Submittals: The Contractor shall promptly revise Schedule of Values and the Application for Payment forms to record each authorized Change Order (Supplemental Agreement) as a separate line item and adjust the Contract Sum. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust time for other items of Work affected by the change and resubmit. Promptly enter changes in Project Record Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 29 00 PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Section 01 26 00 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
2. Section 01 32 00 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.02 SCHEDULE OF VALUES

A. Scope: Submit electronic pdf copy of the Schedule of Values to the MDOT Architect, with a copy to the Project Engineer, at least 10 days prior to submitting first Application for Payment. Upon Project Engineer's request, support the values given with data substantiating their correctness. Payment for materials stored on site will be limited to those listed in Schedule of Unit Material Values (refer to Article 9 of the General Conditions, AIA Document A201™-2007 Amended for requirements). Use Schedule of Values only as basis for contractor's Application for Payment.

B. This copy of the Schedule of Values will be reviewed as Submittal No.1. A copy of this submittal will be reviewed by the Architect, Mechanical, Electrical and Civil Consultants. One copy will be retained by MDOT Architectural Services, one by Architect, Civil Consultant, Mechanical / Electrical Consultants, one sent to Contract Administration for use in reviewing requests for Permission to Sub-Contract (CAD-720 Form), one sent to the Project Engineer, and one returned to the Contractor.

C. Form of Submittal: Submit typewritten Schedule of Values on AIA Document G703-1992, using Table of Contents of this Specification as basis for format for listing costs of Work for Sections under Divisions 02 - 49. Identify each line item with number and title as listed in Table of Contents of this Specification.

D. Preparing Schedule of Values:

1. Itemize separate line item costs for each of the following general cost items: Performance and Payment Bonds, field supervision and layout, temporary facilities and controls, and closeout documents.
2. Itemize separate line item cost for Work required by each Section of this specification. Breakdown installed cost with overhead and profit.
3. Each line item, which has installed value of more than $20,000, break down costs to list major products for operations under each item, rounding figures to nearest dollar. Make sum of total costs of all items listed in schedule equal to total Contract Sum.

E. Preparing Schedule of Unit Material Values:

1. Submit separate schedule of unit prices for materials to be stored on which progress payments will be made. Make form of submittal parallel to Schedule of Values with each line item identified same as line item in Schedule of Values. Include in unit prices only: Cost of material, delivery and unloading site, and sales tax.
2. Make sure unit prices (if required) multiplied by quantities equal material cost of that item in Schedule of Values.

F. Review and Re-submittal: After Project Engineer / Architect's review, if requested, revise and resubmit schedule in same manner

1.03 METHOD OF MEASUREMENT

A. The method of measurement and payment shall conform to the applicable provisions of Article 9 of the AIA Document A201-2007 General Conditions of the Contract for Construction.

1.04 APPLICATIONS FOR PAYMENT

A. Format:

1. Applications for Payments will be prepared on AIA forms G702-Application and Certificate for payment and G703-Continuation Sheet; or, a computer generated form containing similar data may be used.

B. Preparation of Application:

1. Present required information in type written form.
2. Execute certification by signature of authorized officer.
3. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of Work performed and for stored products.
4. List each authorized Change Order (Supplemental Agreement) as an extension on continuation sheet, listing Change Order (Supplemental Agreement) number and dollar amount as for an original Item of Work.
5. Prepare Application for Final Payment as specified in Section 01 77 00-Closeout Procedures.
6. With each Pay Application, furnish Prime Contractor and Sub-Contractor Interim Waivers and Release of Liens, Proof of Stored Materials (if applicable), as-built monthly update certification letter, updated project schedule (If applicabler). For final payment, submit final Contractor and Sub-Contractor Waivers and Release of Liens. Prepare AIA Document G706 and G706A.

C. Submittal Procedures:

1. Submit electronic pdf copy of each Application for Payment to the Project Engineer and to the Architect.
2. Submit an updated construction schedule with each Application for Payment as described in Section 01 32 00-Construction Progress Documentation.
3. Submit request for payment at intervals agreed upon by the Project Engineer, Owner, and Contractor.
4. Submit requests to the Project Engineer at agreed upon times, or as may be directed otherwise.

D. Substantiating Data:

1. Submit data justifying dollar amounts in question when such information is needed.
2. Provide one copy of the data with a cover letter for each submittal.
3. Indicate the Application number, date and line item number and description.

1.05 STATEMENTS AND PAYROLLS

A. The Contractor and subcontractors shall submit weekly two copies of all payrolls to the Project Engineer and meet the requirements of U. S. Department of Transportation Form FHWA 1273, on projects constructed in whole or in part with Federal funds.

B. The Contractor and Subcontractors shall submit Form CAD-880, “Weekly Summary of Wage Rates” and CAD-881, “Weekly Statement of Compliance”, each week to the Project Engineer. The forms may be obtained from the Contract Compliance Officer, Contract Administration Division, Mississippi Department of Transportation, Jackson, Mississippi. Custom forms, approved by Contract Administration Division, may be used in lieu of CAD forms.

C. When no work is performed on Federal-Aid Projects, the Contractor should only submit CAD-880 showing no work activities

D. The Contractor shall make all efforts necessary to submit this information to the Project Engineer in a timely manner. The Engineer will have the authority to suspend the work wholly or in part and to withhold payments because of the Contractor's failure to submit the required information. Submission of forms and payrolls shall be current through the first week of the estimate period in order for the Project Engineer to process an estimate.

1.06 WAGE RATES

A. All persons employed or working upon the site of the Work will be paid at wage rates not less than those contained in the wage determination decision of the Secretary of Labor in effect at time of Advertisement for Bids and/or contained in the Contract.

1.07 CLASSIFICATIONS

A. The Department Contract Compliance Officer shall require that any class of laborers or mechanics, including apprentices and trainees, which is not listed in the wage determination and which is to be employed under the Contract, shall be classified or reclassified conformably to the wage determination.

1.08 BASIS OF PAYMENT

A. This Work will be paid for by Contract Sum for the construction in District Six. The Work includes the construction of the I-10 Jackson County Welcome Center, Jackson County, Mississippi. The Contract Sum shall be full compensation for all site work, for furnishing all materials, and all other Work and effort of whatever nature in the construction of the buildings, installation of underground and other equipment, and final clean-up of the area. It shall also be complete compensation for all equipment, tools, labor, and incidentals necessary to complete the Work.

B. Payment will be made under:

1. Description A:
MDOT Project No. STBG-0010-01(180)
I-10 Jackson County Welcome Center
Jackson County, Mississippi, lump sum

TOTAL PROJECT CONTRACT SUM **LUMP SUM**

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 31 00 PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
Project Management.
Requests for Information (RFIs).
Project meetings.
BIM coordination meetings

B. Project Coordinator: The General Contractor shall designate one individual as Project Coordinator (Superintendent), as referred to in the General Conditions. Prior to beginning Work his name, qualifications and address shall be submitted, in writing, to the MDOT Executive Director with copies to the Construction Engineer, Contract Administration Engineer, District Engineer, Project Engineer and MDOT Architect. Upon approval, he will remain until the Project is completed and cannot be removed during construction without just cause and without the written consent of the Project Engineer.

C. Related Requirements:

1. Section 01 73 00 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

D. Building Construction Manager (BCM): Requirements for a designated manager to coordinate Building Work (CSI Divisions 03 through 28), including submittals, scheduling, inspections, and commissioning coordination.

1.02 DEFINITIONS

A. RFI: Request from Project Engineer, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

B. Building Construction Manager (BCM): A designated management function required only when the Prime Contractor does not meet the Vertical Experience Qualification defined in Paragraph 1.03.A. The BCM shall be responsible for coordination and supervision of Building Work (Divisions 03–28), including vertical sequencing, submittal coordination, inspection readiness, and trade coordination. The BCM does not relieve the Prime Contractor of overall contractual responsibility

1.03 INFORMATIONAL SUBMITTALS

A. Vertical Experience Qualifications: Within 30 days after Notice to Proceed, submit documentation demonstrating that the Prime Contractor has successfully completed, within the past five (5) years:

1. At least two (2) public or commercial building projects with a minimum construction value of $12,000,000 each.

2. One (1) public or commercial building project with a construction value of not less than $15,000,000 that included commissioning of HVAC, electrical, fire alarm, and life safety systems.

3. Experience with BAS/DDC integration and TAB

4. Experience with NFPA 72 fire alarm systems

5. Coordination of ADA and public occupancy inspections

6. Experience coordinating public restroom facilities, welcome centers or other high-occupancy buildings.

B. BCM Requirement if Prime Does Not Qualify: If the Prime Contractor does not meet the Vertical Experience Qualification, the Prime Contractor shall designate a Building Construction Manager (BCM) meeting the experience requirements above. The BCM shall include, at minimum:

1. Building Project Manager

2. Building Superintendent (dedicated to Building Work)

3. QC Manager

The BCM may be an in-house division of the Prime Contractor or a subcontracted management entity. Contractual privity remains solely with the Prime Contractor.

C. BCM Personnel Qualifications: Within 30 days after Notice to Proceed, submit qualifications for the proposed BCM including:

1. Identification of BCM firm or in-house team

2. Resumes of BCM team (ex: Building Project Manager, Building Superintendent, and Quality Control Manager).

D. Key Personnel List: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site.

1. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers.
2. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project

E. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

1.04 PROJECT STAFFING REQUIREMENTS

A. General Staffing: The Prime Contractor shall maintain a dedicated on-site management and quality control staff for the duration of the Work, including both Building Work (Divisions 03–28) and Civil/Site Work. Staffing shall be sufficient to manage the full scope of Work.

B. Minimum Required Personnel:

1. Project Manager
   a. Overall responsibility for contract administration, schedule, cost control, and coordination of Building and Civil Work.
   b. Shall be assigned for the duration of the Project.
   c. Shall have authority to bind the Contractor on contractual and administrative matters.

2. Superintendent
   a. Full-time, on-site whenever Work is in progress.
   b. Responsible for field supervision of all trades, both Building and Civil.
   c. Shall not be replaced without written approval of the Project Engineer.

3. Quality Control Manager
   a. Full-time, on-site whenever Work is in progress.
   b. Shall not be the Superintendent.
   c. Shall perform duties in accordance with Section 01 45 10.
   d. Shall have authority to stop work not in compliance with Contract Documents.

4. Building Construction Manager (BCM) if required under Paragraph 1.03.B
   a. Required only if the Prime Contractor does not meet the Vertical Experience Qualification.
   b. Responsible for coordination of Building Work (Divisions 03–28).
   c. The BCM may include:
      i. Building Project Manager
      ii. Building Superintendent
   d. The BCM may be an in-house team or subcontracted entity, but contractual privity remains solely with the Prime Contractor.

1.05 DUTIES OF PROJECT MANAGER - Duties apply to both Building Work (Divisions 03–28) and Civil/Site Work under this Contract.

A. Overall responsibility for contract administration, cost control, schedule development, and coordination of Building and Civil Work.

B. Review, approve, and submit Applications for Payment. The Project Manager shall certify that the Work included in each Application for Payment has progressed in accordance with the Contract Documents.

C. Prior to submission of each Application for Payment, the Quality Control Manager shall advise the Project Manager of any known non-conforming Work or unresolved deficiencies that may affect payment. The Project Manager shall not include Work in an Application for Payment that the Quality Control Manager has identified as non-compliant unless corrective action has been taken or the Owner has accepted the condition in writing.

D. Coordinate preparation and maintenance of:

1. Construction Schedule

2. Schedule of Values

3. Submittal Log (Maintained by the Quality Control Manager)

4. Applications for Payment

E. Ensure that submittals are reviewed internally prior to submission in accordance with Section 01 33 00.

F. Participate in:

1. Preconstruction Conference

2. Weekly Progress Meetings

3. Coordination Meetings

4. Quality Control Meetings

G. Review proposed Change Orders and assist in preparation of pricing and documentation.

H. Ensure integration of Building Work and Civil/Site Work into a single coordinated construction effort.

I. Coordinate closeout procedures, including:

1. As-builts

2. O&M Manuals

3. Warranties

4. Training coordination

1.06 DUTIES OF PROJECT SUPERINTENDENT

A. General: Coordinate construction operations for all Building and Civil Work to ensure efficient and orderly installation of each part of the Work.

1. Coordination: Coordinate the work of all subcontractors and material suppliers.
2. Supervision: Supervise the activities of every phase of Work taking place on the project.
3. Contractor's Daily Job Diary: Submit copy of daily job dairy to Project Architect/Engineer and MDOT Architect each Monday for previous week.
4. Electrical: Take special care to coordinate and supervise the Work of electrical and other subcontractors.
5. Communication: Establish lines of authority and communication at the job site.
6. Location: The Project Superintendent must be present on the job site at all times while work is in progress. Superintendent shall advise Project Architect/Engineer of an intended absence from the work and designate a person to be in charge of the Work during such absence.
7. Permits: Assist in obtaining building and special permits required for construction.

B. Interpretations of Contract Documents:

1. Consultation: Consult with Project Engineer to obtain interpretations.
2. Assistance: Assist in resolution of questions.
3. Transmissions: Transmit written interpretations to concerned parties.

C. Cessation of Work: Direct that Work not in accordance be corrected and notify the Quality Control Manager.

D. Division 01: Coordinate and assist in the preparation of all requirements of Division 01 and specifically as follows:

1. Enforce safety requirements.
2. Schedule of Value: Assist in preparation and be knowledgeable of each entry in the Schedule of Values.
3. Cutting and Patching: Supervise and control all cutting and patching of other trades work.
4. Project Meetings: Schedule with Project Engineer's approval and attend all project meetings.
5. Construction Schedules: Prepare and submit all construction schedules. Supervise Work to monitor compliance with schedules.
6. Shop Drawings, Product Data and Samples: Administer the processing of all submittals required by the Project Manual.
7. Testing: Coordinate all required testing.
8. Temporary Facilities and Controls: Allocate, maintain and monitor all temporary facilities.
9. Substitutions: Administer the processing of all substitutions.
10. Cleaning: Direct and execute a continuing (daily) cleaning program throughout construction, requiring each trade to dispose of their debris.
11. Project Closeout: Collect and present all closeout documents to the Project Engineer.
12. Project Record Documents: Maintain up-to-date Project Record Documents.

E. Changes: Recommend and assist in the preparation of requests to the Project Engineer for any changes in the Contract.

F. Application for Payment: Assist in the preparation and be knowledgeable of each entry in the Application and Certificate for Payment.

1.07 DUTIES OF QUALITY CONTROL MANAGER - Duties apply to both Building Work (Divisions 03–28) and Civil/Site Work under this Contract.

A. Implement and manage the Quality Control Program in accordance with Section 01 45 10.

B. Conduct and document preparatory meetings in accordance with Section 01 45 10..

C. Participate in Preconstruction, Weekly Progress, and Coordination Meetings.

D. Ensure that no construction begins on a major work category until required submittals are approved.

E. Inspect all Work and rework as applicable to ensure compliance with Contract Documents.

F. Maintain:

1. Daily Quality Control Reports

2. Deficiency Log

3. Rework Log

4. Testing Plan and Testing Log

5. Submittal Log

G. Review and certify submittals prior to submission to Architect.

H. Ensure all required testing and special inspections are performed.

I. Coordinate all testing laboratory personnel and special inspection services.

J. Authority to stop work not in compliance with Contract Documents.

K. The Quality Control Manager shall operate independently of production supervision and shall have authority to stop work when required to ensure compliance with the Contract Documents.

L. Participate in Punch-Out, Date of Completion, and Final Inspections.

1.08 DUTIES OF BUILDING CONSTRUCTION MANAGER

A. Building Construction Manager (BCM) Responsibilities: The BCM shall, on behalf of the Prime Contractor, perform the following for Building Work (CSI Divisions 03-28):

B. All submittals and RFIs related to Building Work shall be routed through BCM for coordination review prior to transmission to the MDOT Architect and in coordination with the Quality Control Manager as required by Section 01 45 10.

C. Prepare and maintain detailed sequencing for Building Work as part of the Project CPM.

D. Coordinate trade stacking, access, and inspections for building systems.

E. Coordinate commissioning activities with the Owner's independent Commissioning Agent, in accordance with Section 01 91 13 – Commissioning. The BCM shall support CxA functional testing, training coordination, and resolution of commissioning issues.

F. Serve as primary point of contact to the MDOT Architect regarding Building Work.

G. The Prime Contractor shall incorporate the BCM Building Schedule into the Project CPM and shall not revise building sequencing without consultation with the BCM, except as directed by the Project Engineer.

H. Direction of Building Subcontractors: Building subcontractors shall coordinate schedule, submittals, and means and methods through the BCM. The Prime Contractor shall incorporate this coordination requirement into applicable subcontracts. Nothing in this Article relieves the Prime Contractor of overall responsibility for the Work, safety, payment administration, or compliance with the Contract Documents.

1.09 COORDINATION AND PROJECT CONDITIONS

A. Coordinate scheduling, submittals, and Work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. Coordinate space requirements, supports, and installation of Mechanical and Electrical Work that are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion and for portions of Work designated for Owner's partial occupancy, if required.

E. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.10 SUBCONTRACTOR'S DUTIES

A. The Subcontractor is responsible to coordinate and supervise his employees in the Work accomplished under his part of the Contract.

B. Schedules: Conduct Work to assure compliance with construction schedules.

C. Suppliers: Transmit all instructions to his material suppliers.

D. Cooperation: Cooperate with the Project Coordinator and other subcontractors.

1.11 REQUESTS FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

MDOT Architect will return RFIs submitted to MDOT Architect by other entities controlled by Contractor with no response.

Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

Project name.
Project number.
Date.
Name of Contractor.
Name of Architect
RFI number, numbered sequentially.
RFI subject.
Specification Section number and title and related paragraphs, as appropriate.
Drawing number and detail references, as appropriate.
Field dimensions and conditions, as appropriate.
Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
Contractor's signature.
Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
RFI Forms: CSI Form 13.2A. Identify each page of attachments with the RFI number and sequential page number.

C. MDOT Architect's Action: MDOT Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by MDOT Architect after 1:00 p.m. will be considered as received the following working day.

The following RFIs will be returned without action:

a. Requests for approval of submittals.
b. Requests for approval of substitutions.
c. Requests for coordination information already indicated in the Contract Documents.
d. Requests for adjustments in the Contract Time or the Contract Sum.
e. Requests for interpretation of Architect's actions on submittals.
f. Incomplete RFIs or inaccurately prepared RFIs.

MDOT Architect's action may include a request for additional information, in which case MDOT Architect's time for response will date from time of receipt of additional information.

MDOT Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 26 00 "Contract Modification Procedures."

g. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify MDOT Architect in writing within 7 days of receipt of the RFI response.

D. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log the first week of each month. Use CSI Log Form 13.2B. Include the following:

Project name.
Name and address of Contractor.
Name and address of Architect.

RFI number including RFIs that were dropped and not submitted.
RFI description.
Date the RFI was submitted.
Date MDOT Architect's response was received.

E. On receipt of MDOT Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify MDOT Architect within seven days if Contractor disagrees with response.
Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.12 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated. Project Meetings shall be held for the following reasons:
Establish an understanding of what is expected from everyone involved.
Enable an orderly Project review during the progress of the Work.
Provide for systematic discussion of problems and effect remedies and clarifications.
Coordination of the Work.
Review installation procedures and schedules.

B. Scheduling and Administration: The Project Engineer shall schedule and preside over all meetings throughout the progress of the Work. Duties include the following:
Review, modify / approve minutes of the previous meeting.
Discuss items that have been done the previous month and anticipated work to be done within the next month.
Review Contractor’s Pay Request and resolve questions or conflicts with Construction Documents.

C. Scheduling and Administration: The Contractor shall attend and administer all meetings throughout the progress of the Work. The BCM shall attend all meetings involving Building Work, BIM coordination, commissioning, or inspections. The BCM shall be prepared to report on building schedule status, submittals, commissioning, and inspections. Duties include the following:
Preparation of agenda for meetings.
Distribution of agenda and written notice 7 days in advance of date for each regularly scheduled meeting.
Make physical arrangements for meetings.
Record the minutes which shall include list of all participants and all significant proceedings and, in particular, all decisions, agreements, clarifications, and other data related to Project cost, time, and modifications.
Distribute copies of minutes within 7 calendar days to all parties affected by decisions made at the meeting.
Follow-up unresolved matters discussed at meetings and promptly effect final resolution, especially for work in progress. Advise all affected parties of result and include report of activities in next scheduled meeting.

D. Scheduling and Administration: Representatives of Contractor’s, Subcontractor’s, and Supplier’s attending the meetings shall be qualified and authorized to act on behalf of the entity each represents.

E. Scheduling and Administration: Consultants may attend meetings to ascertain work is expedited consistent with Contract Documents and construction schedules.

F. Preconstruction Conference: The Project Engineer, with the assistance of the MDOT Architect, will preside over and administer this meeting.

Schedule: Schedule Pre-Construction Meeting within 10 days after Notice to Proceed.

Location: A central site, convenient for all parties, designated by the Project Engineer and the MDOT Architect.

Agenda: Discuss items of significance that could affect progress, including the following:

a. Distribute and discuss tentative construction schedule prepared by Contractor.
b. Phasing.
c. Critical work sequencing and long-lead items.
d. Designation of key personnel and their duties.
e. Procedures for processing field decisions and Change Orders.
f. Procedures for RFIs.
g. Procedures for testing and inspecting.
h. Procedures for processing Applications for Payment.
i. Distribution of the Contract Documents.
j. Submittal procedures.
k. Preparation of record documents.
l. Use of the premises
m. Work restrictions.
n. Working hours.
o. Owner's occupancy requirements.
p. Responsibility for temporary facilities and controls.
q. Procedures for moisture and mold control.
r. Procedures for disruptions and shutdowns.
s. Construction waste management and recycling.
t. Parking availability.
u. Office, work, and material storage areas.
v. Equipment deliveries and priorities.
w. First aid.
x. Security.
y. Progress cleaning.

Minutes: Record and distribute meeting minutes.

G. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Project Engineer and MDOT Architect, and Owner's Commissioning Authority of scheduled meeting dates.

Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. Contract Documents.
b. Options.
c. Related RFIs.
d. Related Change Orders.
e. Purchases.
f. Deliveries.
g. Submittals.
h. Review of mockups.
i. Possible conflicts.
j. Compatibility problems.
k. Time schedules.
l. Weather limitations.

m. Manufacturer's written instructions.
n. Warranty requirements.
o. Compatibility of materials.
p. Acceptability of substrates.
q. Temporary facilities and controls.
r. Space and access limitations.
s. Regulations of authorities having jurisdiction.
t. Testing and inspecting requirements.
u. Installation procedures.
v. Coordination with other work.
w. Required performance results.
x. Protection of adjacent work.
y. Protection of construction and personnel.

Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

H. Progress Meetings:

Schedule: Progress Meetings will be scheduled weekly. The Project Engineer will cancel the meeting with at least 48 hours notice if a meeting is not necessary for any particular month.
Place of Progress Meetings: Contractor’s Field Office except as otherwise agreed.
Attendance: Attending shall be the Project Engineer or his representative and MDOT representatives associated with the Project, the MDOT Architect or his representative (if requested by the District) and his Consultants, the General Contractor, and all Subcontractors as pertinent to the agenda.
Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
    1) Review schedule for next period.
b. Review present and future needs of each entity present, including the following:
    1) Interface requirements.
    2) Sequence of operations.
    3) Status of submittals.
    4) Deliveries.
    5) Off-site fabrication.
    6) Access.
    7) Site utilization.
    8) Temporary facilities and controls.
    9) Progress cleaning.
    10) Quality and work standards.
    11) Status of correction of deficient items.
    12) Field observations.

13) Status of RFIs.
14) Status of proposal requests.
15) Pending changes.
16) Status of Change Orders.
17) Pending claims and disputes.
18) Documentation of information for payment requests.

Minutes: Record and distribute the meeting minutes to each party present and to parties requiring information.

c. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

I. Quality Control meetings required by Section 01 45 10 may be conducted immediately before or after regularly scheduled Progress Meetings. When conducted consecutively, Quality Control agenda items shall be distinctly addressed and documented separately from general Progress Meeting minutes.

J. BIM Coordination Meetings

1. Purpose: Conduct BIM coordination meetings to facilitate interdisciplinary spatial coordination and identification of conflicts between building systems prior to fabrication and installation. BIM coordination is intended solely as a coordination tool and does not modify, supplement, or replace the Contract Documents.

2. Frequency: Conduct BIM coordination meetings not less than monthly, and as often as necessary to resolve clashes and coordination issues prior to fabrication and installation, including weekly meetings during periods of active structural and MEP coordination, as determined by the Contractor’s coordination needs and the Project schedule.

3. Participants: Contractor shall require attendance by all subcontractors (including the BCM), fabricators, and consultants whose Work is included in the BIM coordination effort, including but not limited to structural, mechanical, electrical, plumbing, and fire protection trades, as applicable.

4. Administration: Contractor shall schedule, chair, and document BIM coordination meetings. Record and distribute meeting minutes, coordination decisions, and action items to all required participants. Attendance by the Architect or Consultants, if any, shall be for observation only and shall not transfer coordination responsibility from the Contractor.

5. Models: BIM models used for coordination are provided for coordination purposes only and are not Contract Documents. In the event of a conflict between the BIM model and the Contract Documents, the Contract Documents shall govern. The Architect is not required to provide design, construction, or record BIM models for contractor coordination unless expressly stated elsewhere in the Contract Documents.

   Neither review of, participation in, nor comments made during BIM coordination meetings constitute approval of BIM models or transfer responsibility for model accuracy from the Contractor or Subcontractors.

6. Responsibility: BIM coordination does not relieve the Contractor or Subcontractors of responsibility for compliance with the Contract Documents, required clearances,

code compliance, constructability, or coordination of their Work with other trades. The Contractor and Subcontractors remain solely responsible for the accuracy, completeness, and coordination of any BIM models they create or use for coordination.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 31 23 – PROJECT WEB SITE

PART 1 – GENERAL

1.1 SUMMARY

A. Shop drawing and product data submittals shall be transmitted to Architect in electronic (PDF) format using "Submittal Exchange", a website service designed specifically for transmitting submittals between construction team members.

1. The intent of electronic submittals is to expedite the construction process by reducing paperwork, improving information flow, and decreasing turnaround time.

B. The electronic submittal process is not intended for color samples, color charts, or physical material samples. These will still need to be logged into the software, but the actual sample sent to the Architect for approval.

1.2 PROJECT WEB SITE

A. The Contractor will provide and arrange and instruct the affected project participants on the electronic submittal software "Submittal Exchange" for purposes of hosting and managing project communication and documentation until Final Completion, Project Closeout and Final Payment. There will be a hierarchy of team leaders assigned by the MDOT Architect and Project Architect with "privileges" to facilitate, and in some cases restrict input to various project logs and categories listed on the website.

1. This is in addition to any "internal" software that the contractor uses to perform the work. If contractor chooses to use their own "internal" software, it must be compatible with "Submittal Exchange" Software required for this project.

B. The Owner will provide a list of project participant emails for use of the Owner, Architect, Engineer Architect's/Engineer's consultants, Contractor, contractor consultants, and any other party authorized by MDOT. The Contractor will provide software training through Oracle for project participants unfamiliar with the software.

1.3 SUBMITTALS

A. Upon completion of Project, the Contractor will provide two (2) complete archive DVD copies of Project Web site files to the Architect/Engineer and MDOT.

1.4 PROCEDURES

A. Submittal Preparation - Contractor may use any or all of the following options:

1. Subcontractors and Suppliers provide electronic (PDF) submittals to Contractor, which Contractor then inputs in the Submittal Exchange website.

2. Subcontractors and Suppliers provide paper submittals to Contractor who electronically scans and converts to PDF format, then inputs in the Submitital Exchange website.

3. Subcontractors and Suppliers provide paper submittals to Scanning Service which electronically scans and converts to PDF format, then provides to the Contractor, which then inputs into the Submittal Exchange website.

B. Contractor shall review and apply electronic stamp certifying that the submittal complies with the requirements of the Contract Documents including verification of manufacturer / product, dimensions and coordination of information with other parts of the work prior to submittal in the Submittal Exchange website.

C. Contractor shall transmit each submittal to Architect using the Submittal Exchange website, www.submittalexchange.com.

D. Architect / Engineer review comments will be made available on the Submittal Exchange website for downloading. Contractor will receive email notice of completed review.

E. Distribution of reviewed submittals to subcontractors and suppliers is the responsibility of the Contractor. Resubmittals shall follow the same process as an initial submittal, though the Contractor may engage the Architect for clarifications prior to making such.

F. Submit electronic (and paper copies where required) of submittals at project closeout for record purposes in accordance with Division 1 Section “Closeout Procedures”.

END OF SECTION

SECTION 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's construction schedule.
2. Construction schedule updating reports.
3. Site condition reports.

1.02 SUBMITTALS

A. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit initial schedules to the Project Engineer / MDOT Architect within 15 days after date of Notice to Proceed.
2. Submit to the Project Engineer / MDOT Architect, periodically updated schedules accurately depicting progress to first day of each month.
3. Submit 2 copies, one to be retained by the Project Engineer and the other forwarded to the MDOT Architect.

B. Construction Schedule Updating Reports: Submit with Applications for Payment.

C. Site Condition Reports: Submit at time of discovery of differing conditions.

1.03 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.01 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Form of Schedules: Prepare in form of horizontal bar chart. The following is a minimum requirement and other type schedules are acceptable with Project Engineer’s approval.

1. Provide separate horizontal bar column for each trade or operation.
2. Order: Table of Contents of Specifications.
   a. Identify each column by major Specification section number.
3. Horizontal Time Scale: Identify first work day of each week.
4. Scale and Spacing: To allow space for updating.

B. Content of Schedules:

1. Provide complete sequence of construction by activity.
2. Indicate dates for beginning and completion of each stage of construction.
3. Identify Work of logically grouped activities.
4. Show projected percentage of completion for each item of Work as of first day of each month.

C. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.

D. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the Contract Time.

E. If the Contractor is required to produce two revised construction schedules because of lack of progress in the Work, the Owner will notify the Contractor's surety.

2.02 REPORTS

A. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.01 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Project Engineer, MDOT Architect, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed

their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION

SECTION 01 32 33 PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Periodic construction photographs.

1.02 INFORMATIONAL SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

B. Digital Photographs: Submit (e-mail) image files on a weekly basis.

1. Digital Camera: Minimum sensor resolution of 8 megapixels.
2. Format: Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.
3. Identification: Provide the following information with each image description in file metadata tag:
   a. Name of Project.
   b. Name of photographer.
   c. Name of Architect.
   d. Name of Contractor.
   e. Date photograph was taken.
   f. Description of vantage point, indicating location, direction (by compass point), and elevation of construction.
   g. Unique sequential identifier keyed to accompanying key plan.

PART 2 - PRODUCTS

2.01 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 8 megapixels, and at an image resolution of not less than 3200 by 2400 pixels.

PART 3 - EXECUTION

3.01 CONSTRUCTION PHOTOGRAPHS

A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.

B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in file name for each image.
2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Project Engineer / MDOT Architect.

C. Periodic Construction Photographs:
1. Exterior Site: Take a minimum of 10 site photographs from differing directions indicating relative progress of the Work. The purpose of the photographs is to document the installation of the work and verify that the work is being installed properly.
2. Building: Interior views: 5 photographs of building from differing directions dependent upon light conditions. Exterior views: 5 photographs of building from differing directions dependent upon light and weather conditions.

D. Project Engineer /MDOT Architect -Directed Construction Photographs: The Project Engineer / MDOT Architect may direct the Contractor to take certain photographs during his job site observation or at any time as directed.

END OF SECTION

SECTION 01 33 00 SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Scope: Submit to the MDOT Architectural Services Unit shop drawings, product data, and samples required by Specification Sections. Faxed submittals WILL NOT be accepted. DO NOT submit Material Safety Data Sheets for approval. Refer to Section 01 25 00 – Substitution Procedures and Section 01 60 00 – Product Requirements, for requirements concerning products that will be acceptable on this Project.

C. Related Requirements:

1. Section 01 32 00 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
2. Section 01 78 23 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
3. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
4. Section 01 79 00 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.02 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require MDOT Architect's responsive action.

B. Informational Submittals: Written and graphic information and physical samples that do not require MDOT Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.03 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by MDOT Architect and additional time for handling and reviewing submittals required by those corrections.

1. Acceptance of submittal items will not preclude rejection of these items upon discovery of defects in them prior to final acceptance of completed Work.

1.04 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic copies of digital data files of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    a. MDOT Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on MDOT Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. MDOT Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Partial submittals are NOT ACCEPTABLE, will be considered non-responsive, and will be returned without review.
3. Resubmittal Review: Allow 15 business days for review of each resubmittal.

D. Paper Submittals: Place a permanent label or title block on each submittal item for identification. Paper Submittals are required for sheets larger than 11 by 17 inches.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 3 by 4 inches on label or beside title block to record Contractor's review and approval markings and action taken by MDOT Architect.
3. Include the following information for processing and recording action taken:
    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Name of subcontractor.
    f. Name of supplier.
    g. Name of manufacturer.
    h. Submittal number or other unique identifier, including revision identifier.
        1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
    i. Number and title of appropriate Specification Section.
    j. Drawing number and detail references, as appropriate.
    k. Location(s) where product is to be installed, as appropriate.
    l. Other necessary identification.

4. Transmittal for Paper Submittals: Accompany submittals with transmittal letter, containing data, project title and number; Contractor's name and address; the number of each Shop Drawings, product data and samples submitted; notification of deviations from Contract Documents; and other pertinent data. Submittals shall be sent to MDOT Architect for review or distribution to Consultants, with copy of Transmittal Letter sent to Project Engineer. MDOT Architect will return without review submittals received from sources other than Contractor.

a. Transmittal Form for Paper Submittals: Use AIA Document G810 or CSI Form 12.1A.
b. Transmittal Form for Paper Submittals: Provide locations on form for the following information:
   1) Project name.
   2) Date.
   3) Destination (To:).
   4) Source (From:).
   5) Name and address of Architect.
   6) Name of Contractor.
   7) Name of firm or entity that prepared submittal.
   8) Names of subcontractor, manufacturer, and supplier.
   9) Category and type of submittal.
   10) Submittal purpose and description.
   11) Specification Section number and title.
   12) Specification paragraph number or drawing designation and generic name for each of multiple items.
   13) Drawing number and detail references, as appropriate.
   14) Transmittal number**,** numbered consecutively.
   15) Submittal and transmittal distribution record.
   16) Remarks.
   17) Signature of transmitter.
   18) Contractor’s stamp, initialed or signed, certifying the review of submittal, verification of field measurements, and compliance with Contract Documents PRIOR to submitting to the MDOT Architectural Services Unit.

E. Electronic Submittals: Electronic pdf submittals are required for pages smaller than 11 by 17 inches. Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
   a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Re-submittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by MDOT Architect.
4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Project Engineer and MDOT Architect**,** containing the following information:
   a. Project name.
   b. Date.
   c. Name and address of Architect.
   d. Name of Contractor.
   e. Name of firm or entity that prepared submittal.
   f. Names of subcontractor, manufacturer, and supplier.
   g. Category and type of submittal.
   h. Submittal purpose and description.
   i. Specification Section number and title.
   j. Specification paragraph number or drawing designation and generic name for each of multiple items.
   k. Drawing number and detail references, as appropriate.

l. Location(s) where product is to be installed, as appropriate.
m. Related physical samples submitted directly.
n. Indication of full or partial submittal.
o. Transmittal number, numbered consecutively.
p. Submittal and transmittal distribution record.
q. Other necessary identification.
r. Remarks.

5. Metadata: Include the following information as keywords in the electronic submittal file metadata:
   a. Project name.
   b. Number and title of appropriate Specification Section.
   c. Manufacturer name.
   d. Product name.

F. Options: Identify options requiring selection by MDOT Architect.

G. Deviations: Identify deviations from the Contract Documents on submittals.

H. Re-submittals: Make re-submittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from MDOT Architect's action stamp.

I. Required Attachments:

1. Each Shop Drawing submittal shall include a completed and signed Domestic Materials Self-Certification Form (AASHTO) submitted as part of the same PDF submittal package. Shop Drawings submitted without the required certification will be returned without review. Form is included at the end of this section.

J. Distribution of Submittals after Review:
1. Distribute copies of Shop Drawings and product data which carry MDOT Architect’s / Consultant’s stamp to: Project Engineer’s File, Architectural Services Unit File, Architect’s File (as required) / Electrical / Mechanical / Structural Engineer’s File (as required), Materials’ File (if concrete), Contractor's File, Job Site File, and Subcontractor, Supplier and/or Fabricator as necessary.
2. Distribute samples / color charts as directed. The Project Engineer, MDOT Architect and Consultant (as required) shall retain one of each.

K. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from MDOT Architect's action stamp.

L. After an item has been accepted, no change in brand, make, manufacturer's catalog number, or characteristics will be considered unless:

1. Satisfactory written evidence is presented to and approved by the Project Engineer, that manufacturer cannot make scheduled delivery of accepted item, or;
2. Item delivered has been rejected and substitution of a suitable item is an urgent necessity, or;

3. Other conditions became apparent which indicates acceptance of such substitute item to be in the best interest of the Owner.

PART 2 - PRODUCTS

2.01 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:

1. Submit electronic submittals for 81/2 by 11 inches and 11 by 17 inches submittals only) via email as pdf electronic files.
   a. MDOT Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
2. Action Submittals: Submit eight paper (required for all submittals over 11 by 17 inches in size) copies of each submittal with additional number of copies, if required, by Contractor for distribution. MDOT Architect will return four copies, unless indicated otherwise.
3. Informational Submittals: Submit three paper copies or one electronic pdf copy of each submittal unless otherwise indicated. MDOT Architect will not return copies.
4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
   a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
   b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:
   a. Manufacturer's catalog cuts.
   b. Manufacturer's product specifications.
   c. Standard color charts.
   d. Statement of compliance with specified referenced standards.
   e. Testing by recognized testing agency.
   f. Application of testing agency labels and seals.
   g. Notation of coordination requirements.
   h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:
   a. Wiring diagrams showing factory-installed wiring.
   b. Printed performance curves.
   c. Operational range diagrams.
   d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
5. Submit Product Data concurrent with Samples.
6. Submit Product Data in electronic pdf file.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
   a. Identification of products.
   b. Schedules.
   c. Compliance with specified standards.
   d. Notation of coordination requirements.
   e. Notation of dimensions (required) established by field measurement.
   f. Relationship and attachment to adjoining construction clearly indicated.
   g. Seal and signature of professional engineer if specified.
2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 11 by 17 inches, but no larger than 24 by 36 inches.
3. Submit Shop Drawings in the following format:
   a. Submit eight paper copies of each submittal with additional number of copies, if required, by Contractor for distribution. MDOT Architect will return four copies, unless indicated otherwise

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples.
3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
   a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
   b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
   a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. MDOT Architect will return one sample with options selected.
   b. If a specified product color is discontinued, Contractor shall notify Project Engineer promptly to determine if it affects other color selections.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. Number of Samples: Submit four sets of Samples. Project Engineer and MDOT Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.

E. Field Samples and Mock-Ups: Erect on Project Site at location acceptable to Project Engineer.

1. Construct each sample or mock-up complete, including Work of all trades required in the finished Work. Field Samples are used to determine standards in materials, color, texture, workmanship, and overall appearance.
2. Work shall not be allowed using these materials until the mock-up is approved.
3. The mock-up shall not be destroyed, until after the Work it represents is finished, without permission of the Project Engineer. This mock-up shall be used as a standard to compare to the Work it represents for color, craftsmanship, overall appearance, and how the different materials make up the whole system.

F. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Submit product schedule in the following format:
   a. PDF Electronic pdf file for sheets less than 11 by 17 inches.
   b. Four paper copies (for sheets larger than 11 by 17 inches) of product schedule or list unless otherwise indicated. Architect will return two copies.

G. Coordination Drawings Submittals: Comply with requirements specified in Section 01 31 00 "Project Management and Coordination."

H. Contractor's Construction Schedule: Comply with requirements specified in Section 01 32 00 "Construction Progress Documentation."

I. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 29 00 "Payment Procedures.

J. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 40 00 "Quality Requirements."

K. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 77 00 "Closeout Procedures."

L. Maintenance Data: Comply with requirements specified in Section 01 78 23 "Operation and Maintenance Data."

M. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

N. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

O. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

P. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

Q. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

R. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

S. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

T. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

U. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

V. Schedule of Tests and Inspections: Comply with requirements specified in Section 01 40 00 "Quality Requirements."

W. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

X. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

Y. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

Z. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.02 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to MDOT Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file (optional) and eight paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.01 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to MDOT Architectural Services Unit.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 77 00 "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

D. Notify the Project Engineer in writing at the time of submission, of deviations in submittals from requirements of Contract Documents.

E. Contractor’s responsibility for deviations in submittals from requirements of Contract Documents is not relieved by review of submittals unless written acceptance of specific deviations is given.

F. Contractor’s responsibility for errors and omissions in submittals is not relieved by MDOT Architect’s / Consultant’s review of submittals.

G. Do not order materials or begin Work requiring submittals until the return of submittals bearing MDOT Architect / Consultant’s stamp and initials indicating review.

3.02 MDOT ARCHITECT'S / CONSULTANTS’ ACTION

A. General: MDOT Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: MDOT Architect / Consultants will review with reasonable promptness, each submittal for design concept of Project and information given in Contract Documents, make marks to indicate corrections or revisions required, and return submittals to the Architectural Services Unit, which will retain one copy and forward one copy to the Project Engineer, one copy to the Materials Engineer (if concrete), and one (or the remainder (if paper submittal) to the Contractor. MDOT

Architect / Consultants will stamp each submittal with an action stamp and will mark appropriately to indicate action. Consultants will retain one copy of reviewed submittals.

C. Informational Submittals: MDOT Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. MDOT Architect will forward each submittal to appropriate party.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION

Domestic Materials
Self-Certification Form

This certification is for a manufacturer/supplier to certify the below articles, materials, or supplies are in compliance with the applicable domestic material content procurement preferences found in the Buy America Act requirements (23 CFR 635.410) and the Build America, Buy America Act (BABA) requirements (2 CFR part 184). The individual completing this form takes full responsibility for the information included in the form. State agencies have the authority to request additional details related to the information provided in the form. All forms shall be submitted via AASHTO DataMine for delivery to authorized governmental users through the Industry Document Repository. The manufacturer/supplier is required to include updates to process changes within 10 days of the change occurring via uploading a revised form into DataMine.

PART 1: COMPANY CONTACT INFORMATION

Company/Producer/Manufacturer Name:

Supplier Representative Name:

Contact Email Address: Contact Phone Number:

Date Form is Being Submitted: mm/dd/yyyy

PART 2: DETAILS OF THE ARTICLE, MATERIAL, OR SUPPLY:

Using Table 1 below, provide the classification of the article, material, or supply as one of the following: (1) iron or steel product; (2) construction material (3) manufactured product; or (4) excluded materials including Section 70917(c) materials.

Classification	
Producer of the Article, Material, or Supply:	
Product/Model/Part/Material:	
Manufacturing Address:	
Manufacturing City:	
Manufacturing State:	
Manufacturing Zip Code:	
DataMine # (if applicable):	
Federal/State/Local Project number(s):	
Pay Code Number (PCN):	
Project Item code:	
Project Item Description:	
Quantity Certified:	

TABLE 1: Material Classifications

(1) Iron or Steel Product	
Wholly or predominantly Iron or Steel, or a combination of both (23 CFR 635.410(b)(1)(ii))	Certification requires predominantly of iron or steel or a combination of both means that the cost of the iron and steel content exceeds 50 percent of the total cost of all its components. The cost of iron and steel is the cost of the iron or steel mill products (such as bar, billet, slab, wire, plate, or sheet), castings, or forgings utilized in the manufacture of the product and a good faith estimate of the cost of iron or steel components.
(2) Construction Material	
Non-Ferrous Metals (2 CFR 184.6(a)(1))	Certification requires all manufacturing processes, from initial smelting or melting through final shaping, coating, and assembly, occurred in the United States.
Plastic and Polymer based products (including polyvinyl chloride, composite building materials, and polymers used in fiber optic cables) (2 CFR 184.6(a)(2))	Certification requires all manufacturing processes, from initial combination of constituent plastic or polymer-based inputs, or where applicable, constituent composite materials, until the item is in its final form, occurred in the United States.
Glass (including optic glass) (2 CFR 184.6(a)(3))	Certification requires all manufacturing processes, from initial batching and melting of raw materials through annealing, cooling, and cutting, occurred in the United States.
Fiber Optic Cable (including drop cable) (2 CFR 184.6(a)(4))	Certification requires all manufacturing processes, from the initial ribboning (if applicable), through buffering, fiber stranding and jacking, occurred in the United States. All manufacturing processes also include the standards for glass and optical fiber, but not for non-ferrous metals, plastics and polymer-based products, or any others.
Optical Fiber (2 CFR 184.6(a)(5))	Certification requires all manufacturing processes, from the initial preform fabrication stage through the completion of the draw, occurred in the United States
Lumber (2 CFR 184.6(a)(6))	Certification requires all manufacturing processes, from initial debarking through treatment and planing, occurred in the United States.
Drywall (2 CFR 184.6(a)(7))	Certification requires all manufacturing processes, from initial blending of mined or synthetic gypsum plaster and additives through cutting and drying of sandwiched panels, occurred in the United States.
Engineered Wood (2 CFR 184.6(a)(8))	Certification requires all manufacturing processes, from initial combination of constituent materials until the wood product is in its final form, occurred in the United States.
(3) Manufactured Product	
Manufactured Products other than Precast Concrete Products and Intelligent Transportation Systems and Other Electronic Hardware Systems Installed on the Highway ROW or Other Real Property (23 CFR 635.410(c)(1)(vii)) and 23 CFR 635.410(c)(1)(iv)	• Certification requires for projects obligated before October 1, 2025, no certification is required (excludes EV chargers). • Certification requires for projects obligated on or after October 1, 2025, certification requires the final manufacturing process occurred in the United States (excludes EV chargers). • Certification requires for projects obligated on or after October 1, 2026, and all EV chargers , certification requires the final manufacturing process occurred in the United States and the cost of the components that are mined,

	produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product.
Precast Concrete Products (23 CFR 635.410(c)(2)(i))	Classified as a manufactured product must comply with both the wholly or predominantly iron or steel or a combination of both product and manufactured product certification requirements as stated above.
Intelligent Transportation Systems and Other Electronic Hardware Systems Installed on the Highway ROW or Other Real Property (23 CFR 635.410(c)(2)(ii))	Classified as a manufactured product must comply with both the wholly or predominantly iron or steel or a combination of both product certification requirements for any iron or steel enclosures as well as the manufacturing certification requirements as stated above.
(4) Excluded Materials	
Excluded Materials Including Section 70917(c) Materials (23 CFR 635.410(c)(1)(ii))	No certification is required for excluded materials including Section 70917(c) materials. Section 70917(c) materials means cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives.

PART 3: DECLARATION OF SUBMITTAL

Do the articles, materials, or supplies submitted in this form comply with applicable domestic materials content procurement preferences found in the Buy America Act requirements (23 CFR 635.410) and the Build America, Buy America Act requirements (2 CFR part 184) (Y/N)? _____

PART 4: CERTIFICATION (Read and check all boxes before signing)
Note: State Departments of Transportation may have different language requirements for this section.

☐ I certify that the description above is a true and accurate description of the article, material, or supply provided, and that the undersigned is in a position to legally bind the Company/Organization represented in this form.

☐ I certify that the iron or steel product, construction material, or manufactured product complies with the applicable Buy America or BABA requirements.

Signature: Date: mm/dd/yyyy

Printed Name:
Title:
Company/Organization:
Company/Organization address:

SECTION 01 40 00 QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
2. Requirements for Contractor to provide quality-assurance and -control services required by MDOT Architect, Owner, Commissioning Authority, or authorities having jurisdiction are not limited by provisions of this Section.
3. Specific test and inspection requirements are not specified in this Section.

C. MDOT will provide the following inspections, sampling and testing at no cost to the Contractor:

1. Section 03 20 00 “Concrete Reinforcing”.
2. Section 03 30 00 “Cast-In-Place Concrete”.
3. Section 31 23 11 “Excavation, Fill and Grading for Building”.

D. The Architect will employ and pay for specified services of an independent firm to perform testing and inspection as required by Chapter 17 Special Inspections, except as indicated in individual specifications section, which become the responsibility of the Contractor. For Contractor Furnished testing:

1. Prior to start of Work, submit testing laboratory name, address, and telephone number, and names of full time registered Architect and responsible officer.
2. Submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of deficiencies reported by inspection.

E. The independent firm will perform tests, inspections and other services specified in individual specification sections and as required by Owner.

1. Laboratory: Authorized to operate at Project location.
2. Laboratory Staff: Maintain full time specialist on staff to review services.
3. Testing Equipment: Calibrated at reasonable intervals with devices of accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.

F. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.

1. Notify Architect and independent firm 48 hours prior to expected time for operations requiring services.

2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

G. Testing and employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

H. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by same independent firm on instructions by Architect. Payment for re-testing or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price.

1.02 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Project Engineer or MDOT Architect.

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.03 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Project Engineer for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Project Engineer for a decision before proceeding.

1.04 INFORMATIONAL SUBMITTALS

A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work.

1.05 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Materials will be inspected and sampled in accordance with current Mississippi Department of Transportation SOP pertaining to inspecting and sampling. Distribute copies of reports of inspections and tests to Project Engineer and one copy to the MDOT Architect. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
5. Other required items indicated in individual Specification Sections.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.06 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329 and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:
   a. Provide test specimens representative of proposed products and construction.
   b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
   c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
   d. When testing is complete, remove test specimens, assemblies, and mockups: do not reuse products on Project, unless indicated otherwise in other Sections.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Project Engineer, MDOT Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Project Engineer.
2. Notify Project Engineer and MDOT Architect three days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Project Engineer’s and MDOT Architect's approval of mockups before starting work, fabrication, or construction.
   ~~a. Allow ten days for initial review and each re-review of each mockup.~~
5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed unless otherwise indicated.

K. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections.

L. Tolerances:

1. Walls: Finished wall surfaces shall be plumb and shall have a maximum variation of 1/8 inch in 8 feet when a straightedge is laid on the surface in any direction, and no measurable variation in any 2-foot direction.
2. Ceilings: Finished ceiling surfaces shall present true, level, and plane surfaces, with a maximum variation of 1/8 inch in 8 feet when a straightedge and water level are laid on the surface in any direction and no measurable variation in any 2-foot direction.
3. Concrete Floors: Tolerances for concrete floors and pavement are specified in Division 03.

4. Finished Floors: Level to within plus or minus 1/8 inch in 10 feet for hardwood and resilient floor coverings.

M. Protection of Wood:

1. Provide protection of all wood materials and products, whether or not installed, including erected and installed wood framing and sheathing, from water and moisture of any kind until completion and acceptance of the project.
2. Keep informed of weather conditions and forecasts, and when there is a likelihood of rain, shall protect installed and exposed framing and sheathing and stored lumber exposed to the elements with suitable water-repellent coverings, such as canvas tarpaulins and polyethylene sheeting.
3. Millwork and trim, paneling, cabinets, shelving, and products manufactured from wood shall be kept under cover and dry at the shop until time for delivery. Delivery shall not occur during periods of rain, heavy dew, or fog.

    a. Do not deliver or install until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during remainder of construction period.

~~4.~~ Wood materials or products which become wet from rain, dew, fog, or other source may be considered to have moisture damage and may be rejected, requiring replacement by the Contractor with new, dry materials or products at no increase in the Contract Price.

N. Grout Fill: In applications where the grout installation may be subjected to moisture, the manufacturer shall submit a letter stating that the entire grout matrix does not contain any of the following:

1. Added gypsum.
2. Plaster-of-Paris
3. Sulfur trioxide levels in a portland cement component exceeding ASTM C 150’s published limits.

1.07 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Where testing services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where specified in induvial sections, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports. The manufacturer shall inspect and approve the application or installation work at no additional cost to Contractor or the Owner..

1. The Contractor shall make all necessary arrangements with the manufacturer of the products to be installed to provide onsite consultation and inspection services to assure the correct application or installation of the product, system, or assembly.
2. The manufacturer’s authorized representative shall be present at the time any phase of this work is started.
3. The manufacturer’s authorized representative shall inspect and approve all surfaces over which, or upon which the manufacturer’s product will be applied or installed.
4. The manufacturer’s representative shall make periodic visits to the site as the work proceeds as necessary for consultation and for expediting the work in the most practical manner.

D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Project Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Project Engineer, MDOT Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.

2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.08 CONTRACTOR TESTS AND INSPECTIONS

A. Tests and Inspections: Where required by individual specification sections, the Contractor shall engage a qualified testing agency to conduct tests and inspections as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Notifying Project Engineer, MDOT Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Project Engineer, MDOT Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Project Engineer, MDOT Architect's and Commissioning Authority's reference during normal working hours.

3.02 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
   1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 01 42 00 REFERENCES

PART 1 - GENERAL

1.01 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Reviewed": When used to convey MDOT Architect's action on Contractor's submittals, applications, and requests, "reviewed" is limited to MDOT Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. “Installer”: An installer is Contractor or another entity engaged by Contractor, as an employee, subcontractor, or contractor of lower tier, to perform a particular construction operation, including installation, erection, application, and similar operations.

J. “Experienced”: The term "experienced," when used with the term "installer," means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1. Using a term such as "carpentry" does not imply that accredited or unionized individuals of a corresponding generic name, such as “carpenter”, must perform certain construction activities. It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

K. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.02 INDUSTRY STANDARDS

A. Identification and Purpose:

1. Identification: Throughout the Contract Documents are references to nationally known and recognized Codes, Reference Standards, Reference Specifications, and similar documents that are published by Regulatory Agencies, Trade and Manufacturing Associations and Societies, Testing Agencies and others. References also include certain Project Documents or designated portions.

2. Purpose: All named and otherwise identified “Reference Standards” are “by reference” hereby incorporated into these Specifications as though fully written and hereby serve to establish specific requirements and pertinent characteristics for materials and workmanship as well as methods for testing / reporting on compliance thereto.

B. Procedures and Responsibilities:

1. Compliance with Laws and Codes of governmental agencies having jurisdiction shall be mandatory and take precedence over the requirements of all other Reference Standards. For products or workmanship specified by Associations, Trade, or Federal Standards, comply with the requirements of the standard, except when supplemented instructions indicate a more rigid standard and / or define more precise requirements.

a. Should specified reference standards conflict with regulatory requirements or the Contract Documents, request Project Engineer’s / MDOT Architect’s clarification before proceeding.

2. The Contractor (including any and all Parties furnishing and / or installing any portion of The Work) shall be familiar with the indicated codes and standards. It shall be the Contractor’s responsibility to verify the detailed requirements of the specifically named codes and standards and to verify (and provide written certification, when required) that the items procured for use in this Work (and their installation, as applicable) meet or exceed the specified requirements.

3. The contractual relationship of the Parties to the Contract shall not be altered from the requirements of the Contract Documents by mention or inference otherwise in any reference document.

C. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated or when earlier editions are specifically required by Codes.

D. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.03 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities

indicated in the following list. Abbreviations and acronyms not included in this list shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States." The information in this list is subject to change and is believed to be accurate as of the date of the Contract Documents.

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

AABC	Associated Air Balance Council; www.aabc.com.
AAMA	American Architectural Manufacturers Association; www.aamanet.org.
AASHTO	American Association of State Highway and Transportation Officials www.transportation.org.
ACI	American Concrete Institute (Formerly: ACI International); www.concrete.org
ACPA	American Concrete Pipe Association; www.concrete-pipe.org.
AEIC	Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
AGA	American Gas Association; www.aga.org.
AHAM	Association of Home Appliance Manufacturers; www.aham.org.
AHRI	Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
AI	Asphalt Institute; www.asphaltinstitute.org.
AIA	American Institute of Architects (The); www.aia.org.
AISC	American Institute of Steel Construction; www.aisc.org.
AISI	American Iron and Steel Institute; www.steel.org.
AMCA	Air Movement and Control Association International, Inc.; www.amca.org.
ANSI	American National Standards Institute; www.ansi.org.
AOSA	Association of Official Seed Analysts, Inc.; www.aosaseed.com.
APA	APA - The Engineered Wood Association; www.apawood.org.
APA	Architectural Precast Association; www.archprecast.org.
API	American Petroleum Institute; www.api.org.
ARI	Air-Conditioning & Refrigeration Institute (See AHRI)
ARI	American Refrigeration Institute (See AHRI)
ASCE	American Society of Civil Engineers; www.asce.org.
ASCE/SEI	American Society of Civil Engineers / Structural Engineering Institute (See ASCE)
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
ASME	ASME International (American Society of Mechanical Engineers); www.asme.org.
ASSE	American Society of Sanitary Engineering; www.asse.org.
ASTM	ASTM International (American Society for Testing and Materials International); www.astm.org.
AWI	Architectural Woodwork Institute; www.awinet.org.
AWPA	American Wood Protection Association (Formerly: American Wood-Preservers' Association); www.awpa.com.
AWS	American Welding Society; www.aws.org.
AWWA	American Water Works Association; www.awwa.org.
BHMA	Builders Hardware Manufacturers Association; www.buildershardware.com.
BIA	Brick Industry Association (The); www.gobrick.com.
CFSEI	Cold-Formed Steel Engineers Institute; www.cfsei.org.
CGA	Compressed Gas Association; www.cganet.com.
CIMA	Cellulose Insulation Manufacturers Association; www.cellulose.org.
CISCA	Ceilings & Interior Systems Construction Association; www.cisca.org.

CLFMI	Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
CRI	Carpet and Rug Institute (The); www.carpet-rug.org.
CRRC	Cool Roof Rating Council; www.coolroofs.org
CRSI	Concrete Reinforcing Steel Institute; www.crsi.org.
CSA	CSA International (Formerly: IAS - International Approval Services); www.csa-international.org
CSI	Construction Specifications Institute (The); www.csinet.org.
DASMA	Door and Access Systems Manufacturers Association; www.dasma.com.
DHI	Door and Hardware Institute; www.dhi.org.
ECA	Electronic Components Association; (See ECIA).
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org. ;
FM Approvals	FM Approvals LLC; www.fmglobal.com.
FM Global	FM Global (Formerly: FMG - FM Global); www.fmglobal.com.
GA	Gypsum Association; www.gypsum.org.
GANA	Glass Association of North America; www.glasswebsite.com.
HMMA	Hollow Metal Manufacturers Association (See NAAMM)
HPVA	Hardwood Plywood & Veneer Association; www.hpva.org.
ICBO	International Conference of Building Officials (See ICC)
ICC	International Code Council; www.iccsafe.org.
ICRI	International Concrete Repair Institute, Inc.; www.icri.org.
IES	Illuminating Engineering Society (Formerly: Illuminating Engineering Society of North America); www.ies.org.
IGMA	Insulating Glass Manufacturers Alliance; www.igmaonline.org.
IGSHPA	International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
ISO	International Organization for Standardization; www.iso.org.
ISSFA	International Solid Surface Fabricators Association (See ISFA)
LPI	Lightning Protection Institute; www.lightning.org.
MBMA	Metal Building Manufacturers Association; www.mbma.com.
MCA	Metal Construction Association; www.metalconstruction.org.
MFMA	Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
MIA	Marble Institute of America; www.marble-institute.com.
MMPA	Moulding & Millwork Producers Association (Formerly: Wood Moulding & Millwork Producers Association); www.wmmpa.com.
MPI	Master Painters Institute; www.paintinfo.com.
NAIMA	North American Insulation Manufacturers Association; www.naima.org.
NCMA	National Concrete Masonry Association; www.ncma.org.
NEBB	National Environmental Balancing Bureau; www.nebb.org.
NECA	National Electrical Contractors Association; www.necanet.org.
NEMA	National Electrical Manufacturers Association; www.nema.org.
NETA	InterNational Electrical Testing Association; www.netaworld.org.
NFPA	NFPA (National Fire Protection Association); www.nfpa.org.
NFRC	National Fenestration Rating Council; www.nfrc.org.
NHLA	National Hardwood Lumber Association; www.nhla.com.
NLGA	National Lumber Grades Authority; www.nlga.org.
NSPE	National Society of Professional Engineers; www.nspe.org.
NSSGA	National Stone, Sand & Gravel Association; www.nssga.org.
NTMA	National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
NWFA	National Wood Flooring Association; www.nwfa.org.
PCI	Precast / Prestressed Concrete Institute; www.pci.org.
PDI	Plumbing & Drainage Institute; www.pdionline.org.

RFCI	Resilient Floor Covering Institute; www.rfci.com
SDI	Steel Deck Institute; www.sdi.org.
SDI	Steel Door Institute; www.steeldoor.org.
SEFA	Scientific Equipment and Furniture Association; www.sefalabs.com.
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)
SJI	Steel Joist Institute; www.steeljoist.org.
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
SPFA	Spray Polyurethane Foam Alliance; www.sprayfoam.org.
SPIB	Southern Pine Inspection Bureau; www.spib.org.
SPRI	Single Ply Roofing Industry; www.spri.org.
SRCC	Solar Rating and Certification Corporation; www.solar-rating.org.
SSINA	Specialty Steel Industry of North America; www.ssina.com.
SSPC	SSPC: The Society for Protective Coatings; www.sspc.org.
SWPA	Submersible Wastewater Pump Association; www.swpa.org.
TCNA	Tile Council of North America, Inc.; www.tileusa.com.
TIA	Telecommunications Industry Association (Formerly: TIA/EIA – Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
TMS	The Masonry Society; www.masonrysociety.org.
TPI	Truss Plate Institute; www.tpinst.org.
TPI	Turfgrass Producers International; www.turfgrasssod.org.
UL	Underwriters Laboratories Inc.; http://www.ul.com.
WCMA	Window Covering Manufacturers Association; www.wcmanet.org.
WDMA	Window & Door Manufacturers Association; www.wdma.com.
WWPA	Western Wood Products Association; www.wwpa.org.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

DIN	Deutsches Institut fur Normung e.V.; www.din.de.
IAPMO	International Association of Plumbing and Mechanical Officials; www.iapmo.org.
ICC	International Code Council; www.iccsafe.org.
ICC-ES	ICC Evaluation Service, LLC; www.icc-es.org.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

COE	Army Corps of Engineerswww.usace.army.mil. ;
CPSC	Consumer Product Safety Commission; www.cpsc.gov.
DOC	Department of Commerce National Institute of Standards and Technology; www.nist.gov.
DOE	Department of Energy; www.energy.gov.
EPA	Environmental Protection Agency; www.epa.gov.
FG	Federal Government Publications; www.gpo.gov/fdsys.
GSA	General Services Administration; www.gsa.gov.
HUD	Department of Housing and Urban Development; www.hud.gov.

LBL	Lawrence Berkeley National Laboratory Environmental Energy Technologies Division; www.eetd.lbl.gov.
OSHA	Occupational Safety & Health Administration; www.osha.gov.
TRB	Transportation Research Board; National Cooperative Highway Research Program; www.trb.org.
USDA	Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
USDA	Department of Agriculture; Rural Utilities Service; www.usda.gov.
USPS	United States Postal Service; www.usps.com.

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

CFR	Code of Federal Regulations; ; Available from Government Printing Office; www.gpo.gov/fdsys.
DOD	Department of Defense; Military Specifications and Standards Available from Department of Defense Single Stock Point; www.quicksearch.dla.mil.
FED-STD	Federal Standard (See FS)
FS	Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil. Available from Defense Standardization Program; www.dsp.dla.mil Available from General Services Administration; www.gsa.gov. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.
MILSPEC	Military Specification and Standards (See DOD)
USAB	United States Access Board; www.access-board.gov.
USATBCB	U.S. Architectural & Transportation Barriers Compliance Board (See USAB)

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 43 39 – MOCKUP REQUIREMENTS

PART 1 – GENERAL

1.1 SUMMARY

A. This section includes general information for use of mockups.

B. Mockups are full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances.

1. Mockups are not Samples.

2. Unless otherwise indicated, approved mockups establish the standard by which the final Work will be judged.

3. Refer to individual technical specification sections for more product specific mockup requirements.

4. Mockup of the exterior envelope shall be erected separately from the building, but on the Project site, consisting of multiple products assemblies, and sub-assemblies.

5. Mock-up shall be stepped showing all layers of construction including concrete masonry units, vapor retarder/flashing, insulation, finished brick and metal panels, aluminum windows).

1.2 QUALITY ASSURANCE

A. Pre-Construction Conference: Prior to the construction of the mockup, a conference will be organized and scheduled by the Contractor with 72 hours notice to the Owner and Architect at the Site for the purpose of reviewing the requirements, and intent of mockup. The conference shall be attended by the Owner, Architect, Contractor, all associated Trade Contractors and their Sub-Contractors.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

3.1 INSTALLATION

A. General:

1. Build mockups in location and of size and profile indicated or, or as directed by the Architect. Locate mockups out of the way of new construction. Mockups must remain throughout construction. Mockups susceptible to weather deterioration should be kept covered to maintain original constructed performance – NO EXCEPTIONS.

2. Employ supervisory personnel to oversee mockup construction. Employ same workers that will be employed during the construction of Project.

3. Demonstrate the proposed range of aesthetic effects and workmanship.

4. Commence the actual final Work only after mockup has been inspected and approved in writing by the Architect. This also applies to mockups required by other specification sections – NO EXCEPTIONS.

5. The mockup will establish the standard of quality of workmanship by which the Work will be judged.

6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work. Failure to maintain the mockup, until directed, will be cause for rejection of the Work.

7. Demolish and remove mockups at Final Completion unless otherwise indicated.

B. Mockup Types: Construct mockup in accordance with approved shop drawings, project manual, and Contract Drawings, using exact materials and methods approved for the Project, including required accessories.

1. Exterior Mockups: Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections and supporting materials and as specified herein.

2. Interior Mockups: Coordinate installation of interior materials, finishes and products for which mockups are required in individual Specification Sections and supporting materials and as specified herein.

3. Construction of mockup shall be exact representation of the final Work to be constructed.

3.2 SCHEDULE

A. Provide the following one mock-up where directed on-site:

1. L-shaped Exterior Wall: 4’-0” wide x 8’-0” wide x 8’-0” high exterior wall assembly for concrete masonry unit walls. Provide both

architectural unit masonry, cast stone sills and metal wall panels for each of the two exterior wall types. (Two mock-ups total).

a. Stagger curtainwall openings to ensure details at all conditions.

b. Provide items including but not limited to architectural unit masonry with specified mortar color, concrete masonry, mortar net, weeps, vapor retarder, 2-storefront openings (1'-6" x 2'-0" w/ glazing specified), wall panel system with recommended fasteners.

c. Include wall panel intersection joint, outside corner, storefront opening (head, jamb, and sill conditions), and details.

2. Refer to other sections of the specifications for mockup requirements including but not limited to Self Consolidating Concrete, Tiling, etc.

END OF SECTION

SECTION 01 45 10 – CONSTRUCTION QUALITY CONTROL

PART 1 – GENERAL

1.1 SUMMARY

A. To set forth procedures, conditions and responsibility for coordination of the total project.

B. The Contract, Drawings, other Division-I Specification Sections, apply to this Section.

C. This Section specifies administrative and procedural requirements for quality control services.

D. Quality control services include obtaining and performing tests for contractor quality control testing, performing tests for contractor process control, providing inspection, and exercising management control to ensure that work conforms to the contract requirements. They do not include Contract enforcement activities performed by the Department of Labor or its delegated representative.

E. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with the requirements of the Contract Documents.

F. Requirements of this Section relate to fabrication, workmanship, and installation procedures.

1. Specific quality control requirements for individual construction activities are specified in the Sections that specify those activities. Those requirements, including inspections and tests, cover production of standard products as well as customized fabrication and installation procedures.

2. Inspections, test and related actions specified are not intended to limit the Contractor's quality control procedures that facilitate compliance with the requirements of the Contract Documents.

3. Requirements for the Contractor to provide quality control services required by the authorities having jurisdiction are not limited by provisions of this Section.

1.2 REFERENCES

A. Specification Section 01 45 29 -Testing Laboratory Services. **(Contractor responsibilities for testing).**

B. ASTM D3740 - Practice for Minimum Requirements for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

C. ASTM E329 - Specifications for Agencies Engaged in the Testing and/or Inspections of Materials Used in Construction.

1.3 DEFINITIONS

A. Quality Control (QC): The quality inspection and control system established and carried out by the contractor to insure compliance with the contract plans and specifications, as well as, industry standards.

B. Quality Level: The specific degree of excellence, basic nature, character of kind or performance of a particular item or group of items as specified.

C. Approval: When the words “approval” and “approved” are used in this Section, they shall mean reviewed and certified by the Contractor’s Quality Control Representative prior to submission for Architect or Owner approval, unless expressly stated otherwise.

D. Factory Test: Tests made on various products and component parts prior to shipment to the job site, including, but not limited to items such as structural steel, wood trusses, wood laminated structures, transformers, boilers, air conditioning equipment, electrical equipment, etc..

E. Field Tests: Tests or analysis made at or in the vicinity of the job site in connection with the actual construction, including but not limited to concrete and asphalt batch plants, precast concrete plants and similar establishments directly involved in the construction process.

F. Certified Test Reports: Certified test reports are reports signed by qualified authorized personnel attesting that the test results reported are accurate and that items tested either meet or fail to meet the standard minimum requirements. These test reports include those performed by Factory Mutual, Underwriters Laboratories, Inc., Independent Testing Laboratories and others.

G. Certified Inspection Reports: Certified inspection reports are those signed by approved inspectors attesting that the items inspected meet the specification requirements other than any exceptions included in the report.

H. Manufacturer's Certificate of Conformance or Compliance: A certificate signed by an authorized manufacturer's official attesting that the material or equipment delivered meets the specifications requirements.

1.4 PAYMENT

A. Separate payment will not be made for providing and maintaining an effective Quality Control program, and all costs associated therewith shall be included in the applicable lump-sum prices contained in the cost of the work.

1.5 QUALITY CONTROL MANAGER

A. Organization:

1. The Quality Control organization and supporting staff shall meet all of the following performance requirements. The Quality Control Manager shall operate independently of production supervision and shall have authority to stop work as required to ensure compliance with the Contract Documents.

2. The Architect may recommend to the Owner that the Quality Control Manager be removed and replaced, if the Architect determines that either is not performing satisfactorily.

3. The single Quality Control (QC) Manager shall be responsible for the overall quality of workmanship and compliance with specifications. In addition, the contractor shall have designated a Submittal Assistant, which may be the Project Manager responsible for assisting the QC Manager in processing and maintaining files for the submittals at the job site. The QC Representative(s) whose primary responsibility is to conduct and document quality inspections and testing may be trade specific superintendents or foreman qualified to monitor construction quality by experience and training.

4. The QC Manager and Representatives shall have the authority to stop work at any time quality problems necessitate. This authority shall be delineated in a letter of appointment from a company officer. The letter shall be included in the Quality Assurance Plan.

5. The QC Representative shall be responsible to observe and certify the performance of contractor tests and pre-inspections identified. The QC Representative may elect to use an alternate expert to observe I certify performance. The QC Representative shall be qualified to monitor construction quality by experience and training.

6. After acceptance of the Quality Control Plan, the Contractor shall notify the Owner in writing of any proposed change. Proposed changes are subject to acceptance by the Owner.

B. Quality Control Manager qualifications:

1. Ten years of combined experience as a Superintendent, Quality Control Manager, Project Manager, Project Architect, or Project Engineer on similar size and type construction contracts, and at least two years' experience as a Quality Control Manager.

2. Experience in the areas of hazard identification and safety compliance.

C. Quality Control Manager responsibilities:

1. Participate in the Preconstruction, Weekly Meetings and Coordination and Mutual Understanding Meetings.

2. Conduct Preparatory Meetings for each major work category as required in Article 1.8. Notify the Architect at least three (3) business days in advance and submit completed Preparatory Meeting documentation the next business day.

3. Ensure that required submittals have been approved and Contract Documents permit the Work to proceed prior to commencement of construction activities.

4. Inspect all work and rework as applicable, to ensure its compliance with contract requirements. Maintain a rework log.

5. Immediately stop any segment of work, which does not comply with the contract plans and specifications, and direct the removal and replacement of any defective work.

6. Notify the Project Superintendent and Project Manager of any personnel performing work in a manner not compliant with Contract requirements and recommend corrective action.

7. Prepare daily Quality Control Reports.

8. Conduct Quality Control meetings at least weekly during active construction. Meetings shall include the Superintendent and other personnel as appropriate to the phase of work.

9. Ensure that Safety Officer inspections are performed. Attend weekly Toolbox meetings.

10. Ensure that design and construction submittals are reviewed and approved, as required by the contract, prior to allowing material on site and work to proceed with these items. Maintain a submittal log. The Quality Control Manager shall review all submittals prior to submission to the Architect and shall certify that the submittals have been examined for compliance with the Contract Documents and properly coordinated with related Work. Contractor responsibility for submittals is not relieved by this review.

11. Update As-built drawings daily, maintaining up-to-date set on site.

12. Maintain a testing plan and log, and test results in accordance with the documents. Ensure that all testing is performed per the Contract Documents. Review all test reports and notify the Architect of all deficiencies, along with a proposal for corrective action.

13. Maintain deficiency log on site, noting dates deficiency identified, and date corrected.

14. Perform Punch-out and Pre-Completion inspections, and participate in Final Inspections. Submit list of deficiencies to the Architect for each inspection. Correct all deficiencies prior to the Final inspection. Notify Architect prior to Final Inspection to establish a schedule date acceptable by the Architect.

15. Ensure that all required keys, operation and maintenance manuals, warranty certificates, and the As-built drawings are correct and complete, per the contract, and submitted to the Architect.

16. Assure that all applicable tests, special inspections, and observations required by the contract are performed.

17. Coordinate all factory and on-site testing, Testing Laboratory personnel, and any other inspection and testing personnel required by this Contract.

18. Notify the Architect of any proposed changes to the Quality Control plan.

19. Coordinate commissioning-related activities required by the Contract Documents. Verify that commissioning plans, schedules, pre-functional checklists, functional performance testing, and related documentation are completed prior to Substantial Completion. The Quality Control Manager's role is limited to coordination and verification of compliance with Contract requirements.

1.6 QUALITY CONTROL REQUIREMENTS

A. Establish and maintain a Quality Control (QC) program administered by a Construction Quality Control organization using Quality Control Plans, Preparatory Meetings, submittal review, testing, completion inspections, and documentation necessary to ensure that materials, equipment, workmanship, fabrication, construction and operations comply with the requirements of this Contract.

B. The Quality Control program shall cover on-site and off-site work. No construction work or required testing may be performed unless the Quality Control Manager or a designated Quality Control Representative, approved under the Quality Control Plan, is present on the work site. The Quality Control Manager remains responsible for all quality control activities and documentation.

1.7 CONSTRUCTION QUALITY CONTROL PLANS

A. The Contractor shall furnish for review by the Owner, or its delegated representative, a complete project specific contractor's Quality Control Plan not later than thirty (30) days after receipt of Notice to Proceed. The plan shall identify personnel, procedures, control, instructions, tests, records and forms to be used. Work outside the features of work included in the accepted interim plan will not be permitted to begin until acceptance of a QC Plan containing the additional features of work to be started. Construction shall not begin until the Quality Control Plan has been reviewed and accepted by the Owner Acceptance is conditional and will be predicated on satisfactory performance during the construction operations. The Owner, or its delegated representative, reserves the right to require the contractor to make changes in its Quality Control Plan and operations as necessary to obtain the quality specified.

B. The Contractor's plan shall include the following:

1. The Quality Control organization names and qualifications, in resume format, for each person in the Quality Control organization, including duties, responsibilities and authorities of each person in the QC organization. Individuals proposed as part of the Quality Control organizations may fulfill other duties and responsibilities.

2. A copy of the letter to the Quality Control Manager and Quality Control Representatives signed by an authorized official of the firm, which describes the responsibilities and delegates the authorities of the Quality Control Manager and Quality Control Representatives, shall be furnished.

3. A chart showing the QC organizational structure and its relationship to the production side of the organization.

4. A listing of outside organizations, which will be employed by the contractor and a description of the services these firms will provide.

5. Address the QC Representative's on-site presence and participation in pre-installation, and sub-contractor meetings.

6. List of major work categories requiring Preparatory Meetings prior to commencement. Major work categories shall include but not limited to structural systems, building envelope components, MEP systems, and significant civil/site activities.

7. Plan for conducting Preparatory Meetings prior to commencement of major work categories.

8. Testing Plan, log and list of personnel and accredited laboratories that will perform tests. Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation with the testing plan.

9. Submittal Log, including procedures for reviewing, approving and managing submittals prior to review by the Architect. Provide the names of the persons in the QC organization authorized to review and certify submittals prior to approval.

10. Submittal Log and Schedule of Submittals. The QC Manager shall review and approve the Submittal Log and Schedule of Submittals prior to submission to the Owner. The QC Manager shall certify that the Submittal Log and Submittal Schedule is complete and is coordinated with the requirements of the Construction Schedule.

11. Testing Laboratory information required by Specification Section 01 45 29 - Testing Laboratory Services

12. A Testing Plan and Log that indicates the tests required by the specification paragraph number requiring the test, the frequency, and the person or agency responsible for each test.

13. Reporting procedures including proposed reporting formats and sample forms.

14. Procedures to identify, record, track and complete rework items .

15. Non-compliance Log

16. A plan for implementing the applicable requirements of the International Building Code (IBC), Chapter 17 "Structural Tests and Special Inspections." Structural tests and special inspections, as outlined in Chapter 17 of the IBC shall be performed by representatives of the Owner.

1.8 PREPARATORY MEETINGS

A. The Contractor shall conduct Preparatory Meetings for each major work category prior to commencement of that Work.

B. Preparatory Phase: This phase shall be performed prior to beginning work on the following phases of work at a minimum:

- Cast-In-Place Concrete
- Self Consolidating Concrete
- Unit Masonry Assemblies
- Aluminum Composite Wall Panel Assemblies
- Structural Steel
- Glu-Laminated Construction
- Cross Laminated Timber Decking
- Roofing and Flashing
- Aluminum Entrances and Storefronts
- Air Distribution
- Controls and Instrumentation
- Adjusting and Balancing
- Any site activity as deemed necessary by the MDOT Representative

1. Notify the Architect and Owner Representative at least seven (7) calendar days in advance of each Preparatory Meeting. The meeting shall be conducted by the Quality Control Manager and attended by the Project Engineer, Architect, Project Superintendent, and the foreman or responsible trade supervisor for the major work category under review. When the work will be performed by a subcontractor, that subcontractor's responsible supervisor shall attend. The Contractor shall document the results of the Preparatory Meeting in the daily Quality Control Report and in a Preparatory Meeting Checklist. Perform the following prior to beginning work on each major work category:

   a. A review of each paragraph of applicable specification, reference codes, and standards. A copy of those sections of referenced codes and standards applicable to that portion of work to be accomplished in the field shall be made available by the contractor at the preparatory meeting and inspection. These copies shall be maintained in the field and available for use until final acceptance of the work.

   b. Review the Contract Drawings.

   c. Verify that appropriate shop drawings and submittals for materials and equipment have been tested, submitted and approved. Verify receipt of approved factory test results, when required

   d. Review the testing plan and ensure that provisions have been made to provide the required Quality Control testing;

   e. Examine the work area to ensure that the required preliminary work has been completed and in compliance with the contract.

f. Physical examination of the required materials, equipment and sample work to ensure that they are on hand and conform to the approved shop drawings and submitted data, and are properly stored.

g. Discuss and document procedures for installation, construction methods, construction tolerances, workmanship standards, and the approach that will be used to provide quality construction by planning ahead and identifying potential problems and repetitive deficiencies for each major category; and

h. Review all documentation to ensure that applicable safety requirements are met, and that required Material Safety Data Sheets (MSDS) are submitted.

C. Additional Preparatory Phases

1. Additional Preparatory Meetings shall be conducted for the same major work category if quality of ongoing work is unacceptable, if there are changes in on-site production supervision or work crews, if work resumes after a substantial period of inactivity, or if other conditions arise that warrant renewed coordination

1.9 NOTIFICATION OF NONCOMPLIANCE

A. The Owner will notify the contractor of any detected noncompliance with the foregoing requirements. The contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the contractor, shall be deemed sufficient for the purpose of notification. If the contractor fails or refuses to comply promptly, MDOT may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the contractor.

1.10 COMPLETION INSPECTIONS

A. The Contractor shall perform the necessary prefinal inspections, compile punchlists, and correct deficiencies. Notify the Architect 5 calendar days prior to the Date of Completion inspection. Notify the Architect at least 14 calendar days prior to the date a final acceptance inspection can be held. The Architect will perform final inspection to verify that the facility is complete and ready to be occupied. All items previously identified on the prefinal punchlist will have been corrected and acceptable.

B. Punch-Out Inspection: Near the end of the work, or any increment of the work, the QC Manager shall conduct an inspection of the work. A punch list of items which do not conform to the approved shop drawings and specifications shall be prepared and included in the CQC documentation. The list of deficiencies shall include the estimated date by which the deficiencies will be corrected. The QC Manager shall make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, the contractor shall notify the Owner and Architect that the facility is ready for Date of Completion inspection. (see MDOT Specification 01 77 00 Closeout Procedures)

C. Date of Completion Inspection: The Owner, or its delegated representative, will perform the Date of Completion inspection along with the Architect to verify that the facility is complete and ready for the use intended. An MDOT Date of Completion Punch List may be developed as a result of this inspection .The contractor's QC Manager shall ensure that all items on this list have been corrected before notifying the Owner and its delegated representative, and requesting a Final Completion Inspection.

D. Final Completion Inspection: The contractor's QC Inspection personnel, plus the superintendent or other primary management person, and the Owner's Representative shall be in attendance at the Final Completion inspection. Notice shall be given to the architect/engineer contractor and Owner a minimum of 14 days prior to the final acceptance inspection and shall include the contractor's assurance that all specific items previously identified to the contractor as being unacceptable, along with all remaining work performed under the contract, will be completed and accepted by the date scheduled for the final acceptance inspection.

1.11 INSPECTION OF SERVICES

A. Definitions. "Services," as used in this clause, includes services performed, workmanship, and material furnished or utilized in the performance of services.
B. The General Contractor shall provide and maintain a quality control and contractor based inspection/testing program acceptable to MDOT covering all services under this contract. Complete records of all inspection work performed by the Contractor shall be maintained and made available to MDOT during contract performance and for as long afterwards as the contract requires.

C. MDOT will perform independent special inspections and testing required by Chapter 17 of the International Building Code and called for by the Contract and these specifications. MDOT has the right to inspect and test all services called for by the contract, to the extent practicable at all times and places during the term of the contract.

D. The MDOT sponsored independent special testing and inspection program shall require the Contractor to furnish, and shall require subcontractors to furnish, at no increase in contract price, all reasonable facilities and assistance for the safe and convenient performance of these duties.

E. If any of the services do not conform to contract requirements, MDOT may require the Contractor to perform the services again in conformity with contract requirements, at no increase in contract amount. When the defects in services cannot be corrected by re-performance, MDOT may (1) require the Contractor to take necessary action to ensure that future performance conforms to contract requirements and (2) reduce the contract price to reflect the reduced value of the services performed.

F. If the Contractor fails to promptly perform the services again or to take the necessary action to ensure future performance in conformity with contract requirements, MDOT may (1) by contract or otherwise, perform the services and charge to the Contractor any cost incurred by MDOT that is directly related to the performance of such service or (2) terminate the contract for default.

1.12 TRAINING

A. The Contractor shall provide and coordinate a comprehensive project-specific Owner personnel training program… The Quality Control Manager shall verify that training documentation and required materials are complete prior to Completion. The core of this training will be based on manufacturer's recommendations and the operation and maintenance support information (OMSI) provided as a part of this Contract. Training shall include discussion as well as hands on maintenance, replacement of typical components and repair type maintenance training for parts typically replaced or repaired in the field, such as:

1. Plumbing systems
2. HVAC Systems
3. Temperature Controls
4. Electrical systems
5. Access control system
6. Fire protection systems, including fire alarm systems and sprinkler systems
7. Site mechanical utilities, etc.
8. Site electrical utilities, including substations, transformers, and pad mounted switchgear
9. Other systems deemed necessary by the Architect.

B. Provide each trainee in the course a written training course outline. Submit outline for approval at least 90 calendar days prior to training session. Provide MDOT two copies of the training video recording in DVD format. The recording shall capture, in video and audio, all instructors training presentations including question and answer periods with the trainees.

END OF SECTION

SECTION 01 45 29 – TESTING LABORATORY SERVICES

PART 1 – GENERAL

1.1 SUMMARY

A. On behalf of the Owner, the Architect will employ and pay for the services of an independent laboratory to perform testing and special inspections as outlined in Chapter 17 of the IBC.

B. All other testing and/or inspection services required by individual sections of the specifications shall be performed by an independent testing laboratory employed and paid for by the contractor unless otherwise specified. The contractor shall provide inspections, tests and similar quality control services, specified in individual sections and required by governing authorities, except where they are specifically indicated to be the Owner's responsibility, or are provided by another identified entity; these services include those specified to be performed by an independent agency and not by the contractor. Costs for these services shall be included in the cost of the work. Separate payment will not be made.

1. All Testing Service Agencies, engaging in inspection and testing services, including independent testing laboratories, shall be prequalified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and shall specialize in the types of inspections and tests to be performed. Each Service Agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State in which the Project is located.

    a. Additionally, each laboratory shall: Comply with the requirements of ASTM D3740 and E329.

    b. Maintain full-time registered engineer on staff to review and supervise services.

    c. Calibrate testing equipment at reasonable intervals with devices of accuracy traceable to either National Institute of Standards or Technology (NIST) or accepted values of natural physical constants.

C. Factory Inspections by the contractor: The contractor shall arrange and perform all factory inspections specifically required in the technical sections of the specifications. These inspections shall be reported on the contractor's Quality Control Daily Report.

D. Factory Tests: Unless otherwise specified, the contractor shall arrange for factory tests when they are required under the contract. Certified copies of test reports on materials to be incorporated into the work will be acceptable, provided they are performed by the manufacturer or by agencies or laboratories acceptable to the architect/engineer contractor showing that the materials conform to the

specifications and the tests and certifications meet the requirements of the paragraph entitled "Manufacturer's Certificates of Conformance or Compliance" of this section.

E. Failure and Re-testing: Regardless of the original assignment of responsibility for inspection, testing or similar services, the contractor shall be responsible for re-testing where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements. Removal and replacement Work necessitated by such noncompliance shall be at the contractor's expense. When inspections or tests cannot be performed after proper notification and at the fault of the contractor, rescheduling costs will be the contractor's responsibility.

F. Structural tests and special inspections, as outlined in Chapter 17 of the IBC shall be conducted by individuals and agents that are under the direct supervision of the Architect.

G. Inspection, Sampling and Testing: Refer to each individual specification Section (and Drawings) for specific inspection, sampling and testing requirements above and beyond IBC Chapter 17. Testing beyond Chapter 17 is the responsibility of the General Contractor.

H. Inspection, Sampling and Testing is required, but not limited to sections in the following Divisions: **(Refer to individual specification sections for other testing required by the general contractor).**

1. Division 3 – Cast-in-place concrete, self consolidating concrete and reinforcing by MDOT.

2. Division 4 – Masonry, mortar, prisim load bearing CMU and reinforcing by MDOT/Architect’s third party inspector.

3. Division 5 – Metals (structural steel and any reinforcing by MDOT/Architect’s third party inspector.

4. Division 5 – Cold Formed Steel Stud Framing MDOT/Architect’s third party inspector.

5. Division 7 – Thermal and Moisture Protection

6. Division 8 – Openings

7. Division 9 – Joint Sealants

8. Division 13 – Pre-engineered structures by MDOT/Architect’s third party inspector.

9. Division 31 – Earthwork by MDOT

10. Others as determined by the Architect during the progress of the work.

I. Laboratory's Duties:

1. Upon notice, cooperate with General Contractor to promptly provide qualified personnel. Perform specified inspections, sampling and testing of material and methods of construction to ascertain compliance with requirements of Contract Documents.

    a. Promptly notify Architect and Owner of irregularities or deficiencies of work observed during performance of services.

2. For contractor provided services, the contractor shall forward a certified written report from the independent agency of each inspection, test or similar service within one week of the test date and with 3 copies, I copy for Contracting Officer and 2 copies for the Architect/Engineer contractor.

3. Promptly prepare reports of inspections and tests, including:

    a. Name, address and telephone number of testing agency.

    b. Dates and locations of samples and tests or inspections.

    c. Names of individuals making the inspection or test.

    d. Designation of the Work and test method.

    e. Identification of product and Specification Section.

    f. Complete inspection or test data.

    g. Test results and an interpretation of test results .

    h. Ambient conditions at the time of sample taking and testing.

    i. Professional opinion as to whether inspected or tested Work complies with Contract Document requirements .

    j. Name and signature of laboratory inspector.

    k. Recommendations on retesting.

4. Promptly distribute copies of reports of inspections and tests to:

    a. Project Web Site

    b. Contracting Officer Representative

    c. Architect

    d. Consulting Engineer, when pertinent

    e. General Contractor

    f. Subcontractor, when pertinent

J. General Contractor's Responsibilities:

1. Cooperate with laboratory personnel to provide access to work and to manufacturer's operation. Provide to laboratory in required quantities preliminary representative samples of materials to be tested. When required, furnish copies of mill test reports. Furnish to laboratory, casual labor to obtain and handle samples at the site and to facilitate inspections and tests. Provide facilities for laboratory's exclusive use for storage and curing of concrete test samples. Notify laboratory sufficiently in advance of operations to allow for his assignment of personnel and scheduling of tests.

2. Coordination: Regardless of the original assignment of responsibility for inspection, testing or similar services, the contractor shall coordinate, with each agency engaged to perform inspections, tests and similar services, the sequence of activities to accommodate required services with a minimum of delay. In addition, the contractor shall coordinate with each agency activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests. The contractor is responsible for:

   a. Scheduling times for inspections, tests, taking samples and similar activities.

   b. Notifying the Architect, Engineer and Contracting Officer and testing agency 48 hours in advance of operations requiring testing services.

   c. Providing incidental labor and facilities to facilitate inspections, tests, sample taking and appropriate sample storage

3. Protection and Repair: Regardless of the original assignment of responsibility for inspection, testing or similar services, repair and protection are the contractor's responsibility. Upon completion of inspection, testing, sample-taking and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes. Protect construction exposed by or for quality control service activities and protect repaired construction.

1.2 SUBMITTALS

A. Testing Laboratory information required by Specification Section 01 45 10 – Construction Quality Control.

B. A Testing Plan and Log that indicates the tests required by the specification paragraph number requiring the test, the frequency, and the person or agency responsible for each test.

C. A plan for implementing the applicable requirements of the International Building Code (IBC), Chapter 17 "Structural Tests and Special Inspections."

1. Refer to Structural drawings for additional information.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

END OF SECTION

SECTION 01 50 00 – TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.1 SUMMARY

A. Work required under this section consist of all temporary construction facilities, services and related items to complete the Project indicated on the Drawings and described in the Project Manual. Some requirements are set forth herein. Refer to Division 1 Section “Summary of Work” for specific requirements.

B. Standards:

1. Materials: All materials required by the work of this section shall be as specified in the respective sections.

1.2 SUBMITTALS

A. Prepare and submit a site Laydown and Mobilization Plan for review for the site. Plan shall include at a minimum delivery paths, worker parking, ingress & egress, and drainage area. Do not proceed with construction activities until Plan is approved.

1. Indicate main and secondary laydown areas for approval. If any existing parking lots or roads are to be indicated and used as primary or secondary lay down areas, the Contractor is required to protect the parking lots from damage. If any damage occurs, repairs shall be provided at no expense to MDOT.

2. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

3. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire prevention program.

4. Show locations of mock-ups.

1.3 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in the U.S.

Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.

D. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before MDOT's acceptance, regardless of previously assigned responsibilities.

1.4 FACILITIES AND CONTROLS

A. Access: The Contractor shall provide an adequate access and/or roads to each building for the prosecution of work.

1. Locate temporary roads and paved areas in same location as permanent roads and paved areas to the greatest extent possible. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

2. Provide dust-control treatment that is nonpolluting and non-tracking. Reapply treatment as required to minimize dust.

3. Traffic Controls: Comply with requirements of authorities having jurisdiction.
   a. Maintain access for fire-fighting equipment and access to fire hydrants.
   b. Provide traffic controls as required by MDOT for utility connections in public rights-of-way.

4. Locate parking areas on Laydown and Mobilization Plan.

B. Contractor Employee Parking: **The contractor is required to have all its employees and all the employees under its contract, sub-contractor's contracts and vendors, etc. park in areas designated by MDOT on the approved Site Laydown and Mobilization Plan.** Project parking within the laydown area shall be allowed only for Contractor management staff with visitor parking allocation for MDOT, A&E and Special Inspection consultants.

C. Hoisting Facilities: The Contractor shall be responsible for providing suitable capacity and hoisting facilities for all people and materials.

D. Field Office and Sheds: At all times, the Contractor shall provide and maintain weatherproof temporary offices at a location approved by the Architect, for the Contractor's use and that of his Subcontractors.

1. The field office shall be open at all times work is being performed. All submittals and shop drawings shall be placed in this location for review by any party.

2. The following shall be provided within the General Contractor's jobsite trailer equipped with the following:

   a. Heating and Air Conditioning

b. Telephone with phone conferencing and virtual meeting capabilities
c. Broadband Wireless Internet Connection (access by all parties involved)
d. Power receptacles
e. Photocopier
f. Coffee and Water Beverage Service
g. Small refrigerators
h. Conference Room for a minimum 20 persons.
i. Large screen TV (42” minimum) with connectivity for meetings and presentations (HDMI).
j. Separate office with permanent desk and chair for use by Contractor’s on-site staff.
k. Restroom facilities (minimum 2)

E. Computer:

1. Contractor shall have access to a computer at all times to access the project web site. This shall be accomplished through the use of a hard line connection. A dedicated project router (wireless) shall be included in the Base Bid price and also be accessible by MDOT, Architect, and his consultants.

a. Posting of the wireless key **is required** in the jobsite trailer.

F. Cellular Phone:

1. Contractor shall have a portable cellular telephone with local cellular service which shall be kept with the Superintendent at all times.

G. Sanitation Facilities: The Contractor is responsible for furnishing adequate temporary toilet and wash facilities. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

H. Drinking Water: The Contractor shall provide drinking water facilities for all workmen on the job, including icing when required, paper cups, etc., all maintained in a sanitary condition.

I. Fire Protection: Each Contractor will provide general temporary fire protection requirements for their own requirements in accordance with OSHA.

J. Storage Facilities: The Contractor shall provide suitable watertight and damp proof sheds to house construction materials.

1. The Contractor shall coordinate the allocation of storage areas to the various Subcontractors.

K. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

L. Permanent HVAC System: If MDOT authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-

air grille in system and remove at end of construction and clean HVAC system as required in Section 01 77 00 "Closeout Procedures". If, in the stages of the construction, mechanical and electrical installations will permit, the mechanical and electrical facilities may be used to provide heat and ventilation. However, the MDOT is saved harmless of responsibility as to acceptance of mechanical and/or electrical installations.

M. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

N. Utilities: The Contractor shall make all temporary connections to utility systems as required for construction purposes. They shall also disconnect and return to original condition upon completion. Lighting shall be of adequate intensity and quality for proper prosecution and inspection of work being performed. The cost of temporary utilities is the responsibility of the Contractor and included in the Base Bid.

O. Pumping and Draining:

1. The Contractor shall keep working and storage areas and developed areas of the site free from water that could cause damage or that would interfere with work.

2. The Contractor shall pump or drain water to an approved catch basin or other acceptable area.

P. Job Site Security: The Contractor shall be responsible for site security in accordance with Contract Section G.5, Operations, Storage Areas, and Security. Contractor shall erect security fences around construction and storage areas to prevent the public from entering the construction areas while work is occurring.

1. Temporary Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with1-5/8-inch-OD top and bottom rails. Provide concrete bases for supporting posts.

a. OSHA compliant pedestrian job site access shall be provided through a personnel gate to the Contractor laydown area for employee access to the project site.

Q. Concrete Spoils Area:

1. Concrete washdown area: Contractor shall locate on the Laydown and Mobilization Plan, an area designated on the site for concrete washdown. **All trucks shall use this area only.** After all concrete work has been completed, the concrete spoils shall be removed off of the site, area fill with topsoil, grade for positive drainage, and spread soil amendments and seed per Division 32 Sections.

R. Maintain support facilities until Project Engineer schedules Final Completion inspection. Remove before Final Completion. Personnel remaining after Final Completion will be permitted to use permanent facilities, under conditions acceptable to MDOT.

1.5 TEMPORARY PARTITIONS

A. Temporary Exterior Enclosures:

1. Construction temporary enclosures where facility will be exposed to the elements for more than 12 hours once interior finishes are being peformed. Minimum construction for temporary enclosures shall be 2” x 4” wood studs @ 24” oc, insulated, with 1-layer fire resistant 5/8” plywood on one side and 10 mil visqueen on other. Seal all joints and perimeter.

a. Equip partitions with gasketed dustproof doors and security locks where openings are required.

1.6 TEMPORARY HVAC

A. It is the responsibility of the Contractor to maintain consistent temperature and humidity levels one finishing activities proceed in the buildings.

1. Room temperature: 55-85 degrees Fahrenheit

2. Room relative humidity: 35%-65% preferred but maintaining a 15% fluctuation between highest and lowest average is acceptable.

B. Record temperature and humidity every day in Daily Reports. Take base line readings for high/low humidity average, and temperature average prior to any construction. Submit documentation with each daily report and monthly pay application.

C. Use of the new HVAC units is allowed, but warranties will not start until the date of Final Completion. Filters are required to be changed at once a week minimum. Coils and ductwork will be inspected and be required to be cleaned if found to be excessively dirty due to not changing out the filters at Final Completion.

D. Additional commercial dehumidifiers or other equipment may be required to maintain these conditions. This cost shall be included in the Base Bid.

1.7 SITE STORM PROTECTION

A. When a warning of gale force winds is issued, take precautions to minimize danger to persons, and protect the work and nearby property.

B. Precautions shall include, but are not limited to, securing openings; removing loose materials, tools and equipment from exposed locations; and removing or securing scaffolding and other temporary work.

1.8 PROJECT SITE SIGN

A. Unauthorized signs on the job site without permission of the Architect other than those indicated below. The display of sign advertisements is strictly prohibited.

B. The Contractor shall supply and erect **ONE** Project Sign. Project Sign shall be placed on adequate supports, and be maintained during the construction period. Sign shall be neatly constructed and painted 3/4" thick plywood approximately 4' X 8'. Architect will provide a layout drawing indicating colors, lettering, layout and location of sign.

1.9 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Maintain support facilities until Project Engineer schedules Final Completion inspection. Remove before Final Completion. Personnel remaining after Final Completion will be permitted to use permanent facilities, under conditions acceptable to MDOT.

B. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

C. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

D. Waste Disposal Facilities: Comply with requirements specified in Section 01 74 19 "Construction Waste Management and Disposal.

E. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

1.10 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Environmental Protection Procedures: Designate one person, the Construction Superintendent or other, to enforce strict discipline on activities related to generation of wastes, pollution of air/water/soil, generation of noise, and similar harmful or deleterious effects which might violate regulations or reasonably irritate persons at or in vicinity of Project Site.

D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

F. Provide pumps as required to keep the excavation free from standing water and shall slope the excavation to prevent water from running toward existing buildings at all times.

G. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

H. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Final Completion. Perform control operations lawfully, using environmentally safe materials.

I. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

J. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

K. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

L. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

    1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

M. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by MDOT from fumes and noise.

1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
2. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.

3. Insulate partitions to control noise transmission to occupied areas.

4. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.

5. Protect air-handling equipment.

6. Provide walk-off mats at each entrance through temporary partition.

N. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire prevention program.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

1.11 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Discard or replace water-damaged and wet material.
4. Discard, replace, or clean stored or installed material that begins to grow mold.
5. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Remove materials that cannot be completely restored to their manufactured moisture level within 72 hours.

1.12 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Burning of Trash: No burning of trash or debris shall be done on MDOT's property. All such materials shall be removed from the site and disposed of in accordance with local laws and ordinances.

C. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

D. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Date of Completion.

E. Conduct of workers: Workmen, who, because of improper conduct or persistent violation of MDOT's requirements, become objectionable, shall be removed at the MDOT's request. Inform all workmen of MDOT's requirements.

F. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Final Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor.

2. At Final Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 "Closeout Procedures."

END OF SECTION

SECTION 01 60 00 PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements: Section 01 25 00 "Substitution Procedures" for requests for substitutions.

1.02 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.03 CONTRACTOR OPTIONS

A. For products specified only by reference standards, select any product meeting standards, by any reputable manufacturer.

B. For products specified by naming several products or manufacturers, select any product and manufacturer named.

1. Where more than one manufacturer's product is specified for one use, the Drawings have been prepared for the one listed first; and building adjustments may be necessary to accommodate the others.

2. <u>The Contractor will be responsible for any changes in the building construction required because of product selection, and shall make any such changes to the satisfaction of the Architect, at no cost to the Owner.</u>

C. For product specified by naming one or more products, but indicating the option of selecting equivalent products by stating "or approved equal / equal as approved", or "or equal" after specified product, Contractor must submit request, as required for substitution, for any product not specifically named.

D. In making request for substitution, bidder / contractor represents:

1. He has personally investigated proposed product or method and determined that it is equal or superior in all respects to that specified and that no product involved contains ingredients regulated by the EPA or which are carcinogenic or toxic.

2. He will provide the same guarantee for substitution as for product or method specified.

3. He will coordinate installation of accepted substitution into work, making those changes required for work to be complete in all respects.

4. **He waives all claims for additional costs related to substitution which consequently become apparent.**

5. Cost data is complete and includes all related costs under his contract.

E. Architect is the final judge of equality of all substitutions.

F. Requests for substitution or comparable products shall be submitted and evaluated in accordance with Section 01 25 00 'Substitution Procedures.' Approval of a product as comparable for submittal purposes does not relieve the Contractor of compliance with substitution requirements applicable after Contract award.

G. Substitution requests and comparable product requests shall NOT be submitted during the bidding period and shall be submitted only after Notice to Proceed in accordance with Section 01 25 00 – Substitution Procedures.

H. Where product specifications include the term "or equal" or list multiple manufacturers, such language does not permit substitutions during bidding and applies only to post-award substitution requests submitted in accordance with Section 01 25 00.

I. For purposes of these Contract Documents, the terms "or equal" and "or approved equal" are used interchangeably; in all cases, substitutions are governed by Division 01 requirements and are not permitted during bidding.

1.04 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product only after Notice to Proceed. Comparable product requests are for evaluation of equivalency only and do not constitute approval of a substitution unless reviewed and approved in accordance with Section 01 25 00.

B. Identification Requirements: Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. MDOT Architect's Action: If necessary, MDOT Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. MDOT Architect will notify Contractor of approval

or rejection of proposed comparable product request within 15 days of receipt of request, or ten days of receipt of additional information or documentation, whichever is later.

a. Form of Approval: As specified in Section 01 33 00 "Submittal Procedures."
b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

C. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 33 00 "Submittal Procedures." Show compliance with requirements.

1.05 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weather tight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.07 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and

limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.

2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.

3. Refer to other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 01 77 00 "Closeout Procedures."

1.08 BUILD AMERICA, BUY AMERICA (BABA) REQUIREMENTS

A. General: This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301-8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: Waivers will NOT be considered.

E. If a Basis-of-Design product is later determined to be non-compliant with Build America, Buy America requirements, the Contractor shall propose a compliant equivalent at no additional cost to the Owner unless the Contract Documents explicitly identify such product as potentially non-compliant.

PART 2 - PRODUCTS

2.01 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," MDOT Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Products specified only by reference standards, select any product meeting standards by any manufacturer.
2. Products specified by naming several (minimum of three) products or manufacturers, select any product and manufacturer named. Contractor must submit request, as required for substitution, for any product not specifically named and GIVE REASONS for not using product specified. Requests referenced in this Article are substitution requests and shall be submitted only after Notice to Proceed in accordance with Section 01 25 00.Substitutions WILL NOT be granted unless reasons are considered justified.
3. Products specified by naming one or more products, but indicating the option of selecting equivalent products by stating "or approved equal" after specified product, Contractor must submit request, as required for substitution, for any product not specifically named.
4. Products specified by naming only one product and manufacturer may be considered for substitution if demonstrated to be equal in all respects and if approved in accordance with Section 01 25 00 ‘Substitution Procedures.
5. Products specified by naming only one product and manufacturer and stating no substitutions will be accepted, there is no option and no substitutions will be allowed.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 25 00 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.02 COMPARABLE PRODUCTS

A. Conditions for Consideration: Comparable product requests will be considered only after Notice to Proceed. Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
   1. Evidence that the proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
   2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
   3. Evidence that proposed product provides specified warranty.
   4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
   5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 73 00 EXECUTION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.
8. Correction of the Work.

B. Related Requirements:

1. Section 01 10 00 "Summary" for limits on use of Project site.
2. Section 01 77 00 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.02 INFORMATIONAL SUBMITTALS

A. Certificates: Submit certificate signed by land surveyor or professional engineer certifying that location and elevation of improvements comply with requirements.

B. Certified Surveys: Submit three copies signed by land surveyor or professional engineer.

1.03 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Project Engineer of locations and details of cutting and await directions from Project Engineer before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in MDOT Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.01 MATERIALS

A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to MDOT Architect for the visual and functional performance of in-place materials. Use materials that are not considered hazardous.

B. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.

2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.

2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.

3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.02 PREPARATION

A. Existing Utility Information: Furnish information to local utility and the Project Engineer that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements.

3.03 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Project Engineer and MDOT Architect promptly.

B. General: Engage a land surveyor or professional engineer to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Project Engineer and MDOT Architect when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Project Engineer and MDOT Architect.

3.04 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

3.05 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Final Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Project Engineer. Mounting heights shall comply with ADA and OSHA requirements.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.06 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Temporary Support: Provide temporary support of work to be cut.

C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

D. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.

5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

E. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

F. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.07 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only

cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Date of Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Date of Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.08 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00 "Quality Requirements"

3.09 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Date of Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION

SECTION 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Recycling non-hazardous demolition and construction waste.
2. Disposing of non-hazardous demolition and construction waste.

B. Related Requirements:

1. Division 2, Section "Structure Demolition" for disposition of waste resulting from demolition of buildings, structures, and site improvements.
2. Division 31, Section "Excavation, Fill and Grading for Building" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.02 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.03 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 15 days of date established for the Notice to Proceed.

1.04 INFORMATIONAL SUBMITTALS

A. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them.

1.05 QUALITY ASSURANCE

A. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination."

1.06 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan.

B. Waste Reduction Work Plan: List each type of waste and whether it will be recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
2. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
3. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within five days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Section 01 50 00 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.02 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials accrue to Contractor Procedures in "Procedures" Paragraph below describe the "source-separated" method for handling recyclable waste.

C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
   a. Inspect containers and bins for contamination and remove contaminated materials if found.
2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.03 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.

C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

3.04 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION

SECTION 01 77 00 CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Final completion procedures.
2. Warranties.
3. Final cleaning.
4. Repair of the Work.

B. Related Requirements:

1. Section 01 32 33 "Photographic Documentation" for submitting final completion construction photographic documentation.
2. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.02 FINAL INSPECTIONS

A. Engineer and Architect's Inspection: The Contractor shall make written request for a Final Inspection to the Project Engineer and MDOT Architect. Notice is to be given 10 calendar days prior to this inspection. At the day of inspection, the Contractor shall have in hand 6 copies of the HVAC Test and Balance Report, Reference Specification Sections in Division 23 and 6 copies of a list prepared by the Contractor of deficiencies, which will be edited by the Project Engineer, MDOT Architect and Consultants. A copy of these composite lists will be given to the Contractor for correcting the Work. Within 15 calendar days after this revised list is received, the Contractor shall make all corrections of the items listed. If, in the Project Engineer and MDOT Architect’s judgment, the Project is not ready for an Inspection, the Project Engineer may schedule another inspection.

B. Owner’s Inspection: After the Project Engineer and MDOT Architect have determined the Project to be Complete and all punch list items have been corrected, an Owner's Inspection will be scheduled. The Contractor shall submit a letter that states all items have been corrected and submit required closeout Documents. The Owners may add to the punch list items; if it is determined that corrective work still needs to be done. Within 15 calendar days after this revised list is received, the Contractor shall make all corrections of the items listed.

C. Correction of Work before Final Payment: Contractor shall promptly remove from the Owner's premises, all materials condemned for failure to conform to the Contract, whether incorporated in Work or not, and Contractor shall, at his own expense, replace such condemned materials with those conforming to the requirements of the Contract. Failure to remedy such defects after 10 days written notice will allow the Owner to make good such defects and such costs shall be deducted from the balance due the Contractor or charged to the Contractor in the event no payment is due.

D. Should additional inspections by the MDOT Architect's Consultants of the Work be required due to failure of the Contractor to remedy defects listed, the Project Engineer may deduct the expense of additional Consultants inspections from the Contract Sum in the Owner / Contractor Agreement. The additional expense will be based on the rate shown for services in the Consultants' Architect or Engineering Services Contract.

1.03 FINAL ACCEPTANCE

A. The Mississippi Department of Transportation does not recognize the term "Substantial Completion". The Project Engineer shall determine when the building is complete to the point it can be used for its intended purpose and occupied. This date shall be the Date of Completion.

B. Final Payment shall not be made until items covered in Closeout Procedures are satisfied. This date shall be the Date of Final Acceptance.

1.04 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: All Warranties and Extended Warranties shall use this Date of Completion as the starting date of Warranty Period.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

1.05 CLOSEOUT DOCUMENTS

A. Unless otherwise notified, the Contractor shall submit to the Owner through the Project Engineer to the MDOT Architect 2 copies the following before final payment is made:

1. Request for Final Payment: AIA Document G702, current edition, completed in full or a computer generated form having similar data.
2. Contractor's Affidavit of Payment of Debts and Claims: AIA Document G706, current edition, completed in full.
3. Release of Liens and Certification that all Bills Have Been Paid: AIA Document G706A, current edition, completed in full or a sworn statement and affidavit from the Contractor to the Owner stating that all bills for this project have been paid and that the Owner is released from any and all claims and / or damages.

4. Consent of Surety Company to Final Payment: AIA Document G707, current edition, completed in full by the Bonding Company.
5. Power of Attorney: Closeout Documents should be accompanied by an appropriate Power of Attorney.
6. Guarantee of Work: Sworn statement that all Work is asbestos free and guaranteed against defects in materials and workmanship for one year from Date of Completion, except where specified for longer periods.
    a. Word the guaranty as follows: "We hereby guarantee all Work performed by us on the above captioned Project to be free from asbestos and defective materials. We also guarantee workmanship for a period of one (1) year or such longer period of time as may be called for in the Contract Documents for such portions of the Work".
    b. All guarantees and warranties shall be obtained in the Owner's name.
    c. Within the guaranty period, if repairs or changes are requested in connection with guaranteed Work which, in the opinion of the Owner, is rendered necessary as a result of the use of materials, equipment, or workmanship which are inferior, defective, or not in accordance with the terms of the Contract, the Contractor shall promptly, upon receipt of notice from and without expense to the Owner, place in satisfactory condition in every particular, all such guaranteed Work, correct all defects wherein and make good all damages to the building, site, equipment or contents thereof which, in the opinion of the Owner, is the result of the use of materials, equipment, or workmanship which are inferior, defective or not in accordance with the terms of the Contract; and make good any Work or materials or the equipment and contents of said buildings or site disturbed in fulfilling any such guaranty.
    d. If, after notice, the Contractor fails to proceed promptly to comply with the terms of the guaranty, the Owner may have the defects corrected and the Contractor and his sureties shall be liable for all expense incurred.
    e. All special guaranties applicable to definite parts of the Work stipulated in the Project Manual or other papers forming part of the Contract shall be subject to the terms of this paragraph during the first year of the life of such special guaranty.
7. Project Record Documents: Furnish all other record documents as set forth in Section 01 78 39 - Project Record Documents.
    a. Provide all certificates, warranties, guarantees, bonds, or documents as called for in the individual Sections of the Project Manual. The Contractor is responsible for examining the Project Manual for these requirements.

8. Additional Documents Specified Within the Project Manual:
    a. General Provide all Operational and Maintenance documents as called for in the individual Sections of the Project Manual. The Contractor is responsible for examining the Project Manual for these requirements.
    b. Maintenance Stock: Deliver to Owner all required additional maintenance materials as required in the various Sections of the Specifications.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.01 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting Engineer and Architect final inspection.
   a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   d. Remove tools, construction equipment, machinery, and surplus material from Project site.
   e. Remove snow and ice to provide safe access to building.
   f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
   g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
   h. Sweep concrete floors broom clean in unoccupied spaces.
   i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
   j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
   k. Remove labels that are not permanent.
   l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
   m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
   n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
   o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
   p. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 01 50 00 "Temporary Facilities and Controls." Prepare written report.

3.02 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting Final Inspection.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
   a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION

SECTION 01 78 23 OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

1.02 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. MDOT Architect will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to MDOT Architect.
   a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
   b. Enable inserted reviewer comments on draft submittals.
2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. MDOT Architect will return one copy.

C. Manual Submittal: Submit each manual in final form prior to requesting Final Inspection and at least 15 days before commencing demonstration and training. MDOT Architect and Commissioning Authority will return one copy with comments.

1. Correct or revise each manual to comply with MDOT Architect's and Commissioning Authority's comments. Submit two copies of each corrected manual within 15 days of receipt of MDOT Architect's and Commissioning Authority's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.01 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.

B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

C. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Architect.
7. Name and contact information for Commissioning Authority.
8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
9. Cross-reference to related systems in other operation and maintenance manuals.

D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

F. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

G. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
   a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents**,** and indicate Specification Section number(s) on bottom of spine. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.02 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.

3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.03 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor is delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.04 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds. Include procedures to follow and required notifications for warranty claims.

2.05 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.

2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Schedule Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.01 MANUAL PREPARATION

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.

2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared Record Drawings in Division 01 Section 01 78 39 "Project Record Documents."

F. Comply with Section 01 77 00 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION

SECTION 01 78 39 PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Project Manual (Proposal)
3. Record Product Data.

B. Related Requirements:

1. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.02 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit copies of record Drawings as follows:
   a. Submittal:
      1) Submit PDF electronic files of scanned record prints and two set(s) of marked-up record prints.
      2) Print each drawing, whether or not changes and additional information were recorded.

B. Record Project Manual (Proposal): Submit two paper copies and one annotated PDF electronic files of Project Manual (Proposal), including addenda and Contract modifications.

C. Record Product Data: Submit two paper copies and one annotated PDF electronic files and directories of each submittal.

PART 2 - PRODUCTS

2.01 RECORD DRAWINGS

A. Record Prints: Maintain two sets of marked-up paper copies of the Contract Drawings (half-size) and Shop Drawings, incorporating new and revised Drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Record data as soon as possible after obtaining it.
c. Record and check the markup before enclosing concealed installations.

2. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
4. Note Construction Change Directive numbers, alternate numbers, Change Order (Supplemental Agreements) numbers, and similar identification, where applicable.
5. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
    a. Measured depths of foundations in relation to finish floor datum.
    b. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
    c. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
    d. Field changes of dimension and detail.
    e. Details not on original Contract drawings.

B. Record Digital Data Files: Immediately before inspection for Final Completion review marked-up record prints with Project Engineer and MDOT Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Annotated PDF electronic file.
2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
3. Refer instances of uncertainty to Project Engineer and MDOT Architect for resolution.

C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:
    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Consulting Architect (if applicable).
    e. Name of Contractor.

2.02 RECORD PROJECT MANUAL (PROPOSAL)

A. Preparation: Mark Project Manual (Proposal) to indicate the actual product installation where installation varies from that indicated in the Technical Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including approved substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. Note related Change Orders (Supplemental Agreements), record Product Data, and record Drawings where applicable.

B. Format: Submit record Project Manual (Proposal) as scanned PDF electronic file(s) of marked-up paper copy of Project Manual (Proposal).

2.03 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders (Supplemental Agreements), record Specifications, and record Drawings where applicable.

B. Format: Submit record Product Data as scanned PDF electronic file(s) of marked-up paper copy of Product Data.

PART 3 - EXECUTION

3.01 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Project Engineer’s and MDOT Architect’s reference during normal working hours.

C. The information, except Contract Drawings, shall be arranged and labeled by corresponding Specification Section, neatly bound in three ring binders, indexed, and all shop drawings readable without being removed or unstapled.

D. The name and address of each subcontractor and material supplier shall be listed in front of each binder along with the Project Manual (Proposal).

E. Sufficient information, such as as-built control drawings for air handling system and variable drive controls, shall be furnished to allow qualified personnel to service equipment.

END OF SECTION

SECTION 01 91 13 – COMMISSIONING

PART 1 GENERAL

1.1 DESCRIPTION

A. Commissioning: Commissioning is a systematic process that helps ensure that all building systems perform interactively in accordance with the design intent and the owner's operational needs. This is achieved by implementing commissioning procedures beginning in the project's design phase; by documenting the design intent; and by continuing the commissioning procedures throughout the construction, acceptance, and warranty phases, conducting actual equipment / system performance verification. The commissioning process shall encompass, coordinate and / or help oversee the traditionally separate functions of: system documentation; equipment start up/checkout; control system calibration and point to point (PTP) checkout; testing and balancing; field functional performance testing / performance verification; and owner training.

B. The commissioning process does not take away from or reduce the responsibility of the Contractor or his subcontractors or installing contractors to provide a finished and fully functioning facility.

C. Abbreviations: The following are common abbreviations used in these specifications and in the Commissioning Plan.

1.	A/E	Architect / Engineer.
2.	CA	Commissioning Authority.
3.	CC	Controls Contractor.
4.	GC	General Contractor.
5.	Cx	Commissioning.
6.	Cx Plan	Commissioning Plan document.
7.	EC	Electrical Contractor.
8.	ES	Equipment Supplier.
9.	FIT	Functional Interface Test.
10.	FPT	Functional Performance Test.
11.	IETA	Independent Electrical Testing Agency.
12.	MC	Mechanical Contractor.
13.	PM	Owner's Project Manager (i.e. client).
14.	EMD	Owner's Engineering Maintenance Director.
15.	PTP	Verification Point to point Verification.
16.	Subs	Subcontractors to GC.
17.	TAB	Test and Balance.
18.	CT	Commissioning Team = CA, PM, EM, GC, A/E, MC, CC, EC, TAB Agency & IETA).

1.2 COORDINATION

A. Commissioning Team (CT): The make-up of the Cx team shall be as follows: the commissioning authority (CA); the owner's construction representative; general contractor (GC); the owner's project manager (PM); the architect and design engineers (A/E); the mechanical contractor (MC); the electrical contractor (EC); the TAB agency; the independent electrical testing agency (IETA); the controls

contractor (CC); and any other applicable installing subcontractor or supplier of equipment. Also, if known, the owner's engineering maintenance director (EMD) shall also be considered a member of the Cx team.

B. Management: The CA has already been retained for this project. The CA shall direct and coordinate the project Cx activities. All CT members shall work together as a unit to fulfill both their Cx responsibilities (as described herein, and in the Cx Plan) and their individually contracted responsibilities in order to meet the objectives of the Contract Documents, and the stated design intent.

C. Scheduling: The CA shall work with the PM and GC according to established protocols to schedule the Cx activities. The CA will provide sufficient notice to the GC and PM for scheduling Cx activities. The GC will integrate all Cx activities into the master schedule. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the Cx process. The CA will provide the initial schedule of milestone Cx events (on a percent project completion basis) at the Cx kickoff or scoping meeting, and the preliminary Cx Plan shall provide a format for implementing this schedule. As construction progresses, more detailed schedules will be developed by the CA and updated and submitted to the GC, via revisions of the Preliminary Cx Plan.

1.3 COMMISSIONING PROCESS

A. Cx Plan: The purpose of the Cx plan shall be to provide guidance in the execution of the Cx process. A preliminary Cx Plan shall be provided by the CA, at or before, the initial Cx scoping meeting. The CA will update the Cx plan periodically as the project progresses, issuing a final Cx plan just prior to the start of acceptance phase testing. In the event of conflicts between the Cx Plan and Project Specifications, Project Specifications shall take precedence.

B. Cx Process: The following is a brief overview of typical Cx tasks.
1. Cx during the construction phase shall begin with the initial Cx scoping meeting, which shall be conducted by the CA. During this meeting, the CA shall review the Cx process with the CT members, and distribute the preliminary Cx Plan.
2. The CA shall periodically attend, as needed, regularly scheduled (by GC) construction meetings throughout the construction phase in order to keep CT members apprised of: Cx process milestones and scoping / coordination issues; scheduling of Cx activities; and status / resolution of identified deficiencies and miscellaneous issues.
3. Mechanical & electrical equipment / system submittals & documentation shall be submitted to the CA, during the normal submittal review process, for purposes of a concurrent review. Where applicable, submittals shall include detailed start up and checkout procedures.
4. The CA shall work with the CT and applicable Subs in developing start up plans and start up documentation formats, including providing the Subs with sample prefunctional checklists (PCs), via the Cx Plan, to be completed during the start up process and submitted prior to the beginning of the TAB or IETA fieldwork.

5. In general, Cx checkout and performance verification procedures shall proceed from component level to system level to inter-system level. Various equipment / system PCs shall be completed prior to the start of TAB or IETA fieldwork or functional performance testing.
6. The Subs, under their own initiative, shall execute equipment / system PCs and perform start up on equipment they have installed, but shall provide the CT with a tentative schedule prior to commencing these activities. The CA shall randomly witness equipment / system start up with appropriate personnel and document whether or not checklists and start up procedures have been completed in a satisfactory manner, and in accordance with the project documents.
7. The TAB agency shall be released on a system-by-system basis to begin TAB fieldwork, after signed & certified PCs have been received by the CT, from the installing contractor, for the applicable system.
8. At the completion of the TAB or IETA fieldwork, the Cx authority shall conduct a final TAB report verification on randomly selected systems. The CA shall randomly select a maximum of 25% of the final TAB report data for purposes of verification. If 10% or more of the retested items are found to be plus or minus 10% or more out-of-tolerance of published final TAB (or IETA) report values, then the TAB agency (or IETA) shall be liable for retesting part or all of the specific system before undergoing further performance verification. However, all out-of-tolerance values identified shall be corrected. The TAB agency (or IETA) shall make an allowance in their contract price for the additional time needed to complete any required retesting.
9. The CA shall, with the assistance of the CT, develop specific equipment and system FPT procedures.
10. The CA shall instruct the GC on all FPT procedures after which the GC shall instruct the subs on all FPT procedures. FPT procedures shall be executed by the Subs, under the supervision of the GC and CA..
11. Items of non-compliance in material, installation or setup shall be corrected, and the system re-tested, at the Sub’s expense.
12. The CA shall review the O&M documentation for completeness.
13. All Cx / FPT procedures shall be completed prior to substantial completion, except for opposed season system checks.
14. The CA shall review, confirm the acceptability of, and help coordinate (together with the GC) the training provided by the Subs and verify that all such training was completed satisfactorily.
15. CA shall issue a complete bound final Cx report to the owner.

1.4 RESPONSIBILITIES

A. The responsibilities of various parties in the Cx process (i.e. members of the CT) are described in this section. The project responsibilities of the mechanical contractor, TAB agency and controls contractor are itemized under Division 23, those of the electrical contractor and IETA under Division 26, and those of the other sections where requirements of other divisions are found. It is noted that the services listed for the various CT members (other than the CA) are not provided for under this contract, but have been delineated here to help clarify the Cx process.

B. Architect (of A/E):

1. Does not manage the CA's contract; said contract managed directly by owner or owner's designated representative (i.e. owner's PM or program manager, etc.).
2. Attend the initial Cx scoping meeting and regularly scheduled construction meetings where the CT's attendance has been requested.
3. Perform normal submittal review, construction observation, as built drawing preparation, O&M manual preparation, etc., as contracted.
4. Provide any design narrative documentation requested by the CA.
5. Coordinate resolution of system deficiencies identified during Cx construction and acceptance phases, according to the Contract Documents.
6. Prepare and submit final as built design intent documentation for inclusion in the Cx Manual. Review and approve the O&M manuals.
7. Coordinate resolution of design non-conformance and design deficiencies identified during warranty-period Cx.

C. Mechanical and Electrical Designers/Engineers (of the A/E):
1. Perform normal submittal review, construction observation, as built drawing preparation, etc., as contracted. One site observation should be completed just prior to system start up.
2. Provide any design narrative and control sequence documentation requested by the CA. The designers shall assist (along with the contractors) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed FPT procedures.
3. Attend the initial Cx scoping meeting and regularly scheduled construction meetings where the CT's attendance has been requested.
4. Participate in the resolution of system deficiencies identified during Cx construction and acceptance phases, according to the Contract Documents.
5. Prepare and submit the final as built design intent and operating parameters documentation for inclusion in the Cx manual. Review and approve the O&M manuals.
6. Provide a presentation at the first training session for the owner's personnel.
7. Participate in the resolution of non-conformance and design deficiencies identified during warranty-period Cx.

D. Cx Authority (CA):
1. The CA is not responsible for design content, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management. The CA may assist with problem solving and / or resolving non-conformance or deficiency issues, but ultimately that responsibility resides with the general contractor and the A/E. The primary role of the CA shall be as follows: develop and coordinate the execution of the Cx plan; review project design documents and equipment submittals; inspect, observe and document the status of the construction as the installation progresses via periodic site inspections and follow-up written inspection reports; conduct performance verification of the final submitted TAB or IETA report; and conduct field FPT of completed HVAC / mechanical and electrical systems to verify

compliance with the documented design intent and the Contract Documents. The installing contractors shall provide all applicable tools and/or personnel to start up, check-out and functionally test equipment and systems, except for specified testing with portable data-loggers (if applicable), which shall be supplied and installed by the CA.

2. The CA shall coordinate and direct the Cx activities in a logical, sequential and efficient manner utilizing its technical expertise as well as the following: consistent test protocols and FPT forms; centralized documentation; clear and regular communications and consultations with all necessary parties (i.e. members of the CT); and periodically updated Cx event schedules.
3. In conjunction with the GC, coordinate Cx activities among all contractors, sub-trades and equipment suppliers to ensure that Cx activities are being scheduled into the master schedule.
4. Plan and conduct initial Cx scoping meeting. Attend periodically, as needed, regularly scheduled (by GC) construction meetings throughout the construction phase in order to keep CT members apprised of: Cx process milestones and scoping / coordination issues; scheduling of Cx activities; and status / resolution of identified deficiencies and miscellaneous issues.
5. Prepare the Cx plan, and ensure its distribution for review and comment.
6. Revise the Cx plan as required during construction phase.
7. Request and review additional information required to perform Cx tasks including O&M materials, contractor start up and checkout procedures.
8. Review and provide written comments on normal contractor submittals applicable to systems being commissioned for compliance with Cx needs concurrent with the A/E reviews.
9. Write and distribute sample PCs and start up checklists.
10. Develop start up and initial systems checkout plan with Subs.
11. Perform site visits, as necessary, to observe component and system installations. Attend selected construction and / or job-site planning meetings to obtain information on construction progress. Assist in resolving any discrepancies.
12. Before start up, gather and review the current control sequences and work with contractors and design engineers until sufficient clarity has been obtained, in writing, to be able to write detailed FPT procedures.
13. Randomly witness HVAC / mechanical systems piping testing and flushing procedures. Document this testing and include the documentation in O&M manuals. Notify owner’s project manager of any deficiencies in results or procedures.
14. Randomly witness ductwork air leakage testing (DALT) procedures. Document this testing and include the documentation in O&M manuals. Notify owner’s project manager of any deficiencies in results or procedures.
15. Monitor and randomly observe equipment start ups and initial system operations tests and checks to ensure that all results are documented as the checks are done.
16. Confirm/verify pre-functional tests and start up checklists procedures have been accurately completed.
17. Review TAB execution plan and estimated time.
18. Monitor controls point to point checks done by the controls contractor, and ensure that all results are documented as the checks are done.

19. Perform random functional performance checks of the control system prior to TAB fieldwork being executed, to confirm that CC has implemented acceptable PTP checkout procedures.
20. Review final TAB (or IETA) report and conducts final TAB (or IETA) report performance verification.
21. With necessary assistance and review form installing contractors, write the FPT procedures for equipment and systems. This shall include any energy management control system trending, stand-alone data logger monitoring or manual functional testing, if required. Submit to PM for review and for approval, if required.
22. Direct the contractors to operate equipment and systems as required to ensure that all required FPTs are carried out for verification purposes.
23. Facilitate and oversee the conducting of all FPTs and document the results.
24. Analyze any functional performance trend logs and monitoring data to verify performance.
25. Randomly witness performance testing of smoke control systems and all other owner contracted tests or tests by manufacturer's personnel over which the CA may not have direct control. Document these tests and include this documentation in Cx Record in O&M manuals.
26. Maintain a master deficiency (i.e. Action Item Summary) and resolution log and a separate testing record. Provide the PM with written progress reports and test results with recommended actions and help the PM coordinate the resolution of non-compliance issues and design deficiencies identified during all phases of Cx.
27. Ensure that all required O&M manuals, instructions and demonstrations are provided to the Owner's designated operating staff.
28. Review equipment warranties to ensure that the owner's responsibilities are clearly defined. Verify that installing contractors have maintained appropriate maintenance logs, where applicable, of all interim maintenance tasks performed on all started-up equipment, so that manufacturer's warranties are not voided prior to the equipment being turned over to the owner. Verify that installing contractors' maintenance log is submitted when the equipment is officially released to the owner.
29. Prepare and submit a final Cx Report, which documents all checks and tests done throughout the Cx process, and the results obtained from same.
30. Oversee and confirm acceptability of the training of the owner's operating personnel.
31. Coordinate and supervise required seasonal or deferred testing and deficiency corrections.
32. Return to the site at 10-months into the 12-month warranty period and review with facility staff the current building operation and the condition of outstanding issues related to the original and seasonal Cx. Also, interview facility staff and identify problems or concerns they have operating the building as originally intended. Make suggestions for improvements and for recording these changes in the O&M manuals. Identify areas that may come under warranty or under the original construction contract. Assist facility staff in developing reports, documents, and requests for services to remedy outstanding problems.

33. Alternate: Assist in the development of a preventative maintenance plan, a detailed operating plan, an energy and resource management plan, and as built documentation.

E. Owner's Project Manager (PM):
1. Facilitate the coordination of the Cx work by the CA and with the GC and CA help ensure that Cx activities are being scheduled into the master schedule.
2. Review and approve the final Cx plan.
3. Attend the initial Cx scoping meeting and regularly scheduled construction meetings where the CT's attendance has been requested.
4. Perform the normal review of contractor submittals.
5. Ensure that a copy of all design & construction documents, addenda, change orders and mechanical and electrical equipment / systems submittals and shop drawing related to commissioned equipment has been furnished to the CA for purposes of a concurrent review.
6. Review and approve the FPT procedures submitted by the CA, prior to testing.
7. When necessary, observe and witness installing contractors' execution of PC & equipment start up and FPT of selected equipment.
8. Review Cx progress and submitted deficiency reports.
9. Coordinate the resolution of non-compliance issues and design deficiencies identified in all phases of Cx.
10. Assist the GC in coordinating the training of the owner's personnel.
11. Manage the contract of the A/E, GC and CA.
12. Warranty Period: Assist the CA as necessary in the seasonal or deferred testing and deficiency corrections required by the specifications.

F. General Contractor (GC):
1. Participate in the mechanical / electrical systems Cx process by facilitating the coordination of the Cx work with the PM and CA to ensure that Cx activities are being scheduled into the master schedule.
2. Ensure that the various installing contractors perform all assigned Cx responsibilities as specified.
3. Ensure that the TAB agency and independent electrical testing agencies (IETA) perform all assigned Cx responsibilities as specified.
4. Furnish a copy of all design & construction documents, addenda, change orders and mechanical and electrical equipment / systems submittals and shop drawing related to commissioned equipment to the CA for purposes of a concurrent review.
5. Incorporate into each issued purchase order or subcontract, written requirements for submittal data, O&M data, Cx tasks and responsibilities, and owner training requirements.
6. The GC shall facilitate communications among all contractors and suppliers and other CT members, and shall foster the necessary cooperative action. The GC shall attend the initial Cx scoping meeting and as necessary, request the CA's and CT's attendance at applicable regularly scheduled construction meetings to facilitate the Cx process. In addition, the GC shall help ensure that action items arising from meeting discussions are satisfactorily addressed, as required, to enable the Cx process to proceed on schedule.

7. Ensure that all Subs execute their Cx responsibilities according to the Contract Documents and schedule.
8. In the event that any scheduled equipment or system start ups or FPTs are terminated because the CA or the design engineer(s) discover deficient or incomplete work, or due to the non-attendance of required contractor or equipment manufacturer's personnel, the contractor or sub-contractor responsible for the termination shall also be held responsible for paying reasonable costs of time and travel expenses of any or all of the following representatives who were physically present for the purpose of witnessing the start up or the FPT: the CA, the mechanical engineer, the electrical engineer, the owner. The owner may provide a statement to the general contractor identifying the specific activity that was terminated, the scheduled date, and a list of those in attendance, along with their reasonable time and travel expense costs.
9. Coordinate the training of the owner's personnel.
10. Prepare O&M manuals according to the Contract Documents, including clarifying and updating the original sequence of operation to as built conditions.
11. Warranty Period: Ensure that Subs execute seasonal or deferred FPT, witnessed by the CA, according to the specifications. Ensure that Subs correct deficiencies and make necessary adjustments to O&M manuals and as built drawing for applicable issues identified in any seasonal testing.

G. Mechanical Contractor:
1. The mechanical contractor's Cx team representative shall have the authority to make decisions on behalf of the mechanical contractor as they relate to the organization and scheduling of Cx. The representative shall help ensure that communications are maintained between Division 15 contractors, equipment suppliers and all other Cx team members. One specific responsibility shall be to attend the initial Cx scoping meeting, and all subsequent regularly scheduled construction meetings where the CA's and CT's attendance has been specifically requested. Help ensure that action items arising from mechanical issues are addressed in a timely manner to allow the Cx process to proceed on schedule.
2. Shall ensure that his sub-contractors include in their quotes, the cost of participating in the Cx process as described herein.
3. If applicable (i.e. the controls contractor is a subcontractor under the mechanical contractor), the mechanical contractor shall ensure that the HVAC / mechanical systems controls contractor performs its Cx responsibilities.
4. Provide instruction and demonstrations for the Owner's designated engineering maintenance staff, in conjunction with the Cx authority and the design engineer and with the participation of qualified technicians from major equipment suppliers and the controls contractor.
5. Include specified requirements for submittal data, O&M data and training information in each purchase order or sub-contract written.
6. Ensure cooperation and participation of specialty sub-contractors such as sheet metal, piping, refrigeration, and water treatment as applicable.
7. Ensure participation of major equipment manufacturers in appropriate start up, testing and training activities. In addition, ensure that copies of

manufacturers' technician's equipment PCs or start-up / checkout paperwork are submitted to the CT for its information and reference.

8. Notify the CA, in writing, a minimum of two weeks in advance of scheduled equipment and system start ups, so that the CA may witness system verifications, and equipment and system start ups.
9. Provide sufficient personnel to assist the CA as required during system verification and FPT.
10. Prior to mechanical equipment / system start up, inspect, check and confirm the correct and complete installation of all equipment and systems, utilizing either the PCs included in the Cx plan, or an alternate start-up checklist approved by the CT. Document the results of all inspections and checks on the checklists and sign them, certifying that start-up work has been satisfactorily implemented. If deficient or incomplete work is discovered, ensure corrective action is taken and re-check until the results are satisfactory, and the system is ready for safe start up.
11. If applicable (i.e. the TAB agency is a subcontractor under the mechanical contractor), notify the CA a minimum of two weeks in advance, of the time when TAB fieldwork will begin. Attend the initial TAB scoping meeting for review of the TAB procedures.
12. Provide equipment and systems start up resources as specified and required. If during an attempted equipment or system start up, deficient or incomplete work is discovered that would preclude safe operation, the start up shall be aborted until corrective action has been taken. Ensure such action is taken and verified before re-scheduling a new start up. Those responsible for deficient or incomplete work will be responsible for all associated costs.
13. Implement system functional performance checks in advance, utilizing the sample FPT forms provided in the Cx plan, to ensure that all equipment and systems are fully functional and ready for the CA to witness formal FPT.
14. Operate equipment and systems for FPTs in accordance with the Cx plan and as directed by the Cx authority. If improper functionality, incomplete work, or other deficiencies affecting system performance are discovered, the FPTs will be aborted by the CA. Those responsible for deficient or incomplete work will be responsible for all associated costs in accordance with Section 17100. Mechanical contractor shall ensure that all corrections necessary for full and complete system operation, as specified, are completed or otherwise satisfactorily addressed. Upon correction of submitted FPT action items, in conjunction with the CC and other applicable sub-contractors, carry out preliminary functional performance checks to confirm correct operation before requesting the CA to reschedule the FPTs for the system in question.
15. Prepare, for use by the CA, a preliminary schedule for: O&M manual submission (preliminary); pipe and duct system leakage testing; piping systems flushing and cleaning; equipment start up; mechanical system operation; TAB fieldwork; and other miscellaneous task completion. Update schedule as appropriate throughout the construction period.
16. Attend initial O&M staff training session, and conduct mechanical system orientation and inspection at the equipment placement completion stage.
17. Update drawings to as built condition and review with the CA. In addition, gather O&M data on all equipment, and assemble in binders as required

by the Cx specification. Submit preliminary O & M manuals to CA as soon as all system / equipment submittals have been approved. O&M manuals shall be properly tabbed by equipment classification or Division 15 specification number, and shall be as "user-friendly" as possible and shall include the following: copies of specific submitted performance data on the particular equipment; performance curves for all fans, pumps, airflow / waterflow monitoring stations, pump triple-duty valves, circuit setter / auto-flow valves, etc.; operating and maintenance instructions including suggested equipment PC and required maintenance intervals; all applicable equipment maintenance logs; and appropriate applicable drawings.

18. Participate in, and schedule, vendors and contractors to participate in the O&M staff training sessions as set up by the GC.
19. Provide written notification to the GC and CA that the following work has been completed in accordance with the contract documents and the equipment, systems and sub-systems are operating as required.
    a. HVAC / mechanical equipment including all fans, air handling units, dehumidification units, ductwork, dampers, terminals and all Division 23 equipment.
    b. Refrigeration equipment, pumping systems and heat rejection equipment.
    c. Fire stopping in all fire rated construction, including fire and smoke damper installation, caulking, gasketing and sealing of smoke barriers.
    d. Dedicated smoke control systems including stairway pressurization and atrium systems.
    e. Non-dedicated systems using the air-handling units for smoke control.
    f. Fire detection and smoke detection devices furnished under other divisions of the specifications as they affect the operation of the smoke control systems.
    g. That the building control system is functioning to control mechanical equipment and smoke control systems as specified.
    h. Provide a complete set of as built drawings and O&M manuals to the CA as well as completing, signing, and submitting all mechanical systems / equipment PCs.

H. Controls Contractor:
1. Include the cost in his contract of participating in the Cx process as described herein.
2. Review system design for controllability with respect to equipment selected for the project.
3. Review and confirm in writing that a proper hardware specification exists to permit FPT as required by the project specifications and control sequences of operation.
4. Review and confirm in writing that proper safeties and interlocks are included in the project design documents.
5. Ensure that control valves and actuators have been properly sized, based upon design pressure drops, and that selected control valves will result in the airflow / waterflow capacity control specified. Include all valve sizing information in control valve submittal.

6. Ensure that control dampers have been properly sized to control airflows as specified. Review and confirm in writing proper damper positioning for mixing to prevent stratification. Ensure correct actuator vs. damper movement for smooth operation, and include damper sizing, control method and actuator selection data in control damper submittal.
7. Ensure that temperature, pressure, humidity, CO2, airflow and waterflow sensor ranges have been properly selected, and include supporting data with submittal.
8. Clarify all questions concerning control sequences of operation with the design engineer.
9. Attend initial Cx scoping meeting scheduled by the CA, and all subsequent regularly scheduled construction meetings where the CA's and CT's attendance has been specifically requested. Help ensure that action items arising from control system issues are addressed in a timely manner to allow the Cx process to proceed on schedule.
10. Provide the following submittals to the CA for review:
    a. All operation and maintenance manuals including all hardware and software (i.e. application software and project applications code manuals) submittals.
    b. Control panel construction shop drawings.
    c. Diagrams showing all control points, sensor locations, point names, actuators, controllers and where necessary, points of access, all superimposed on diagrams of the physical equipment.
    d. Narrative description of all control sequences for each piece of equipment controlled.
    e. Logic diagrams showing the logic flow of all control sequences.
    f. A list of all control points, including analog inputs, analog outputs, digital inputs and digital outputs. Include the values of all parameters for each system point. Provide a separate list for each stand-alone control unit.
    g. Provide a program write-up, organized in the same manner as the control software. This narrative shall describe the logic flow of the software and the functions of each routine and sub-routine. It should also explain individual math or logic operations that are not clear from reading the software listing.
11. Inspect, check and confirm the proper installation and performance of controls/BAS hardware and software provided by others.
12. Integrate installation and programming scheduling with construction and Cx schedules.
13. Inspect, check and confirm the correct installation and operation of input and output field points and devices through documented and signed off point to point checkout sheets.
14. Provide thorough training to owner's engineering operations personnel on hardware operations and programming, and the application program for the system, in accordance with the O&M staff training program in the Cx plan.
15. In conjunction with the mechanical contractor, demonstrate system performance to the CA including all modes of system operation (e.g. occupied, unoccupied, emergency, etc.) during FPT. If improper functionality, incomplete work, or other deficiencies affecting system performance are discovered, the FPTs will be aborted by the CA. Those

responsible for deficient or incomplete work will be responsible for all associated costs.

16. Provide control system technicians to assist during system verification and FPT. The BAS controls contractor shall make two (2) technician available to the CA throughout the FPT phase of the commissioning process. One of the technicians shall be familiar with the controls software and programming and the other shall be capable of making controls system hardware repairs during FPT. The BAS controls contractor shall also submit a copy of his controls point-to-point (PTP) checkout sheets to the CA, prior to the start of the mechanical system FPT.
17. Provide support and coordination with TAB agency on all interfaces between controls and TAB scopes of work. Provide, at no additional cost to the TAB and Cx agencies, all devices, such as portable operator's terminals and all software for the TAB agency to use in completing TAB procedures.

I. TAB Agency:

1. Include the cost in his contract of participating in the Cx process as described herein.
2. Attend initial Cx scoping meeting scheduled by the CA, and all subsequent regularly scheduled construction meetings where the CA's and CT's attendance has been specifically requested, both prior to and during TAB fieldwork.
3. Submit proposed TAB procedures to the CA and design engineer for review and acceptance within 90 days of contract award.
4. Attend the TAB planning meeting scheduled by the GC. Be prepared to discuss the procedures that shall be followed in testing, adjusting and balancing the HVAC / mechanical systems.
5. Submit deficiency reports generated during TAB fieldwork to appropriate installing contractors, and to the CT, so that immediate attention can be given to addressing and resolving the various deficiencies identified.
6. At the completion of the TAB work and prior to substantial completion, submit the final TAB report to the general contractor with copies to the Owner, CA and the design engineer.
7. Participate in performance verification of the final TAB report by the CA. The TAB agency shall provide one (1) technician with full instrumentation for the purpose of verifying the data submitted in the final TAB report. This will consist of repeating a sample (25%) of the measurements contained in the TAB report as directed by the CA.

J. Electrical Contractor:

1. Include the cost in his contract of participating in the Cx process as described herein.
2. Review design with respect to providing power to the mechanical equipment and verify the following:
    a. That proper hardware specifications exist to accomplish the specified functional performance and sequences of operation required by the project documents.
    b. That proper safeties and interlocks are included in the design of electrical connections for mechanical equipment.

3. Attend initial Cx scoping meeting scheduled by the CA, and all subsequent regularly scheduled construction meetings where the CA's and CT's attendance has been specifically requested. Help ensure that action items arising from electrical system issues are addressed in a timely manner to allow the Cx process to proceed on schedule.
4. Schedule work so that required electrical installations are completed, and so that systems verification checks and FPTs can be carried out on schedule.
5. Inspect, check and confirm in writing the proper installation and performance of all electrical systems / services provided.
6. Provide electrical system technicians to assist during system verification and FPT as required by the CA.

K. Independent Electrical Testing Agency:
1. Include the cost in his contract of participating in the Cx process as described herein.
2. Attend initial Cx scoping meeting scheduled by the CA, and all subsequent regularly scheduled construction meetings where the CA's and CT's attendance has been specifically requested, both prior to and during IETA fieldwork.
3. Submit proposed electrical system testing procedures to the CA and design engineer for review and acceptance within 90 days of contract award.
4. Attend the IETA planning meeting scheduled by the GC. Be prepared to discuss the procedures that shall be followed in testing the electrical systems.
5. Submit deficiency reports generated during IETA fieldwork to appropriate installing contractors, and to the CT, so that immediate attention can be given to addressing and resolving the various deficiencies identified.
6. At the completion of the IETA work and prior to substantial completion, submit the final IETA report to the general contractor with copies to the Owner, CA and the design engineer.
7. Participate in performance verification of the final IETA report by the CA. The IETA agency shall provide one (1) technician with full instrumentation for the purpose of verifying the data submitted in the final IETA report. This will consist of repeating a sample (25%) of the measurements contained in the IETA report as directed by the CA.

L. Equipment Suppliers:
1. Provide all requested submittal data including detailed start up procedures and specific responsibilities of the owner to keep warranties in force.
2. Assist in equipment start-up / checkout and testing per agreement with Subs.
3. Include all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment according to these Contract Documents in the base bid price to the contractor, except for stand-alone data-logging equipment that may be used by the CA.
4. Provide information requested by CA regarding equipment sequence of operation and testing procedures.

5. Review test procedures for equipment installed by factory representatives.

1.5 DEFINITIONS

A. Factory Testing: Testing of equipment on site or at the factory by factory personnel with an owner's representative present.

B. Functional Performance Test (FPT): Test of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. FPT is the dynamic testing of systems (rather than just components) under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up or down to maintain the differential pressure set point). Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The systems are run through numerous control systems' sequences of operation, and components are verified to be responding per the specified design sequences. Traditional air or water test and balancing (TAB) is not FPT, in the Cx sense of the word. The TAB agency's primary work is setting up the systems flows and pressures as specified, while FPT is verifying that which has already been set up. However, prior to the commencement of FPT, the CA shall conduct a final TAB report verification. The Cx authority develops the FPT procedures in a sequential written form, coordinates, oversees and documents the actual testing, which is usually performed by the installing contractor or vendor. FPTs are performed after PCs have been submitted, equipment start up / checkout have been completed, and all TAB or IETA fieldwork has been completed, and a report issued.

C. General Contractor: The prime contractor for this project. Generally refers to all the GC's subcontractors as well.

D. Indirect Indicators: Indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100% closed.

E. Manual Test: Using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrast to analyzing monitored data taken over time to make the "observation").

F. Monitoring: The recording of parameters (flow, current, status, temperature, pressure, etc.) of equipment operation using data-loggers or the trending capabilities of control systems.

G. Simulated Signal: Writing over a sensor value in the control system to see the response of a system (e.g., changing the outside air temperature value from 50°F to 75°F to verify economizer operation).

H. Phased Cx: Cx that is completed in phases (by floors, for example) due to the size of the structure or other scheduling issues, in order to minimize the total construction time.

I. Pre-functional Checklist (PC): A list of items to inspect and elementary component tests to conduct to verify proper installation / start-up / checkout of equipment. Sample PCs are provided by the CA in the preliminary Cx Plan; however, the Subs may utilize their own PCs or PCs provided by their equipment suppliers, provided that accepted industry start-up procedures are followed. Correct start-up procedures & checklists are essential for ensuring that equipment and systems are checked out properly before being brought on-line and made operational. PCs are primarily static inspections and procedures to prepare the equipment or system for initial operation (e.g., belt tension, oil levels OK, labels affixed, gages in place, sensors calibrated, etc.). However, some PC items entail simple testing of the function of a component, a piece of equipment or system (such as measuring the voltage imbalance on a three-phase pump motor of a chiller system, or the rotation on a pump or fan). The word pre – functional refers to before functional testing. PC augment and are combined with the manufacturer's start up checklist. Even without a Cx process, contractors will typically perform some of the pre-functional checklist items a CA will recommend; however, few contractors document in writing the execution of these checklist items. Start-up checklists shall be utilized on this project to help ensure that the independent testing phases (i.e. TAB / IETA and FPT) of the project proceed smoothly without unnecessary delays. Each piece of equipment must undergo proper start-up procedures, no exceptions.

J. Project Manager (PM): The contracting and managing authority for the owner over the design and/or the construction of the project.

K. Sampling: Functionally testing a fraction (i.e. representative sample) of the total number of identical or near identical pieces of equipment.

L. Seasonal Performance Tests: FPT that is deferred until the system(s) will experience conditions closer to their design conditions.

M. Simulated Condition: Condition that is created for the purpose of testing the response of a system (e.g., applying a hair blower to a space sensor to see the response in a VAV box).

N. Specifications: The construction specifications of the Contract Documents.

O. Start-up: The initial starting or activating of dynamic equipment, including executing PCs.

P. Subs: The subcontractors to the GC who provide and install building components and systems.

Q. Test Procedures: The step-by-step process, which must be executed to fulfill the test requirements. The test procedures are developed by the CA.

R. Test Requirements: Requirements specifying what modes and functions, etc. shall be tested. The test requirements are not detailed test procedures. The test requirements are specified in the Contract Documents.

S. Trending: Monitoring using the building automation system (BAS).

T. Vendor: Supplier of equipment.

U. Warranty Period: Warranty period for the entire project, including equipment components. Warranty begins at Substantial Completion and extends for at least one year, unless specifically noted otherwise in the Contract Document and accepted submittals.

1.6 SYSTEMS TO BE COMMISSIONED

A. The following systems shall undergo Cx on this project:

	HVAC / Mechanical Systems		Electrical Systems
X	Pumps	X	Lighting Controls
X	Mechanical Piping Systems	X	Main Service
X	Ductwork & Duct Specialties	X	Distribution
X	Variable Frequency Drives	X	Communication system
X	Chillers	X	Emergency Power
X	Terminal Units (Air)	X	Fire Pump system
X	Exhaust Fans	X	Back-up Generator systems
X	HVAC Control Systems		
X	Indoor Air Quality		
X	Tab Fieldwork		Plumbing
X	Air Handling Units	X	Domestic Water Heaters
X	Ductless Split Systems	X	Water Infrastructure System: Water Well, Pump system, Water Tank, Etc.

PART 2 PRODUCTS

2.1 TEST EQUIPMENT

A. All standard test equipment required to perform equipment / system start up, initial checkout (including PTP checkout) and required FPT shall be provided by the applicable (i.e. Division 23 or 26) contractor for the equipment / system being tested. For example, the Division 23 MC shall be responsible for all standard test equipment required for the checkout of HVAC / mechanical systems, except for equipment specific to and used by TAB in their Cx responsibilities, and the Division 23 CC shall be responsible for test equipment for checkout of the BAS system controls. Two-way radios shall be provided by the Division contractor.

B. Special equipment, tools and instruments (only available from vendor, specific to a piece of equipment) required for test equipment, according to these Contract Documents, shall be included in the base bid price to the GC and left on site, except for stand-alone data logging equipment that may be used by the CA.

C. All test equipment shall be of sufficient quality and accuracy to test and /or measure system performance with the tolerances required by the Specifications. If not otherwise noted, the following minimum requirements apply; Temperature sensors and digital thermometers shall have a certified calibration within the past

year and a resolution of ± 0.1°F. Pressure sensors shall have an accuracy of ± 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year. All equipment shall be calibrated according to the manufacturer's recommended intervals and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.

PART 3 EXECUTION

3.1 MEETINGS

A. Scoping Meeting: Within 60 to 90 days, depending on building size, prior to the commencement of construction, the CA will schedule, plan and conduct a Cx scoping meeting with the entire CT in attendance. The CA will also provide copies of the preliminary Cx Plan to all CT members, at or before this meeting. Meeting minutes will be compiled and distributed to all parties by the CA.

B. Miscellaneous Meetings: The GC shall periodically request the CA's and CT's attendance at applicable regularly scheduled construction meetings to facilitate the Cx process. These meetings will cover Cx process coordination, deficiency resolution and planning issues with members of the CT and various Subs. In addition, the GC shall help ensure that action items arising from meeting discussions are satisfactorily addressed, as required, to enable the Cx process to proceed on schedule.

3.2 REPORTING

A. The CA will provide regular reports to the PM and GC as deemed necessary, with increasing frequency as construction and Cx progresses.

B. The CA will regularly communicate with all members of the Cx team, keeping them apprised of Cx progress and scheduling changes through memos, field inspection reports, miscellaneous progress reports, etc.

C. The CA shall maintain a master deficiency (i.e. Action Item Summary) and resolution log and a separate testing record. In addition, the CA will help the PM & GC coordinate the resolution of non-compliance issues and design deficiencies identified in the Action Item Summary and during all phases of Cx.

D. A final summary report will be provided by the CA, which summarizes the results of the Cx process. The final Cx report shall include: an executive summary of the Cx process; a project narrative covering highlights of all project Cx phases; a detailed summary of all observations, comments and deficiencies noted throughout the Cx process; a summary of FPT results; appropriate conclusions and recommendations; and a value statement detailing the economic impact of Cx to the project. The conclusion and recommendations will focus on evaluating the Cx process issues and identifying areas where the process could be improved. All acquired documentation, logs, minutes, reports, deficiency lists, communications, findings, unresolved issues, etc., will be compiled in appendices and provided with the summary report. PCs, TAB verification results, FPT results and monitoring reports will also be part of the final Cx report.

3.3 SUBMITTALS

A. The CA will provide appropriate contractors with a specific request for the type of submittal documentation the CA requires to facilitate the Cx work. These requests will be integrated into the normal submittal process and protocol of the construction team. As a minimum, the request will include the manufacturer and model number, the manufacturer's printed installation and detailed start up procedures, full sequences of operation, and O&M data, performance data and performance curves, any performance test procedures, control drawings and details of owner contracted tests.

B. The CA will review and submit written comments on submittals related to the commissioned equipment for conformance to the Contract Documents. This review is intended to aid in the development of FPT procedures as well as to verify compliance with equipment specifications. The CA will notify the PM, GC and/or A/E where applicable, of omitted items or of items that are not in conformance with the Contract Documents and which require resubmission.

C. The CA may request additional design narrative from the A/E and Controls Contractor, depending on the completeness of the design intent documentation and control sequences of operation provided with the specifications.

D. The CA shall review O&M manual documentation for acceptability and completeness to ensure that O&M manuals are as follows: properly tabbed by equipment classification or Division 23 / 26 specification number; as "user-friendly" as possible; include copies of specific submitted performance data for specific equipment; include performance curves for all fans, pumps, airflow / waterflow monitoring stations, pump triple-duty valves, circuit setter / auto-flow valves, etc.; include operating and maintenance instructions including suggested equipment PCs and required maintenance intervals; include all applicable equipment maintenance logs; include appropriate applicable drawings.

3.4 START-UP, PRE-FUNCTIONAL CHECKLISTS (PCs) AND INITIAL CHECKOUT

A. The following procedures apply to all equipment to be commissioned (See Section 1.6, Systems to be commissioned). Some systems that are not comprised of actual dynamic machinery, e.g., electrical system power quality, may have very simplified PCs and start up procedures.

B. General: PCs are necessary for ensuring that equipment and systems are made properly operational for TAB or IETA fieldwork, and Cx FPT. PCs help ensure that FPT (and in-depth system checkout) may proceed without unnecessary delays. Each piece of equipment shall receive a full pre-functional checkout, and no sampling strategies shall be used. The pre-functional testing for a given system must be successfully completed prior to the beginning of the TAB or IETA fieldwork, and prior to the start of formal FPT of equipment or systems.

C. Start up and Initial Checkout Plan: The CA shall assist the CT members responsible for start up of any equipment in developing detailed start up plans for all equipment. The primary role of the CA in this process is to ensure that written documentation is produced that verifies that equipment / system manufacturer-recommended start-up / checkout procedures have been completed. Parties responsible for PCs and start up are identified in the Cx scoping meeting and on the PC forms.

1. The CA will adapt manufacturer's recommended start-up / checkout procedures in preparing PC forms. These checklists indicate required procedures to be executed as part of start up and initial checkout of the systems and the responsible party.
2. Sample PCs shall be provided by the CA to the CT members, via the preliminary Cx Plan. Installing contractor CT members shall determine which trade is responsible for executing and documenting the various line item tasks and notes indicated on the PCs. Most PC forms will have more than one trade responsible for its execution.
3. The installing contractor CT members responsible for the purchase of various pieces of equipment shall develop the full start-up plan (with the assistance provided by the CA as needed) for that equipment. This shall be accomplished by combining the CA's PCs with both the manufacturer's detailed start up and checkout procedures along with the contractors own standard field checkout sheets. The start-up plan shall include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan.
4. The full start-up plan could consist of something as simple as:
   a. The CA's PCs.
   b. The manufacturer's standard written start up procedures copied from the installation manuals with check boxes by each procedure and a signature block added by at the end of the form.
   c. The manufacturer's normally used field checkout sheets.
5. The installing contractor CT members shall submit full start-up plans for all required equipment / systems to the CA for review and confirmation of acceptability. The CA shall review the start-up plan and PC format for acceptability, noting any procedures that need to be added.
6. The full start-up procedures and all PC forms shall be provided to the A/E and PM for review and approval, depending on management protocol.

D. Sensor Calibration: Control system PTP checkout and calibration of all sensors shall be included as part of the PCs performed by the Controls Contractor, according to the following procedures:
1. All Sensors: Verify that sensors with shielded cable are grounded only at one end. For sensor pairs that are used to determine a temperature or pressure difference, make sure they are reading with in 0.2°F of each other for temperature and with in a tolerance of equal to 2% of the reading of each other, for pressure. Tolerances for critical applications will be stricter.
2. Sensors without Transmitters: Standard Application: Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or building automation system (BAS) is within the tolerances in the table below of the instrument measured value. If not, calibrate or replace sensor.
3. Sensors with Transmitters: Standard Application: Disconnect sensor. Connect a signal generator in place of the sensor. Connect ammeter in series between transmitter and BAS control panel. Using manufacturer's resistance-temperature data simulate minimum desired temperature. Adjust transmitter potentiometer zero until 4mA is read by the ammeter. Repeat for the maximum temperature matching 20mA to the

potentiometer span or maximum and verify at the BAS. Reconnect sensor. Make a reading with the calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or building automation system (BAS)) is within the tolerances in the table below of the instrument-measured value. If not, replace sensor and repeat. For pressure sensors, perform a similar process with a suitable signal generator.

E. Execution of Pre-functional Checklists and Start up:

1. Six (6) weeks prior to start up, the Subs and vendors schedule start up with the PM, GC and CA. The performance of the PC, start up and checkout are directed and executed by the Subcontractor or vendor. When checking off PC, signatures will be required of other Subs for verification of completion of their work.
2. The CA shall observe, at minimum, the procedures for each piece of primary equipment, unless there are multiple units, (in which case a sampling strategy may be used as approved by the CA.
3. For lower-level components of equipment, (e.g., VAV boxes, sensors, controllers), the CA shall observe a sampling of the pre-functional and start up procedures. The sampling procedures are identified in the Cx Plan.
4. The Subs and vendors shall execute start up and provide the CA with a signed and dated copy of the completed start up and pre-functional tests and checklists and/or PTP checkout sheets.
5. Only individuals that have direct knowledge and witness that a line item task on the pre-functional checklist was actually performed shall initial or check that item off. It is not acceptable for witnessing supervisors to fill out these forms.

F. Deficiencies, Non-Conformance and Approval in Checklists and Start up:

1. The Subs shall clearly list any outstanding items of the initial start up and pre-functional procedures that were not completed successfully on an attached sheet. The procedures form and any outstanding deficiencies are to be provided to the CA within two (2) days of test completion.
2. The CA will review the report and submit it with his comments to the Subcontractor and the PM. The CA shall oversee the Subs and the vendors in collecting and retesting deficiencies or uncompleted items. The installing Subs or vendors shall correct all areas that are deficient in the checklists and tests in a timely manner, and shall notify the CA as soon as outstanding items have been corrected and resubmit an updated start up report and a Statement of Correction on the original non-compliance report. When satisfactorily completed the CA recommends approval of the execution of the checklists and start up of each system to the PM using a standard form.
3. Items left incomplete, which later cause deficiencies or delays during functional testing, may result in back charges to the responsible party. Refer to Part 3.7 herein for details.

3.5 FUNCTIONAL PERFORMANCE TESTING

A. This sub-section applies to all Cx functional testing for all divisions.

B. Objectives and Scope: The objective of FPT is to demonstrate that each system is operating according to the documented design intent and Contract Documents. Functional testing facilitates bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of deficient performance are identified and corrected, improving the operation and functioning of the systems.

C. Development of Test Procedures: Before test procedures are written, the CA shall obtain all requested documentation, equipment or systems, including an updated points list, program code, control sequences and parameters. The CA will develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. Prior to execution, the CA shall provide a copy of the test procedures to the Subcontractor(s) who shall review the tests of feasibility, safety, equipment and warranty protection. The CA shall submit the tests to the A/E for review, if requested.

D. The CA shall review owner-contracted, factory testing or required owner acceptance tests, including documentation format, and shall determine what further testing or format changes may be required to comply with the Specifications. Redundancy of testing shall be minimized.

E. The purpose of any given specific test is to verify and document compliance with the stated criteria of acceptance given on the test form. In general, the FPTs will be comprised of the following:
1. Sensor Calibration Checks / Equipment Room.
2. Sensor Calibration Checks / Space.
3. Device Calibration Checks.
4. Sequence of Operation Functional Tests.

F. Test Methods:
1. FPT and verification will be achieved by a combination of manual testing (persons manipulate the equipment and observe performance) and simultaneous monitoring of the performance via the Building Automation System (BAS). Analysis of the results may also include using the control system’s trend log capabilities or stand-alone data loggers. The CA may substitute specified methods referenced in other specification sections, or require an additional method to be executed, other than what was specified, with the approval of the A/E and PM. This may require a change order and adjustment in charge to the Owner. The CA will determine which method is most appropriate for tests that do not have a method specified.
2. Simulated Conditions: Simulating conditions (not by an overwritten value) shall be allowed, though timing the testing to experience actual conditions is encouraged wherever practical.
3. Overwritten Values: Overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading in a control system to be something other than it really is, shall be allowed, but shall be used with caution and avoided when possible. Such testing methods often can only test a part of a system, as the interactions and responses of other systems will be erroneous or not applicable. Simulating a condition is preferable, e.g., for the above case, by heating the outside air

sensor with a heat source rather than overwriting the value or by altering the appropriate set point to see the desired response.

4. Simulated Signals: Using a signal generator which creates a simulated signal to test and calibrate transducers and DDC constants is generally recommended over using the sensor to act as the signal generator via simulated conditions or overwritten values.
5. Altering Set Points: Rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test a sequence is acceptable. For example, to see the AC compressor lockout work at an outside air temperature below 55°F, when the outside air temperature is above 55°F, temporarily change the lockout setpoint to be 2°F above the current outside air temperature.
6. Indirect Indicators: Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the tested of the tested parameters, that the indirect readings through the control system represent actual conditions and responses. Much of this verification is completed during pre-functional testing.
7. Setup: Each function and test shall be performed under conditions that simulate conditions as close as is practically possible. The Subcontractor executing the test shall provide all necessary materials, system modifications, etc. to produce necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the Subcontractor shall return all affected building equipment and systems, due to these temporary modifications, to their pre-test condition.
8. Sampling: Multiple identical pieces of non-life-safety or otherwise non-critical equipment may be functionally tested using a sampling strategy. Significant application differences and significant sequence of operation differences in otherwise identical equipment invalidates their common identity. A small size or capacity difference, alone, does not constitute a difference.
9. If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the CA will stop the testing and require the responsible Subcontractor to perform and document a checkout of the remaining units, prior to continuing with functionally testing the remaining units.

G. Coordination and Scheduling: The Subs shall provide sufficient notice to the CA regarding their completion schedule for the PC and start up of all equipment and systems. The CA will schedule functional tests through the PM, GC, and affected Subs. The CA shall direct, witness and document the functional testing of all equipment and systems. The Subs shall execute the tests.

H. In general, FPT will be conducted after pre-functional testing and start up has been satisfactorily completed, and after verification of the final TAB report. The control system shall be sufficiently tested and all PTP checkout sheets submitted to the CA for review prior to the start of the TAB field work. Once air balancing and water balancing has been completed and the final TAB report verification concluded, FPT of air-related or water-related equipment or systems can begin. Testing proceeds from components to subsystems to systems. When the proper

performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems is checked.

I. Test Equipment: Refer to CX Authority, Part 2 for test equipment requirements.

J. Problem Solving: The CA will recommend solutions to problems found; however, the burden of responsibility to solve, correct and retest problems is with the GC, Subs, and A/E.

3.6 DOCUMENTATION, NON-CONFORMANCE AND APPROVAL OF TESTS

A. Documentation: The CA shall witness and document the results of all FPTs using the specific procedural forms developed for that purpose. Prior to testing, these forms are provided to the PM for review and approval and to the Subs for review. The CA will include the filled out forms in the O&M manuals.

B. Non-Conformance:
1. The CA will record the results of the FPT on the test forms. All deficiencies or non-conformance issues shall be noted and reported to the Owner and the PM via written interim reports.
2. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CA. In such cases, the deficiency and resolution will be documented on the procedure form.
3. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures.
4. As tests progress and a deficiency is identified, the CA discusses the issue with the executing contractor.
   a. When there is no dispute on the deficiency and the Subcontractor accepts responsibility to correct it:
      1) The CA documents the deficiency and the Sub’s response and intentions, and they go on to another test or sequence. After a days work, the CA submits the non-compliance reports to the PM/owner for signature. A copy is provided to the Subcontractor and CA. The Subcontractor corrects the deficiency, signs the statement of correction at the bottom of the non-compliance form certifying that the equipment is ready to be tested and sends it back to the CA.
      2) The CA reschedules the test, and the test is repeated.
   b. If there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:
      1) The deficiency shall be documented with the Sub’s response and a copy given to the PM/Owner and the Sub's representative assumed to be responsible.
      2) Resolutions shall be made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with the A/E. Final acceptance authority is with the Owner Representative.
      3) The CA documents the resolution process.
      4) Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency, signs a

statement of correction and provides it to the CA. The CA reschedules the test, and the test is repeated until satisfactory performance is achieved.

5. Cost of Retesting:
   a. The cost for the Subcontractor to retest a pre-functional or functional test, if they are responsible for the deficiency, shall be theirs.
   b. For a deficiency identified, not related to any pre-functional checklist or start up fault, the following shall apply. The CA and PM will direct the retesting of the equipment once at no “charge” to the GC for their time. However, the CA’s and PM’s time for a second retest will be charged to the GC, who may choose to recover costs from the responsible Sub.
   c. The time for the CA and PM to direct any retesting required because a specific pre-functional checklist or start up test item, reported to have been successfully completed, but determined during functional testing to be faulty, will be back charged to the GC. The GC may choose to recover costs from the party responsible for executing the faulty pre-functional test.
6. The contractor shall respond in writing to the CA and PM at least as often as Cx meetings are being scheduled concerning the status of each apparent outstanding discrepancy identified during Cx. Discussion shall cover explanations of any disagreements and proposals for their resolution.
7. The CA retains the original non-conformance forms until the end of the project.

C. Failure Due to Manufacturer’s Defects: If 10% of identical pieces of equipment (size alone does not constitute a difference) fail to perform in accordance with the Contract Documents (mechanically or substantively) due to a manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the GC or PM. In such case, the Contractor shall provide the Owner with the following:
   1. Within one (1) week of notification from the PM, the Contractor or manufacturer’s representative shall examine all other identical units making a record of the findings. The findings shall be provided to the PM within two (2) weeks of the original notice.
   2. Within two (2) weeks of the original notification, the Contractor or manufacturer shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.
   3. The PM/Owner will determine whether a replacement of all identical units or a repair is acceptable.
   4. Two (2) examples of the proposed solution will be installed by the Contractor and the PM will be allowed to test the installations for up to one week, upon which the PM will decide whether to accept the solution.
   5. Upon acceptance, the Contractor and/or manufacturer shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The

replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.

D. Approval: The CA notes each satisfactorily demonstrated function on the test form. Formal approval of the functional test is made later after review by the CA and by the PM, if necessary. The CA recommends acceptance of each test to the Owner using a standard form.

3.7 OPERATION AND MAINTENANCE MANUALS

A. Standard O&M Manuals:
1. The specific content and format requirements for the standard O&M manuals are detailed elsewhere throughout the specifications. Special requirements for the controls contractor and TAB agency are found in their respective sections of the specifications.
2. A/E Contribution: The A/E will include in the beginning of the O&M manuals a separate section describing the systems including:
a. The design intent narrative prepared by the A/E and provided as part of the bid documents, updated to as built status by the A/E.
b. Simplified professionally drawn single line system diagrams on 8 ½" x 11" or 11" x 17" sheets. These shall include chillers, water system, condenser water system, heating systems, supply air systems, exhaust systems and others as designated. These shall show major pieces of equipment such as pumps, chillers, boilers, control valves, expansion tanks, coils, service valves, etc.
3. CA Review: Prior to substantial completion, the CA shall review the O&M manuals, documentation and redline as builts for systems that were commissioned and list other systems documentation that the CA should review to verify compliance with the Specifications. The CA will communicate deficiencies in the manuals to the PM or A/E, as requested. Upon a successful review of the corrections, the CA recommends approval and acceptance of these sections of the O&M manuals to the PM or A/E. The CA also reviews each equipment warranty and verifies that all requirements to keep the warranty valid are clearly stated. This work does not supersede the A/E's review of the O&M manuals according to the A/E's contract.

B. Cx Record in O&M Manuals:
1. The CA is responsible for compiling, organizing, and indexing all Cx data by equipment into labeled, indexed and tabbed, three-ring binders and delivering them to the GC, to be included with the O&M manuals. Three (3) copies of the manuals will be provided.
2. Other documentation will be retained by the CA.

3.8 TRAINING OF OWNER PERSONNEL

A. The GC shall be responsible for training coordination and scheduling and ultimately for ensuring that training is complete.

B. The CA shall be responsible for overseeing and approving the conduct and adequacy of the training of Owner personnel for commissioned equipment.
1. The CA shall interview the facility manager and lead engineer to determine the special needs and areas where training will be most

valuable. The Owner and CA shall decide how rigorous the training should be for. The CA shall communicate the results to the Subs and vendors who have training responsibilities.

2. In addition to these general requirements, the specific training requirements of Owner personnel by Subs and vendors is specified in Division 15 and 16 and list other sections where training requirements are found.
3. Each Subcontractor and vendor responsible for training will submit a written training plan to the CA for review and approval prior to training. The plan will cover the following elements:
   a. Equipment (included in training).
   b. Intended audience.
   c. Location of training.
   d. Objectives.
   e. Subjects covered (description, duration of discussion, special methods, etc.).
   f. Duration of training on each subject.
   g. Instructor for each subject.
   h. Methods (classroom lecture, video, site walk-through, actual operational demonstrations, written handouts, etc.).
   i. Instructor and qualifications.
4. For the primary HVAC equipment, the Controls Contractor shall provide a short discussion of the control of the equipment during the mechanical or electrical training conducted by others.
5. The CA develops an overall training plan and coordinates and schedules, with the PM and GC, the overall training for the commissioned systems. The CA develops criteria for determining that the training was satisfactorily completed, including attending some of the training, etc. The CA recommends approval of the training to the PM using a standard form. The PM also signs the approval form.
6. At one of the training sessions, the CA discusses the use of the blank functional test forms for the re-Cx equipment.
7. At the first training session, the mechanical design engineer will present the overall system design concept and the design concept of each equipment section. This presentation shall be one hour in length and include a review of all systems using the simplified system schematics (one-line drawings) including chilled water systems, condenser water or heat rejection systems, heating systems, and gas supply systems, supply air systems, exhaust systems and outside air strategies.

3.9 DEFERRED TESTING

A. Unforeseen Deferred Tests: If any check or test cannot be completed due to the building structure, required occupancy condition or other deficiency, execution of checklists and functional testing may be delayed upon approval by the PM. These tests will be conducted in the same manner as the seasonal tests as soon as possible. Services of necessary parties will be negotiated.

B. Seasonal Testing: During the warranty period, seasonal testing (test delayed until weather conditions are closer to the system’s design) specified in other sections of the specifications (e.g. Testing and Balancing) shall be completed as part of this contract. The CA shall coordinate this activity. Tests will be executed,

documented and deficiencies corrected by the appropriate Subs, with facilities staff and the CA witnessing. Any final adjustments to the O&M manuals and as-builts due to the testing will be made.

END OF SECTION

SECTION 03 12 10 – FORMLINERS FOR ARCHITECTURAL CONCRETE

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes formliners for architectural concrete on walls, columns and pilasters where exposed concrete is indicated on Drawings.

B. Related Sections include the following:

1. Division 3 Section “Cast-in Place Concrete”

1.2 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Printed product data and installation guidelines for formliner system.

2. Manufacturer's installation instructions, showing required preparation and installation procedures.

3. Storage and handling requirements and recommendations.

4. Installation methods.

5. Cleaning and maintenance instructions.

B. Shop Drawings: Submit formwork panel elevations, detailing the location of architectural concrete work, including but not limited to the following:

1. Form tie locations, end locations and other special conditions, panel sizes, joint locations, joint widths, reveal and false-joint locations and dimensions, elevations, sections and details of assembly components, attachment details, and weather sealing; indicate locations, configurations, typical details, connections, expansion joints, large scale plans.

2. Show sequence of installation.

3. Show location of members, other items of work and related work of other Sections to be coordinated with work of this section.

4. Submit detail drawings depicting proper installation and flashing techniques. Coordinate locations with those found on the Contract Drawings.

C. Quality Assurance Submittals: Copies of test reports by independent laboratories verifying the performance of the system shall be submitted to the Architect upon request.

D. Verification Samples: For each finish product specified, two samples, minimum size 12 inches by 12 inches, representing actual products, styles, colors, patterns, and textures.

1. Form release sample representing form release specified.

1.3 QUALITY ASSURANCE

A. Single Source Requirements: Provide primary and secondary components required for installation of formliner systems shall be components of system recommended by single source.

B. Manufacturer Qualifications: Minimum 5 years experience manufacturing similar products.

C. Installer Qualifications:

1. Experienced and competent in architectural concrete installation.

2. If requested, submit a list of recently completed projects using similar materials.

D. Mock-Up: Refer to Section 03 31 26 Self-Consolidating Concrete for mockup requirements including formliners.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to the location in unopened factory containers. Upon arrival, materials shall be inspected for damage and manufacturer informed of any discrepancies. Deficient materials shall not be used.

B. Materials shall be stored in a protected location indoors in a cool, dry place and covered with black polyethylene sheeting to protect them from the elements.

C. Store covered, out of direct sunlight. Ultraviolet radiation can cause formliners to become brittle or discolored and permanent deformation can occur if they are exposed to temperatures above 140 degrees Fahrenheit.

D. Formliners are combustible. Keep away from open flame or welding sparks, especially if the liners have been coated with any type of form release.

1.5 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. T This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Spec Formliners, Inc. (Basis of Design):

1. Phone: 714-429-9500; Web: www.specformliners.com

B. US Formliners, Inc.

1. Phone: 706-549-6787; Web: reckli.com/us/usformliner

C. Fitzgerald Formliners:

1. Phone: 800-547-7760; Web: www.formliners.com

D. Formliners shall meet the requirements of BABA – Build American / Buy American. Formliners are to be manufactured in the U.S.

2.2 MATERIALS

A. ThermoSpec Single-Use Thermoformed plastic Formliners: As manufactured by Spec Formliners, Inc.

1. Description: Single Use

2. Panel Size: Provide in maximum size possible to accommodate design with minimum to no liner joints.

3. Formwork: formwork must be used with all formliners. All formwork shall be rigid to remain sealed during concrete placement and vibration. Seal all joints by caulking or gasketing to prevent grout leakage, ACI 347-68.

4. Form Liner Joints: Minimize joints in the form liners. Apply SpecSeal brand sealant to form liners edges and then firmly butt edges. Compress the joint as tightly as possible, without buckling or distorting.

5. Form Release: Spray form liners with form release compatible for use with self-consolidating concrete to minimize bug-holes, etc. before each use and within the same day that concrete is placed. Apply with low flow, wide angle, flat spray nozzle and assure an even coat. Wipe with a cloth to insure a thorough, even coat to the entire form liner surface and to absorb any puddling. Refer to mockup requirements in Section 03 31 26 for form release mockup requirements.

6. Compliance:

   a. IZOD Impact, ASTM D 256: 2.0.

   b. Tensile Strength, ASTM D 6383: 3,700 psi.

   c. Heat Deflection, ASTM D 695: 188.

   d. Vicat Softening, ASTM D 1525: 212.

7. Style:

   a. Pattern Number: 1218 Rough Cut Board profile

      (1) 1/8” minimum relief
      (2) 6” wide light wood grain planks **(Custom Mold Pattern)**
      (3) Form liner size: maximum lengths and widths possible, but no less than 48” tall by 144” long.
      (4) Provide “finger-joint” ends to lock the panels together to minimize vertical joints

   b. **Custom Mold Pattern Number:** Similar to 1218 Rough Cut Board profile, but center to center board repeat pattern shall be adjusted vertically to align with the 6” horizontal jointing on sloped concrete columns and pilasters.

      i. Locations: Main building and picnic pavilions

2.3 ACCESSORIES

1. Spec Release: As determined by final mockup evaluation and finish surface of concrete.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates are within manufacturer's specified tolerances and have been prepared in accordance with manufacturer's instructions.

B. If substrate preparation is the responsibility of another installer, do not proceed with installation. Notify Architect of unsatisfactory preparation immediately. Commencement of full installation represents acceptance of existing substrate conditions.

3.2 INSTALLATION

A. Install in accordance with manufacturer's written instructions as applicable to each type of substrate required. Install in accordance with specified pattern.

B. Tolerances: Dimensions of the finished panel, at the time of erection in the structure, shall conform to the tolerances for precast, non prestressed elements in ACI 117, unless otherwise specified by the Architect.

C. Refer to Section

3.3 CLEANING AND PROTECTION

A. Cleaning: As recommended by manufacturer.

1. Thoroughly flush wall and area after cleaning.

2. Clean adjacent materials and surfaces of all foreign materials resulting from the work of this Section 03 31 26 Self Consolidating Concrete for finish requirements.

B. Protection:

1. Protect installed materials from water impinging on the visible surface, chinking, sealants joints, and from behind.

2. Protect installed materials from dust, dirt, precipitation, freezing, damaged, spilled materials, and continuous high humidity until they are fully dry.

END OF SECTION

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Footings, Grade Beams and Pile Caps.
2. Building and Foundation walls.
3. Elevated slabs.
4. Concrete toppings.
5. Building frame members.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete and grout mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, and bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. De-watering System Shop Drawings: Shop drawings indicating de-watering plan and layout. Review Geo-technical Report for subgrade water table relative to work. Review local topography for water sources relative to work.

E. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.

1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.

F. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Waterstops.
6. Curing compounds.
7. Floor and slab treatments.
8. Bonding agents.
9. Adhesives.
10. Semi-rigid joint filler.
11. Joint-filler strips.
12. Repair materials.

C. Minutes of pre-installation conference.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

B. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."

D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5 and Section 7, "Lightweight Concrete."

2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

E. Pre-installation Conference.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

   a. Contractor's superintendent.
   b. Special Inspector / Testing agency.
   c. Ready-mix concrete manufacturer.
   d. Concrete subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi-rigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, concrete repair procedures, and concrete protection.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Steel reinforcement shall be placed on blocking or dunnage to prevent contact with soil and water.

B. Storage Box: General Contractor shall provide a wood storage box for storing standard cylinder specimens. The wood storage box shall have a wood frame made of 2x4 pine stud material. The box frame shall have a bottom and four sides. The box frame shall have a veneer of 3/4” pine plywood on the bottom and the four sides. Top of the box shall be framed of 2x4 pine stud material with 3/4" pine plywood. The top of the box shall be attached to the lower box with a minimum of two – 4” hinges. The inside clear dimensions of the box shall be a minimum of 44” long by 20” wide by 16” deep. Provide attached blocking under the bottom of the completed storage box to allow a minimum of 3 1/2" clear. The exterior of the storage box shall be painted safety orange. Label the exterior top of the storage box with white paint, 6” tall letters indicating “TESTING AGENCY USE ONLY DO NOT DISTURB”. Coordinate with concrete testing agency for location of storage box to prevent damage and or disturbing cylinder specimens.

1.8 BUILD AMERICA, BUY AMERICA (BABA) REQUIREMENTS

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

E. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

F. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

G. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.

2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Reinforcing Bars: ASTM A722, Grade 150.

C. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

D. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60, deformed bars, assembled with clips.

E. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.

F. Deformed-Steel Wire: ASTM A 496/A 496M.

G. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

H. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

2.3 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected bar supports.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I/II. Supplement with the following:

a. Fly Ash: ASTM C 618, Class F or C.

b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33. Provide aggregates from a single source.

C. Lightweight Aggregate: ASTM C 330.

D. Water: ASTM C 94/C 94M.

2.5 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.

2. Retarding Admixture: ASTM C 494/C 494M, Type B.

3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.

4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.

5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.

6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.6 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, certified by curing compound manufacturer to not interfere with bonding of floor covering.

2.7 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

B. Semi-rigid Joint Filler: Two-component, semirigid, 100 percent solids, per ASTM D 2240.

C. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.8 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.

2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.

3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.

4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.

2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.

3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.

4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.9 CONCRETE MIXTURES

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 and as indicated on drawings.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Limit water-soluble, chloride-ion content in hardened concrete to percent by weight of cement as follows:

1. Prestressed / Post-tensioned Concrete: 0.06.

2. Concrete exposed to moisture: 0.30.

3. Concrete protected from moisture: 1.00.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.

2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.10 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.11 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

2. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.

2. Class B, 1/4 inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.

2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Utility Pipe and other penetrations. All utility piping shall be enclosed within a steel sleeve when located within concrete foundations, top of utility piping is less than 6” below concrete foundations, or the top of utility piping is less than the diameter of the utility pipe below the concrete foundation. The inside diameter of the steel sleeve shall be a minimum of 2” greater than the outside diameter of the utility pipe.

B. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings,

templates, diagrams, instructions, and directions furnished with items to be embedded. Wet sticking or placement of embedded items is not permitted.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges".

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.

2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORES AND RESHORES

A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.

B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.

C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars. Wet sticking or placement of reinforcement is not permitted.

1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where required.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated.

2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.

3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.

4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.

5. Locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.

3.7 WATERSTOPS

A. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.8 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Concrete shall not be placed in water. Formwork and open trenches shall be free of standing or flowing water prior to concrete placement and during concrete placement.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.

2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Maintain reinforcement in position on chairs during concrete placement.

3. Screed slab surfaces with a straightedge and strike off to correct elevations.

4. Slope surfaces uniformly to drains where required.

5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleed-water appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.9 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce profile amplitude of 1/4 inch in one direction.

1. Apply scratch finish to surfaces indicated and those to receive concrete floor toppings or to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.

2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by broom with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

G. Slip-Resistive Finish: Before final floating, apply slip-resistive finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:

1. Uniformly spread 25 lb/100 sq. ft. of dampened slip-resistive over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.

2. After broadcasting and tamping, apply float finish.

3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive finish.

3.11 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.

2. Construct concrete bases to height shown and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.

3. Minimum Compressive Strength: 4,000 psi at 28 days.

4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.

5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete substrate.

6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

3.12 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

a. Water.

b. Continuous water-fog spray.

c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.

b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.13 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semi-rigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, pop-outs, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

2. After concrete has cured at least 14 days, correct high areas by grinding.

3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.

5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a Special Inspection Agency to perform field tests and inspections and prepare reports in accordance with the 2018 International Building Code, Chapter 17.

B. Formwork Inspections:

1. Verify layout of all work for shape, location, and dimensions of concrete member being formed.

2. Inspect erected formwork to verify that work is in accordance with formwork design, and that supports, shoring, bracing, fastenings, wedges, ties, and items are secure.

C. Reinforcement Inspections:

1. Contractor shall notify the inspection agency providing reinforcing observation services a minimum of twenty-four (24) hours before placement of concrete so field observation off the reinforcing may be performed.

2. Observe and inspect reinforcement in all cast-in-place concrete, excluding slabs on grade, footings without transverse reinforcement and topping slabs.

a. Verify reinforcing bar size and placement.

b. Verify reinforcing bar grade, and that bars are free of dirt, excessive rust and damage.

c. Verify reinforcing bars are adequately tied, chaired and supported to prevent displacement during concrete placement.

d. Verify proper clear distances between bars and to surfaces of concrete.

e. Verify bar laps for proper length and stagger, and bar bends for minimum diameter, slope and length.

f. Verify that mechanical splices are placed in accordance with the contract Documents.

g. Verify all welding of reinforcing is in accordance with AWS D1.4. Verify proper joint preparation is provided and proper electrodes, properly dried and stored, are used. Verify weldability of reinforcing steel other than ASTM A706.

D. Cast-in-Place Concrete

1. Concrete mix verification. Contractor shall submit approved mix design for each class of concrete to inspection agency providing prior to commencement of work.

   a. Verify that the mixer truck trip ticket conforms to the approved design.

   b. Verify that the total water added to the mix on site does not exceed that allowed by the concrete mix design.

   c. Verify the concrete quality is indicative of adequate mixing time, consistency and relevant time limits.

2. Inspect preparation and placement of concrete.

   a. Verify acceptable general conditions of concrete base prior to placement.

   b. Verify that concrete conveyance and depositing avoids segregation and contamination.

   c. Verify that concrete is properly consolidated and reinforcement is in the proper location.

3. Observe protection and curing methods for all concrete; excluding slabs on grade, strip footing without transverse reinforcement and topping slabs.

   a. Verify that specified curing procedures are followed.

   b. Verify that specified hot and cold weather procedures are followed.

4. Inspect installation of all bolts or anchors.

   a. Verify specified size, type, spacing, configuration, embedment and quality.

   b. Verify proper concrete placement and consolidation around all anchors.

   c. For post-installed anchors, verify manufacturer’s installation recommendations are followed.

E. Concrete Composite Samples: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Compression Test Specimens: ASTM C 31/C 31M. Testing agency to determine specimen size and cast per item E.1.a OR item E.1.b.

   a. Cast and laboratory cure one set of four standard 6x12 cylinder specimens for each composite sample. Mold and store cylinders for laboratory cured specimens.

   b. Cast and laboratory cure one set of six standard 4x8 cylinder specimens for each composite sample. Mold and store cylinders for laboratory cured specimens.

2. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture, for each 150 cu. yd. cast, or fraction thereof, or for each 5,000 square feet of wall or slab cast, whichever is more stringent.

   a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, of each concrete mixture. Perform additional tests when concrete consistency appears to change.

4. Air Entrainment: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; test first batch of air-entrained concrete and one additional test for each composite sample each day.

5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.

6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's casting of each concrete mixture.

7. Compressive-Strength Tests: ASTM C 39/C 39M. Testing agency to determine specimen size and test per item E.7.a or item E.7.b.

   a. Test one laboratory cured standard 6x12 cylinder specimen at 7 days, two at 28 days with one retained in reserve for later testing if required.

      A compressive-strength test shall be the average compressive strength from two standard 6x12 specimens obtained from same composite sample and tested at 28 days.

   b. Test two laboratory cured standard 4x8 cylinder specimen at 7 days, three at 28 days with one retained in reserve for later testing if required.

A compressive-strength test shall be the average compressive strength from three laboratory cured standard 4x8 specimens obtained from same composite sample and tested at 28 days.

c. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

8. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

9. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

10. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.

11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents

.END OF SECTION

SECTION 03 31 26 - SELF-CONSOLIDATING CONCRETE (SCC)

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes the following materials and procedures for producing Self-Consolidating Concrete.

1. Self-consolidating concrete at board-formed concrete surfaces including interior “feature” wall.

2. Self-consolidating concrete at board-formed concrete columns and at exterior pedestrian plaza pilasters, picnic pavilions and vertically formed edges.

3. Other areas where shown on the drawings.

1.02 RELATED SECTIONS

A. Related Sections:
1. Division 3 Section “Cast-in-Place Concrete”
2. Division 3 Section “Formliners for Architectural Concrete”
3. Division 6 Section “Cross Laminated Timber Decking”
4. Division 6 Section “Glue Laminated Construction”
5. Division 7 Section “Joint Sealants”

1.03 REFERENCES

A. Standards referenced shall be the most current versions.

B. American Concrete Institute (ACI):

1. ACI SPEC-301 - Specifications for Structural Concrete
2. ACI SPEC-305.1 - Specification for Hot Weather Concreting
3. ACI SPEC-306.1 - Standard Specification for Cold Weather Concreting
4. ACI SPEC-308.1 - Standard Specification for Curing Concrete
5. ACI CODE-318 - Building Code Requirements for Structural Concrete (ACI 318-14) and Commentary

1.04 DEFINITIONS

A. Self-Consolidating Concrete (SCC): A highly flowable, non-segregating concrete that can spread into place, fill the formwork, and encapsulate the reinforcement without any mechanical consolidation.

B. Passing Ability: The ability of SCC to flow under its own weight (without vibration) and fill completely all spaces within intricate formwork, containing obstacles, such as reinforcement.

C. J-Ring Test: Test used to determine the passing ability of SCC, or the degree to which the passage of concrete through the bars of the J-Ring apparatus is restricted.

D. J-Ring Flow: The distance of lateral flow of concrete using the J-Ring in combination with a slump cone.

E. Slump Flow: Test method used to measure the unconfined flow and stability of SCC using a slump cone (upright or inverted).

F. Slump Flow Spread: The numerical value in inches (mm) of flow determined as the average diameter of the circular deposit of SCC at the conclusion of the slump flow test.

G. Stability: The ability of a concrete mixture to resist segregation of the paste from the aggregates.

H. Static Segregation (Segregation Factor): Segregation of the mortar from the coarse aggregate that occurs after placement while the concrete is still in a plastic state.

I. Static Segregation Resistance: Resistance of a concrete mixture to segregation of the mortar component from the coarse aggregate while the concrete is at rest and before initial setting.

J. Visual Stability Index (VSI) Rating: An assessment of the homogeneity of concrete based on the visual inspection of the concrete sample at the end of the slump flow test.

1.05 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete and grout mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, and bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Formwork Shop Drawings: For all “board-formed” concrete formwork - prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.

1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.

E. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect.

F. Certification: Manufacturer’s certification stating that the products delivered meet or exceed Project Specifications.

1. Ready-mixed concrete delivery tickets.

1.06 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Curing compounds.
6. Floor and slab treatments.
7. Bonding agents.
8. Adhesives.
9. Semi-rigid joint filler.
10. Joint-filler strips.
11. Repair materials.

1.07 QUALITY ASSURANCE

A. In accordance with ACI SPEC-301 for mixing, transportation and placing of concrete

B. In accordance with ACI SPEC-305.1 for hot weather concrete placement and protection.

C. In accordance with ACI SPEC-306.1 for cold weather concrete placement and protection.

D. In accordance with ACI SPEC-308.1 for curing.

E. In accordance with ACI SPEC-301 for concrete consolidation.

F. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.

G. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

H. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."

I. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5 and Section 7, "Lightweight Concrete."

2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

J. Pre-installation Conference.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Special Inspector / Testing agency.
c. Ready-mix concrete manufacturer.
d. Concrete subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi-rigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, concrete repair procedures, and concrete protection.

1.08 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.08 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Steel reinforcement shall be placed on blocking or dunnage to prevent contact with soil and water.

B. Storage Box: General Contractor shall provide a wood storage box for storing standard cylinder specimens. The wood storage box shall have a wood frame made of 2x4 pine stud material. The box frame shall have a bottom and four sides. The box frame shall have a veneer of 3/4" pine plywood on the bottom and the four sides. Top of the box shall be framed of 2x4 pine stud material with 3/4" pine plywood. The top of the box shall be attached to the lower box with a minimum of two – 4" hinges. The inside clear dimensions of the box shall be a minimum of 44" long by 20" wide by 16" deep. Provide attached blocking under the bottom of the completed storage box to allow a minimum of 3 1/2" clear. The exterior of the storage box shall be painted safety orange. Label the exterior top of the storage box with white paint, 6" tall letters indicating "TESTING AGENCY USE ONLY DO NOT DISTURB". Coordinate with concrete testing agency for location of storage box to prevent damage and or disturbing cylinder specimens.

C. Testing and Inspection Agency Qualifications: Independent agency conforming to the requirements of ASTM E 329.

D. Testing shall be conducted by an ACI Self-Consolidating Concrete Testing Technician, or equivalent.

1.09 MOCKUPS:

A. General: Prior to production placements, construct field mockups to demonstrate surface quality, color uniformity, bughole density, tie-hole detailing, liner alignment, and

compatibility of proposed self-consolidating concrete (SCC) mixture(s) and form-release agents with the board-formed formliners and curing methods intended for the Work.

B. Purpose:

1. Verify that SCC mixture(s) meet flow, stability, and passing ability requirements under actual field conditions.
2. Confirm that formwork, tie pattern, formliners, release agents, venting, and placement procedures achieve the required architectural finish.
3. Establish acceptable standards for surface appearance, color, texture, bughole density, tie-hole repair, and lift/joint visibility.
4. Train placement crew and confirm constructability, leak control, and curing practices prior to production.

C. Mockup Configuration:

1. Wall Panel: Minimum of four 8 ft high × 8 ft long × 12 in thick, full wall depth, using the same form system, tie layout, liner, release agent, and reinforcement congestion intended for production.
2. Column/Pilaster: Minimum of four 2 ft × 2 ft × 8 ft high, including sloped surface, to demonstrate liner wrapping, corner grain alignment, and consolidation around reinforcement.
3. Provide cleanouts, vents, and all accessories identical to production work.
4. Each mockup panel and column/pilaster will be evaluated using different combinations of SCC mixtures and form-release agents.

D. Variables to Evaluate:

1. Concrete Mix Designs: Minimum of two SCC mixtures differing in HRWR, viscosity modifier, or paste/aggregate ratio.
2. Form-Release Agents: Minimum of two agents from approved reactive families (e.g., water-based micro-emulsion and vegetable/synthetic-ester).
3. Placement Rates: At least one panel cast at target production rate to confirm form pressure behavior.

E. Testing During Mockup: Perform the following fresh-concrete tests at discharge and mid-placement for each panel:

1. Slump Flow (ASTM C1611) – Record spread (inches) and T_{50} time (seconds).
2. Passing Ability (ASTM C1621 – J-Ring) – Record flow and difference from slump-flow.
3. Visual Stability Index (VSI per ACI 237R) – Record; acceptable range 0–1.0.
4. Air Content (ASTM C231 or C173) and Temperature (ASTM C1064).
5. Segregation Resistance (ASTM C1610) if required.
6. Record placement rate (ft/hr) and ambient conditions.

F. Acceptance Criteria:

1. Surface Appearance: Uniform color and texture; clearly defined board grain; minimal surface blemishes.
2. Bugholes: Match approved mockup panel; none > 3/8 in; average density ≤ 10 per ft² unless otherwise accepted.
3. Tie Holes: Uniform alignment and size; patched or plugged per accepted method on mockup panel.
4. Joints/Lifts: Level, clean interfaces; minimal “cold-banding.”

5. Color Variance: Consistent within ΔE ≤ 3 (if measured) between panels and control sample.
6. No staining, darkening, or sheen from release agent.
7. No segregation, honeycombing, or laitance streaking.

G. Evaluation and Approval:

1. Strip forms/liners without damaging surface; review within 48 hours under natural diffuse light.
2. Architect/Owner will select approved SCC mixture, release agent, placement rate, and curing method based on mockup performance.
3. Document test data and observations for each panel.

H. Retention:

1. Retain accepted mockup on site, protected from damage, as control standard for color, texture, and finish quality throughout the Project.
2. Work not matching the approved mockup is subject to removal and replacement at no cost to Owner.

I. Rejection and Repetition: If none of the combinations meet acceptance, revise mixture proportions, release agents, or placement procedures and construct additional mockups until approval is obtained.

1.10 DELIVERY, STORAGE AND HANDLING

A. Ready-mixed concrete truck driver shall provide batch ticket to the Architect/Engineer or his/her representative at the time of concrete delivery. Contents of the batch ticket shall be as specified in ASTM C 94.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Portland Cement: Shall conform to ASTM C 150, Type I/II.

B. Supplementary Cementitious Materials (SCM):

1. The substitution of supplementary cementitious materials for cement shall be made on the basis of mass.
2. Fly Ash: Shall conform to ASTM C 618.
3. Slag Cement: Shall conform to ASTM C 989.
4. Silica Fume: Shall conform to ASTM C 1240.
5. Metakaolin: Shall conform to ASTM C 618, Class N.

C. Aggregates: Fine and coarse aggregates shall conform to ASTM C 33.

D. Water: Shall conform to ASTM C 1602.

E. Admixtures: Furnish from one manufacturer.

1. Characteristics: Compatible with each other and free of intentionally-added chlorides.

2. Air-Entraining Admixture:
   a. Shall conform to ASTM C 260.

3. Water-Reducing Admixture:
   a. Shall conform to ASTM C 494 Type A.

4. Mid-Range Water-Reducing Admixture:
   a. Shall conform to ASTM C 494 Type A.

5. High-Range Water-Reducing Admixture:
   a. Shall conform to ASTM C 494 Type F.

6. Accelerating Admixture:
   a. Shall conform to ASTM C 494 Type C or E.

7. Retarding Admixture:
   a. Shall conform to ASTM C 494 Type B or D.

8. Hydration Controlling Admixture:
   a. Shall conform to ASTM C 494 Type B or D.

9. Workability-Retaining Admixture:
   a. Shall retain concrete workability without affecting time of setting or early-age strength development.
   b. Shall conform to ASTM C 494 Type S.

10. Permeability-Reducing Admixture:
   a. Shall be a portland cement-based crystalline capillary waterproofing admixture that reacts in concrete to form non-soluble crystalline hydration products in the capillary pores of the concrete.
   b. Shall conform to ASTM C 494, Type S.
   c. Shall show a reduction in permeability of concrete compared to an identical concrete mixture without the admixture, when tested in accordance with CRD-C 48 at a pressure of 200 psi [equivalent to 460 ft (140 m) of head].
   d. Shall reduce or have no penetration of water compared to an identical concrete mixture without the admixture, when tested in accordance with DIN 1048 for a duration of 96 hours.
   e. Shall be certified to NSF/ANSI 61.

11. Viscosity-Modifying Admixture:
   a. Shall conform to ASTM C 494 Type S.

12. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C494, Type C.
   a. Shall be a nominal 30 percent solution of calcium nitrite or an amine/ester-based organic corrosion-inhibiting admixture.

13. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C494, Type S.

14. Shrinkage-Reducing Admixture:
    a. Shall conform to ASTM C 494 Type S.

15. Alkali-Silica Reaction Inhibiting Admixture:
    a. Shall contain a nominal lithium nitrate content of 30 percent.
    b. Shall conform to ASTM C 494 Type S.

16. Coloring Admixture: ASTM C979. Colored water-reducing admixtures, color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.

17. Other admixtures shall be approved by the Architect/Engineer.

F. Evaporation Reducer:

1. Shall be a monomolecular film-forming liquid for application to fresh concrete to prevent rapid drying of the surface.
2. Evaporation reducer shall not be used as a finishing aid.

2.02 CONCRETE MIXTURES

A. Mixture Specifications:

1. Water-to-cementitious materials ratio shall not exceed 0.45 by mass.

2. Supplementary Cementitious Materials: The mass of SCM shall not exceed the percentages listed in the following table for concrete exposed to freezing and thawing and in continuous contact with moisture and exposed to deicing chemicals.

Material	Maximum percent of total cementitious materials by mass
Fly ash or other pozzolans	25
Slag cement	50
Silica Fume	10
Total of fly ash or other pozzolans and silica fume	35*
Total of fly ash or other pozzolans, slag cement and silica fume	50*

*Fly ash or other pozzolans and silica fume shall not constitute more than 25 and 10 percent, respectively, of the total mass of cementitious materials

B. Slump Flow:

1. Slump flow shall be measured in accordance with ASTM C 1611.

2. The design slump flow of the SCC mixture shall be established after consideration of the project requirements.

3. The slump flow of SCC used on the project shall be the design slump flow plus or minus 2 inches.

4. Typical ranges of slump flow are outlined in the following table:

Type of Construction	Range of Slump Flow Values	
	inches	mm
Slabs	20-30	500-750
Architectural members	24-30	600-750
Wall, lightly reinforced	20-30	500-750
Column or wall, densely reinforced	24-30	600-750
Drilled Shafts	20-24	500-600

C. Visual Stability Index (VSI): VSI Rating (in accordance with ASTM C 1611 shall not exceed 1.0. Values of 2 or greater are not permitted.

D. J-Ring Flow: Difference between slump flow and J-Ring flow, as measured by ASTM C1621, shall not be more than 2 inches

E. Stability: The stability of the concrete mixture shall be determined in the laboratory prior to approval of the SCC mixture using test method ASTM C 1610 or ASTM C 1712. Concrete mixtures shall have a maximum static segregation (segregation factor) of 15 percent, based on ASTM C 1610 or a maximum penetration depth based on ASTM C 1712.

F. T_{50} Time: T_{50} time, measured in accordance with ASTM C1611, shall be 2 to 7 seconds, unless otherwise demonstrated on the approved mockup to produce the required architectural finish.

G. Compressive strength: as indicated on the Contract Documents at 28 days.

H. Air content: as indicated on the Contract Documents.

I. Maximum nominal size of coarse aggregate: as indicated on the Contract Documents.

J. Furnish to the Architect/Engineer a mixture proportion for the SCC to be used.

1. Proportion SCC mixture according to project specific criteria (Compressive Strength, Air Content, Slump Flow, T_{50}, VSI, J-Ring Value and Segregation Factor or Static Segregation Resistance (Penetration depth)).

2. Green Sense Concrete shall be proportioned in accordance with the BASF Corporation – Admixture Systems procedure.
3. Use the same components in the trial batches as that to be used in the project including coarse and fine aggregates, inert non-cementitious fillers, water, source and type of cement, supplementary cementitious materials and admixtures including any site-added admixtures intended to be used.

2.03 FORM-FACING MATERIALS

A. Concrete formwork for “board-formed” concrete walls, columns, pedestals shall be in accordance with Section 03 12 10, Formliners for Architectural Concrete. Additional measures shall be taken to seal the formwork to prevent leakage of cement paste or mortar.

B. Refer to Section 03 30 00 Cast-in-Place Concrete for additional Form Facing Materials requirements.

2.04 STEEL REINFORCEMENT

A. Refer to Section 03 30 00 Cast-in-Place Concrete for Steel Reinforcement and Reinforcement Accessories requirements.

PART 3 - EXECUTION

3.01 FORMWORK AND FORMLINERS

A. General: Except as modified below, conform to 03 33 00 and ACI 301/ACI 347. Provide formwork designed for SCC lateral pressure based on planned rate of rise, concrete temperature, and set characteristics.

B. Tightness/Leak Control: Make forms watertight. Seal panel seams, tie holes, cleanouts, blockouts, and around embeds to prevent paste loss. Retighten immediately prior to placement.

C. Cleanouts/Venting: Provide cleanouts at the base of walls/columns and vent/relief holes at high points, re-entrant corners, and over intricate relief to release trapped air during SCC placement. Plug as head rises.

D. Form-Release Agent (SCC-suitable): Apply a chemically-reactive, non-staining, low-residue, silicone-free agent compatible with coatings/sealers, as a thin micro-film by fine-mist spray; wipe off excess. Barrier-type oils are not permitted for architectural SCC.

E. Board-Formed Thermoformed Formliners (Single-Use):
1. Install per manufacturer, tight-butted seams, oriented as indicated; align “board” courses continuously across joints and faces.
2. Back the liner uniformly to avoid “pillowing”; provide additional studs/walers as required to limit deflection.

3. Treat/caulk liner seams, tie-hole sleeves, and terminations to prevent paste leakage telegraphing through the texture.
4. Maintain liner temperature limits and storage to prevent warping; discard damaged liners.

F. Ties and Patterning: Use tie systems compatible with liners; maintain an orderly, approved tie pattern. Provide cones/plugs sized to the texture depth.

3.02 EMBEDDED ITEMS

A. Same as 03 33 00 with this addition: Seal around sleeves, embeds, and anchors to prevent SCC leakage streaks on the board texture. Wet-sticking is not permitted.

3.03 REMOVING FORMS AND FORMLINERS

A. Remove side forms when concrete can support itself and removal will not mar the surface; minimum curing temperature ≥ 50 °F for ≥ 24 hours unless otherwise justified by in-place strength. Maintain curing and protection.

B. Liner Removal: Detach liners without prying against the concrete. Follow manufacturer’s removal sequence. Do not reuse single-use liners.

C. Repair/clean any reusable form components before reuse; do not reuse patched facings for exposed work without Architect approval.

3.04 SHORES AND RESHORES

A. Per 03 33 00/ACI 318/301.

3.05 STEEL REINFORCEMENT

A. Per 03 33 00 plus: Maintain clearances to allow SCC flow through congested regions. Use chairs/spacers that do not telegraph through the liner texture.

3.06 JOINTS (WALLS/COLUMNS/PILASTERS)

A. Per 03 33 00 with the following for SCC:

1. Before resuming at construction joints, remove surface laitance to sound mortar, clean, and bring to SSD—no standing water.
2. Do not use internal vibrators at the joint interface; use light external tapping to knit fresh to hardened concrete.

3.07 SCC PLACEMENT (WALLS/COLUMNS/PILASTERS ONLY)

A. Pre-Placement: Verify form tightness, liner installation, reinforcement, embeds, cleanouts, and vents. Complete required inspections.

B. Admixture/Water Control: No water added after HRWR dosing. On-site admixture adjustments only if in the approved procedure and witnessed by testing agency.

C. Method and Rate of Rise: Place SCC continuously at a controlled rate of rise consistent with form pressure design per ACI 347/347.3R. Avoid segregation. Maintain short drop; use tremie/elephant trunk or pump lines as needed.

D. Consolidation:

1. Internal vibration is not permitted for SCC, except at pre-identified congested areas with pencil vibrators used briefly and sparingly when directed by the Engineer.
2. Permit light external form vibration/tapping only to release air at liners and corners; avoid over-vibration that blurs texture.
3. Manage vent holes (open/close) as the head rises to evacuate trapped air.

E. Observation and Leaks: Continuously observe forms/liners during placement. Stop and seal leaks that would mar the board pattern before continuing.

F. Lift Heights/Intervals: Where lifts are required, keep lift joints level, staged to avoid visible “cold-banding” across board courses; coordinate lift breaks at reveals/corners where possible.

3.08 FINISHING OF FORMED SURFACES (BOARD-FORMED)

A. As-Cast Architectural Finish: Final appearance is the as-cast board-formed texture from the liner. Do not sack-rub, grind, or strongly abrade surfaces unless specifically indicated; preserve board grain detail.

B. Bugholes/Tie Holes:

1. Acceptable bughole size/density shall match the approved mockup; minimize via venting and release-agent control.
2. Treat tie holes and required bughole repairs with patch materials color- and texture-matched to surrounding concrete; tool to simulate adjacent board grain.

C. Color Uniformity: Maintain consistent mixture, placement sequence, head pressure, and curing to limit panel-to-panel variation. Changes require a new mockup.

3.09 CURING – FORMED SURFACES ONLY

A. Protect per ACI 301/308. Keep forms in place as long as practicable to aid curing; if forms/liners are removed early, moist cure exposed surfaces with fog-mist or wet coverings for not less than 7 days (or equivalent accelerated method).

B. Curing Compounds: Do not apply curing compounds on architectural board-formed surfaces unless a clear, compatible product is expressly approved and demonstrated on the mockup to be non-glossy, non-darkening, and compatible with any subsequent finish.

3.10 CONCRETE SURFACE REPAIRS (ARCHITECTURAL)

A. Evaluate defects immediately after stripping. Repairs shall preserve board texture; no broad sacking or parging unless indicated.

B. Patching: Use proprietary or site-mixed mortars approved by Architect; trial on mockup area to match color/texture. Tool grain lines to align with adjacent “boards.”

C. Prohibitions: No grinding that removes or smears the board grain. No solvent cleaning that alters color sheen.

3.11 FIELD QUALITY CONTROL (SCC)

A. Refer to Section 03 30 00 Cast-in-Place Concrete for FIELD QUALITY CONTROL.

END OF SECTION - 03 31 26

SECTION 04 22 00 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Mortar and grout.
3. Steel reinforcing bars.
4. Masonry joint reinforcement.
5. Ties and anchors.
6. Miscellaneous masonry accessories.

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to perform preconstruction testing indicated below. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense. The samples requiring testing indicated below shall be cast/formed at the same time from the same batches to establish a base line for each component and combination.

1. Concrete Masonry Unit Test: For each type of unit required, according to ASTM C 140 for compressive strength. Testing for each type of unit required shall be performed and dated within 180 days prior to the Notice to Proceed date.
2. Mortar Test (Compressive Strength): For each mix required, according to ASTM C 780. Testing for each mix required shall be performed and dated within 180 days prior to the Notice to Proceed date.
3. Grout Test (Compressive Strength): For each mix required, according to ASTM C 1019. Testing for each mix required shall be performed and dated within 180 days prior to the Notice to Proceed date.
4. Prism Test (Compressive Strength): For each combination of components required, (Concrete Masonry Units, Mortar, and Grout), according to ASTM C1314. Testing for each combination shall be performed and dated within 180 days prior to the Notice to Proceed date. For each combination perform two-7 day and three-28 day test for Concrete Masonry Unit and Mortar, no grout and each combination perform two-7 day and three-28 day test for Concrete Masonry Unit and Mortar, with grout, 10 total assemblies per combination required.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Preconstruction testing data and results.

C. Shop Drawings (include):

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement."
3. Reinforcing Bar Positioners. See Contract Documents for dimensional requirements.
4. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

1.6 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of the following:

1. Masonry units.
2. Cementitious materials. Include brand, type, component certifications and name of manufacturer.
3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Grout mixes. Include description of type and proportions of ingredients.
5. Reinforcing bars.
6. Joint reinforcement.
7. Anchors, ties, and metal accessories.

B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

C. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

C. Masonry Standard: Comply with TMS 402/602-16 unless modified by requirements in the Contract Documents.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry. Masonry units shall be placed on blocking or dunnage to prevent contact with soil and water.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

F. Steel Reinforcement: Deliver, store and handle steel reinforcement to prevent bending and damage. Steel reinforcement shall be placed on blocking or dunnage to prevent contact with soil or water.

1.9 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.

B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry

damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 402/602-16.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 402/602-16.

1.10 BUILD AMERICA, BUY AMERICA (BABA) REQUIREMENTS

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.11 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

1.12 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide square-edged units for outside corners unless otherwise indicated.

B. CONCRETE MASONRY UNITS: ASTM C 90.

1. Density Classification: Normal weight.
2. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.

C. Concrete Building Brick: ASTM C 55.

1. Density Classification: Normal weight.

1.13 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Masonry Cement: ASTM C 91.

D. Mortar Cement: ASTM C 1329.

E. Aggregate for Mortar: ASTM C 144.

F. Aggregate for Grout: ASTM C 404.

G. Cold-Weather Admixture: Non-chloride, non-corrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

H. Water: Potable.

1.14 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.

B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

1. Interior Walls: Mill- galvanized, carbon steel.
2. Exterior Walls: Hot-dip galvanized, carbon steel.
3. Wire Size for Side Rods: 0.148-inch diameter.
4. Wire Size for Cross Rods: 0.148-inch diameter.
5. Wire Size for Veneer Ties: 0.148-inch diameter.
6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.

7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

1.15 TIES AND ANCHORS

A. Adjustable Anchors for Connecting to Structural Steel Framing or Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1.16 MISCELLANEOUS ANCHORS

A. Anchor Bolts: Headed steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

B. Post-installed Anchors: Chemical anchors.

1. Load Capacity: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
2. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 unless otherwise indicated.
3. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

1.17 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Pre-molded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Reinforcing Bar Positioners: Cold-drawn steel wire conforming to ASTM A1064/A1064M. Wire positioner designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in position within cells. Wire Diameter 9 gauge (.148" or W1.7). Hot-dip galvanize after fabrication, ASTM A153/A153M-B2. Provide positioners designed for number of bars and size of bars indicated on Contract Documents. Hairpin Positioners are not permitted.

1.18 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the type of mortar as indicated on drawings.

C. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 3.2.1 in TMS 402/602-16 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C 476, paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 2 - EXECUTION

2.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

2.2 INSTALLATION, GENERAL

A. Build chases and recesses to accommodate items specified in this and other Sections.

B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

D. Masonry protection, cover the top of all unfinished masonry work to protect from moisture intrusion at the conclusion of work each day and during inclement weather producing precipitation.

E. Cold weather installation per the requirements of TMS 602, section 1.8C.

F. Hot weather installation per the requirements of TMS 602, section 1.8D.

2.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

2.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4-inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar before laying fresh masonry.

E. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.
2. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078400 "Firestopping."

2.5 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

2.6 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Place reinforcement not more than 16 inches O.C.
2. Place reinforcement not more than 8 inches O.C. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

2.7 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

2.8 LINTELS

A. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.

B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

2.9 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 402/602-16.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 402/602-16 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

2.10 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports in accordance with the International Building Code, Chapter 17. Contractor shall allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.

B. Mortar and Grout Verification. Contractor shall submit reviewed mix design for mortar and grout to the testing agency and the special inspection agency prior to commencement of work.

1. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140, Preconstruction only.
2. Mortar Test: For each mix provided, according to ASTM C 780. Provide one test per 10,000 sf of wall.
3. Grout Test: For each mix provided, according to ASTM C 1019. Perform test for each mix provided for each day's work. Provide one test per 5,000 sf of wall.
4. Prism Test: For each combination of components required, (Concrete Masonry Units, Mortar, and Grout), according to ASTM C1314, Preconstruction only.

C. Masonry preparation and placement:

1. Verify proportions of site-prepared mortar.
2. Verify masonry bearing surfaces are clean and free of debris.
3. Verify masonry units are clean, sound and dry.
4. Inspect placement of masonry units for:

   a. Nominal unit widths. Size and location of structural elements
   b. Layup. Stack or running bond as indicated on drawings.
   c. Thickness and tooling of mortar joints.
   d. Acceptable depth of furrowing of bed joints.
   e. Construction, expansion and contraction joints for location and continuity of reinforcement.
   f. Note temperature. Verify proper application of hot and cold weather requirements.
   g. Verify grout spaces are correctly sized and clean, cleanouts are closed after inspection and grout barriers are in place before grouting.

D. Masonry Reinforcement:

1. Inspect placement and alignment of vertical bars and dowels for size, grade, and spacing. Inspect length of lap splices, clearances between bars, clearances to masonry units and outside face of walls and positioning of reinforcement.
2. Inspect horizontal joint reinforcement and masonry reinforcement bars for size, length of lap splices, dowels, clearances between bars, clearances to masonry units and outside face of walls, and alignment.
3. Inspect the installation of masonry anchors, including other details of anchorage of masonry to structural members, frames or other construction, for type, size and location.
4. Verify all welding of reinforcing is in accordance with AWS D1.4. Verify proper joint preparation is provided and proper electrodes, properly dried and stored, are used. Verify weldability of reinforcing steel other than ASTM A706.

E. Verify proper grouting procedures are used, including consolidation to approved height of grout space, reconsolidation and vibration.

2.11 REPAIRING AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

C. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

2.12 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042200

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SECTION 04 22 23 – ARCHITECTURAL UNIT MASONRY

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes the following:

1. Architecturally styled concrete masonry units.

2. Colored mortar – bulk silo

3. Anchors, ties, reinforcing, insulation, masonry accessories, and concealed flashings.

4. Other items as specified herein or indicated on the Drawings.

B. Related Sections include the following:

1. Division 4 Section “Cast Stone Masonry”

2. Division 5 Section “Metal Fabrications”

3. Division 7 Section “Water Repellents”

4. Division 7 Section “Joint Sealants”

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Material Certificates: For each type and size of product indicated. For masonry units include data on material properties.

C. Shop Drawings:

1. Expansion Joints: provide layout of all joints to be provided in masonry walls.

2. Flashing: show layout of flashing, including preformed corners and end dam locations.

D. Samples: For verification purposes submit the following:

1. Manufacturer’s complete and current product data for each different masonry unit, accessory, and other manufactured product indicated, including certifications that each item and type complies with specified requirements.

a. Include instructions for handling, storage, installation, and protection.

2. Provide samples for initial selection purposes of the following:

a. Exposed masonry, showing full extent of colors and variations anticipated, for each standard and special shape unit.

b. Up to 3 different masonry / colored mortar selections shall be included for initial selection. Each to be laid with mortar selected in a 4'-0" x 4'-0" panel at the project site (3 total mockups). These are in addition to the exterior wall mockup required by Section 01 43 39. Mortar to cure on-site for a minimum of 28 days before selections will be made.

c. Once the initial masonry and mortar selection is made, these products are to be included in full size mock-up (refer to Quality Assurance).

1.3 QUALITY ASSURANCE

A. All work shall comply with the 2021 International Building Code (IBC 2021) and ACI 530.

B. Mockups: Prior to any permanent work or pre-installation conference, construct full sized mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Mockup to be representative of the finished work in all respects including masonry units, all anchors, connections, flashings, and sealants as accepted on the final shop drawings. Build mockups to comply with the following requirements, using materials indicated for the completed work:

1. Refer to Section 01 43 39 Mockups for additional information.

2. Include all accessories as specified herein including but not limited to insulation, thru wall flashing, and mortar drip collector.

3. Include expansion joint area for mock-up installation of sealants per Division 7 Section "Joints Sealants".

4. Use sample panel to test proposed cleaning and water repellent procedures.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

6. Obtain Architect's approval of mockups at the pre-installation meeting before starting <u>any</u> permanent work, including layout.

C. Pre-installation Meeting:

1. Prior to installation of any permanent work, but after the installation of the mock-up, a pre-installation meeting with the Architect, mason, and manufacturer's representatives (masonry units, mortar, accessories) shall convene to review at a minimum the following:

a. Project Manual, Detail Drawings, Manufacturer's Specifications and warranty requirements

b. Job and surface readiness, material storage and protection.

c. Review installation procedures and coordination required with related work.

d. Review of mock up as specified herein.

e. Review materials, preparation, installation, tolerances, protection, and coordination with other work.

f. Note deviations, differences or discrepancies.

g. Site conditions, project specific details, and other adverse conditions

2. Minutes shall be taken at the conference by the Contractor and distributed to all parties present. All outstanding issues shall be noted in writing designating the responsible party for follow-up action and the timetable for completion.

a. Installation of permanent work shall not proceed until all outstanding issues are completed and the mock up is approved fully in writing.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver masonry materials to project in undamaged condition.

B. Store and handle masonry units palleted, off the ground, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not place until units are in an air-dried condition.

C. Store cementitious materials and insulation off the ground, under cover, and in dry location.

D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

E. Store masonry accessories including metal items to prevent corrosion and accumulation of dirt and oil.

1.5 PROJECT CONDITIONS

A. Protection of Masonry:

1. During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day’s work. Cover partially completed masonry when construction is not in progress.

2. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

3. Where one wythe of multi-wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads

for at least 3 days after constructing masonry walls or columns.

C. Stain Prevention:

1. General: Prevent grout or mortar from staining the face of masonry to be left exposed. Remove immediately any grout or mortar in contact with exposed masonry before initial set.

2. Ground-Level Clay Staining Protection: Protect installed masonry at ground level from clay staining by maintaining a continuous perimeter 6 feet (6'-0") wide of sod as specified. This sod is intended as a temporary protective barrier only (not final landscaping) to prevent clay, soil, mud, or other materials from contacting and staining masonry and/or mortar. Maintain this protection until final landscaping or other permanent improvements adjacent to completed masonry work are in place.

   Provide sod continuously around the entire perimeter of the building, whether masonry occurs at that location or not.

   No exposed soil, clay, construction mud, or aggregate shall be permitted within this 6'-0" perimeter at any time after masonry installation. Removal, disturbance, or interruption of the protective sod for access, staging, utilities, or other construction activities shall not be permitted without prior written approval of the Architect.

   Masonry staining resulting from failure to maintain this protection shall be considered defective work and shall be cleaned, repaired, or replaced at no additional cost to the Owner.

3. Scaffolding and Temporary Access: Scaffolding, lifts, and other temporary access systems required for masonry installation shall be installed and operated in a manner that does not compromise the required 6'-0" protective perimeter. Scaffolding legs, base plates, wheels, outriggers, or similar components shall not bear directly on exposed soil or clay within this zone.

   Where scaffolding or access equipment must occur within the protective perimeter, provide continuous ground protection, such as plywood mats, temporary decking, or other approved rigid protection placed over sod or approved base material, to prevent soil disturbance, clay splash, or staining of adjacent masonry.

   Temporary removal or disturbance of protective sod for scaffolding or access shall require prior written approval of the Architect and shall include approved measures to maintain continuous protection of adjacent masonry. Masonry staining or discoloration resulting from scaffolding or access operations shall be considered defective work and shall be corrected at no additional cost to the Owner.

4. Horizontal Surfaces: Protect sills, ledges, and projections from droppings of mortar or grout.

5. Adjacent Finished Surfaces: Protect surfaces of window frames, door frames,

and similar components with painted or integral finishes from mortar droppings, staining, and other damage.

D. Clean Air Space: Prevent grout and mortar from occurring in, bridging, forming ledges, and/or filling air space between masonry and back up walls.

E. Cold-Weather Construction: When the ambient temperature falls below 40 degrees (4 degrees Celsius) comply with provisions of ACI 530, Specification for Masonry, for cold-weather construction and the following:

1. Do not lay masonry units that are wet or frozen.

2. Remove masonry damaged by freezing conditions.

F. Hot-Weather Construction: When the ambient temperature exceeds 90 degrees (32 degrees Celsius) comply with provisions of ACI 530, Specification for Masonry, for hot-weather construction.

G. Protect plastic insulation from exposure to sunlight and against ignition. Schedule delivery so that installation and concealment may be performed as rapidly as possible.

1.6 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. T This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 MANUFACTURERS (ARCHITECTURAL CONCRETE UNITS ONLY)

A. Saturn Materials, LLC – Basis of Design

B. Echelon, An Oldcastle Company

C. Angelus Block Co., Inc.

D. Equal as approved.

2.2 ARCHITECTURAL CONCRETE MASONRY UNITS

A. General / Appearance: Pre-finished, architectural concrete block meeting the requirements of ASTM C90. Provides the look of cast stone with manufactured masonry veneer advantages.

1. Basis of Design Product: Monarch Cored Brick 3-5/8”x3-5/8”x15-5/8” concrete masonry units, from Saturn Materials, LLC.

2. Color: As selected from manufacturers standard color range.

2.3 LINTELS

A. Provide and install lintels of steel and other materials where indicated.

1. Steel lintels are specified in Division 5 Section “Metal Fabrications” and/or “Structural Steel Framing”.

2.4 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C207, Type S.

C. Aggregate for Mortar: ASTM C 144.

D. Pigments: Conforming to ASTM C979. Comply with quantity limitations in referenced standards and from the pigment manufacturer.

E. Admixtures: Comply with quantity limitation specified ASTM C1384 “Standard Specification for Admixtures for Masonry Mortars” when adding to mortar.

1. Cold Weather: Comply with ASTM C494 “Standard Specification for Chemical Admixtures for Concrete.”

2. Integral Water Repellant: Liquid polymeric, admixture that does not reduce flexural bond strength

a. Basis of Design Product: “RainBloc Water Repellent Masonry Unit Admixture”, manufactured by ACM Chemistries, Inc.

F. Water: Potable. All water should be clean and free from organic material and deleterious amounts of dissolved acids, alkalies and salts.

2.5 MORTAR MIXES

A. Mortar must include manufacturer approved compatible integral water repellent additive added to each batch in the dosage rates for mortar type specified.

B. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.

2. Use portland cement-lime or masonry cement mortar unless otherwise indicated.

C. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

1. All mortar to be dispensed in bulk bags using on-site silo systems to ensure consistent mixes.

D. Mortar and Grout for Concrete Masonry Units:

1. Provide under Division 4 Section “Concrete Unit Masonry”.

E. Mortar for Architectural Unit Masonry:

1. Provide pre-blended mortar that meets or exceeds the requirements of ASTM C1714 Type N.

a. Manufacturer’s standard gray and colored mortar, preblended bulk bags dispensed in on-site silos, containing proportion mixture of Portland cement, hydrated lime, mortar/masonry cement, sand, color, and admixtures depending on condition from one of the following manufacturer’s:

(1) Ash Grove

(2) Holcim

(3) Cemex

b. Mortar Type 1: equal to Ash Grove Masonry N Pre Blended mortar

(1) Color as selected by Architect after approval of mock-up samples.

2.6 MASONRY ANCHORS AND TIES

A. Provide accessories from one of the following manufacturers:

1. Hohmann & Barnard

2. Wire-Bond

3. Quality Steel and Wire

B. Materials:

1. Anchors and Ties: Carbon Steel: To ASTM A366, hot-dip galvanized after fabrication to ASTM A153, Class B.

2. Wire: Carbon Steel: To ASTM A82, with zinc coating hot-dip galvanized after fabrication to ASTM A153.

   a. Tensile Strength: Not less than 80,000 psi (552 MPa).

   b. Yield Point: Not less than 70,000 psi (483 MPa).

3. Seismic Reinforcement Retaining Clip: Rigid polyvinyl chloride clip to ASTM D1781, ASTM D2240, ASTM D638, ASTM D790, with ridge to secure continuous wire in mortar and 3 additional ridges to secure masonry wire tie.

4. Anchor (and insulation) tape: Equal to Hohmann & Barnard's “X-Seal Transition Anchor Tape”.

   a. Provide at all locations where flexible anchors are secured thru to substrate using mechanical devices (screws).

   b. 3 inch wide tape consists of a reinforced polyolefin base, laminated to a polypropylene layer. Adhesive-backed with removable release liner.

   c. Manufactured from 45% post-industrial and/or post-consumer recycled material.

   d. Apply in continuous lengths only.

   e. Permeability:

      (1) MVTR: ASTM E96 - B <.075 Perms[1]

      (2) Air permeability: TAPPI-460 >5000 Sec/100cc

C. General:

1. Tie length required to extend approximately 2 inches into masonry. Provide heavier gauge ties if required for depth of cavity.

2. Provide “Seismic Reinforcement Retaining Clips” at end of all pintles. Clip shall engage a 9 ga. continuous pencil rod.

D. Flexible Anchors: Where masonry is indicated to be anchored to structural framework with flexible anchors, provide 2-piece anchors which will permit horizontal and vertical movement of masonry, but will provide lateral restraint.

1. Anchored to Structural Steel:

a. Equal to Hohmann & Barnard's "#359-FH Weld-on Ties" with "#VBT – Vee Byna-Tie"

(1) Provide ties in lengths as required.

b. Attach each anchor to structural steel by welding.

2. Anchored to CMU:

a. Equal to Hohmann & Barnard's "HB 213 S.I.S.", 14 gauge, with "HB-213 Adjustable Veneer Anchor Insulation Washer"

(1) Provide ties in lengths as required.

b. Attach each anchor to wall with expansion anchor as recommended by the manufacturer.

3. Anchored to concrete:

a. Hohmann & Barnard's "HB-5213 Adjustable Veneer Anchor" with "BL 523 Brass Expansion Bolt"
(1) Provide ties in lengths as required.

B. Finish for Masonry Anchors and Ties:

1. For interior locations, including devices which extend only into interior wythes of exterior masonry, fabricate from steel with mill galvanized finish complying with ASTM A641, Class 1 or 3; or hot-dip coating complying with ASTM A153, Class B-2.

2. For devices which extend into exterior wythe, fabricate from steel with hot-dip galvanized coating, ASTM A153, Class, B-2.

2.7 ACCESSORIES

A. Flashing for Masonry (Thru-Wall Flashing):

1. Provide flashing and accessories from one of the following manufacturers:

a. Sandell Construction Solutions

b. Advanced Building Products, Inc.

c. York Flashings

2. Provide concealed flashings, shown to be built into masonry, except that any

noted as stainless steel or other metal are specified in Division 7.

3. Flashing shall consist of a full, single sheet of 5 oz. copper sheet bonded with a proprietary rubber based adhesive, between two layers of fiberglass fabric weighing not less than 0.3 oz/ft2/layer with a minimum of 10x20 threads per inch.

   a. Equal to "Copper Fabric Flashing"; Sandell Construction Solutions

   b. Provide preformed corner and end dam assemblies per manufacturer. No field assemblies will be allowed.

4. Mastic shall be used while splicing copper flashings and spotted to vertical surfaces. When splicing, material should be coated with a yield of 30 square foot per gallon coverage.

   a. Equal to "Asphalt Trowel Mastic"; Sandell Construction Solutions

5. Drip Plate: 26 gauge, type 304 stainless steel with continuous 1/8 inch foam strip.

   a. Hohmann & Barnard's "FTSA"

   b. Provide manufacturer's preformed corners.

C. Mortar Drip Collector:

1. A fluid conducting, non-absorbant, mold and mildew resistant polyment mesh designed to prevent weephole blockage. Trapezodial shaped, formed at unequal heights.

   a. Equal to "Mortar Net with Insect Barrier" as manufactured by Mortar Net USA or approved equal.

   b. Material to be 10" tall x 5'-0" long x as thick as the air space shown in which the drip collector is being installed.

D. Weephole Vents:

1. UV stable, 90% open recycled polyester mesh weephole vents between units in the weep course.

   a. Equal to "Mortar Net Weep Vents" as manufactured by Mortar Net USA or approved equal.
   b. Architect to select color from manufacturer's full line of colors to match mortar color as specified herein.

E. Miscellaneous Masonry Accessories:

1. Masonry Cleaner: Equal to Prosoco "Sure Klean 600", EaCo Chem NMD 80, or equal. **Cleaners containing muriatic acid will not be accepted.**

   a. Manufacturer to confirm in writing that cleaner will not affect texture or color

of Architectural Masonry.

F. Cavity Insulation:

1. Extruded Polystyrene Board Insulation: Comply with ASTM C 578, Type IV, 25 psi minimum compressive strength, 1.55 lb/cu. ft.

a. Size: 16” wide x 96 inches long x thickness as indicated on Drawings.

b. Thermal Resistance: (180 day real-time aging as mandated by ASTM C578, measured per ASTM C 518 at mean temperature of 75F): R-5.0 per inch of thickness, with 90% lifetime limited warranty on thermal resistance.

c. Edge Condition: Square.

d. Surface Burning Characteristics (ASTM E 84): Flame spread less than 25, smoke developed less than 450, certified by independent third party such as Underwriters Laboratories (UL).

e. Insulation tape for ALL joints shall be as recommended by the manufacturer for a complete system.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that site conditions are properly prepared to receive Architectural concrete masonry units.

B. Verify that bearing elements are within tolerances conforming to the requirements of ACI 117.

C. Verify that locations of penetrations, projections and built-in items are correct and properly prepared for work specified in this section.

D. Verify Architectural concrete masonry units are according to project specification and meet appropriate ASTM specification requirements. Commencement of installation constitutes acceptance of Architectural Concrete Units.

E. Preparation: Prepare surfaces and materials in accordance with MSJC Specifications for Masonry Structures. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

F. Provide adequate lighting for masonry work by placing all lighting at a reasonable distance from the wall for even illumination.

3.2 PREPARATION

A. Proceed with installation only after substrate(s) are been properly prepared and within tolerances recommended by the manufacturer.

B. Commencement of installation constitutes acceptance of site conditions.

C. Draw blocks from more than one pallet at a time during installation.

D. Refer to NCMA TEK Notes, for hot and cold weather construction practices.

3.3 MORTAR BEDDING AND JOINTING

A. Mortar shall be dispensed in pre-blended (containing proportion mixture of Portland cement, hydrated lime, mortar/masonry cement, sand, and color depending on condition) 3000 lb bulk bags into an on-site silo system that charges the Masonry Contractor's mechanical batch mixer.

1. **No on-site batch control will be allowed – silos only.**

B. Once batch is charged into the batch mixer from the silo, add water and mix mortar to ensure homogeneity and workability. Hand mixing of the mortar is not permitted.

1. Observe mixing times of 4 - 5 minutes, consistent from batch to batch.

2. Use clean, potable water, add the maximum amount consistent with optimum workability.

3. Maintain a uniform water/cement ratio.

C. Rinse out mixer following each batch.

1. At the end of the day, thoroughly rinse the mixer to avoid contamination of future mortar batches.

D. Do not use mortar which has begun to set, and discard if more than 2 1/2 hours has elapsed since initial mixing.

1. Retemper mortar during this time by adding additional mixing water only to replace water lost due to evaporation.

2. **Do not retemper colored mortars.**

3.4 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as

recommended by flashing manufacturer.

2. At lintels, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.

3. Install flashings with 6 inch minimum lap at splices. Bond to slab, and seal at penetrations and interruptions with mastic.

4. Thru wall flashings shall extend a minimum of 6” above the top of the Mortar Drip Collector Material.

C. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Use specified weep/vent products to form weep holes.

2. Space weep holes 24 inches o.c. unless otherwise indicated.

3. Install a minimum of two weep hole inserts above openings less than 5’-4” wide.

4. Provide at next to top course to ensure proper cavity ventilation.

D. Place cavity drainage material in cavities per the following:

1. To prevent mortar bridging between the outer wythe and inner wall, install flashing extending from the bottom of the drainage material to at least 6" above the top of the drainage material.

2. Lay the first one (1) or two (2) courses at flashing level, then install drainage material continuously by placing it against the inside of the openings. No fasteners or adhesives are required.

3.5 EXPANSION JOINTS

A. Provide vertical expansion and isolation joints in masonry where indicated on Drawings. Build in related masonry accessory items as the masonry work progresses.

1. See Division 7 Sections “Joint Sealants”.

B. Provide compressible filler per Division 7 Section “Joint Sealants” at the top of the walls and the underside of any fixed angles.

3.6 INSTALLATION

A. Cutting: Make all unit cuts, including those for bonding, holes, boxes, etc., with motor-driven masonry saws, using either an abrasive or diamond blade. Cut neatly and locate for best appearance.

B. Architectural Concrete Masonry Units:

1. Install concrete masonry units in accordance with industry accepted masonry practices and manufacturer's instructions.

2. Bond Pattern: As indicated on Construction Drawings.

3. Do not use masonry units with broken corners and edges in excess of ASTM C90 and ASTM C1634.

4. Supporting and Forms: Construct forms as needed to adequately and safely support installed concrete masonry units until mortar has cured.

C. Mortar Bedding and Jointing:

1. Lay units with full mortar coverage on head and bed joints taking care not to block cores to be grouted or filled with masonry insulation.

2. Tool all joints into a concave configuration when mortar is thumbprint hard.

3. Remove mortar from the face of masonry units before it sets.

4. Tuckpoint joints of scored units for proper appearance and to prevent water penetration. Rake joints are not permitted and will be considered defective work.

D. Flashing: Install flashing at locations shown in the plans and in strict accordance with Construction Drawings, manufacturer’s instructions and accepted best practices for masonry flashing.

E. Weeps and Vents: Install weep holes and vents at proper intervals at courses above grade and at any water stops over windows, doors and beams. Consult NCMA TEK notes for proper flashing and drawings.

3.7 INSPECTION

A. Faces must conform to the requirements of ASTM C90 when viewed from twenty (20) feet at right angles to the wall with normal lighting.

B. Keep work surfaces clean during installation. Use brushes, rags and burlap to remove excess mortar lumps and smears prior to hardening on the finished surfaces.

3.8 CLEANING OF MASONRY

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. General:

1. **All cleaning methods are to be verified for compliance by the Architect prior to use. Do not start cleaning until all trades adjacent to area to be cleaned have signed off on preparation and protection of their surfaces.**

2. Apply with a standard water hose nozzle (jet nozzles not allowed). Apply using a circular application pattern and maintain an adequate and consistent distance.

PRESSURE WASHERS WILL NOT BE ALLOWED AS A MEANS OF APPLYING OR CLEANING.

a. **Do not hold the spray nozzle closer than 8” to the wall.**

C. Pre-Cleaning:

1. Prior to cleaning masonry, all large mortar droppings should be removed within 24 hours of laying with stiff bristled nylon or natural bristle brushes. Cleaning should begin 21 to 28 days with type N, after laying the masonry.

D. Cleaning:

1. Saturation: Thoroughly saturate all masonry with water before applying any cleaning product.

2. Clean:

a. Use a cleaning solution as specified herein and procedure recommended by the manufacturer.

b. Apply the cleaning solution as recommended. The cleaning solution should remain on the masonry 3 to 6 minutes before proceeding to the next step. Clean the masonry starting at the top and working down, being sure to keep areas below the cleaning area saturated with water.

c. Do not allow the cleaning chemicals to dry on the masonry.

3. Rinse:

a. Thoroughly rinse all masonry with water to remove the cleaning compound. It is vital that all chemicals used in cleaning be rinsed out of the masonry before they dry in place.

b. Begin at the top of the masonry and work down using two or three passes. Be certain all “dirty” water is flushed all the way to the ground and does not stay on the masonry.

END OF SECTION

SECTION 04 72 00 – CAST STONE MASONRY

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes custom cast architectural cast stone units as indicated on the Drawings (panels, caps, copings, sills, etc.).

B. Coordinate with structural drawings for embedded anchors or dowels.

C. Related Sections include the following:

1. Division 4 Section “Architectural Unit Masonry”

2. Division 7 Section “Water Repellents”

3. Division 7 Section “Joint Sealants”

4. Division 7 Section “Sheet Metal Flashing and Trim”

1.2 REFERENCES

A. ACI 318 - Building Code Requirements for Reinforced Concrete.

B. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

C. ASTM C 33 - Standard Specification for Concrete Aggregates.

D. ASTM C 150 - Standard Specification for Portland Cement.

E. ASTM C 270 - Standard Specification for Mortar for Unit Masonry.

F. ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete.

G. ASTM C 642 - Standard Test Method for Specific Gravity, Absorption, and Voids in Hardened Concrete.

H. ASTM C856 – Standard Practice for Petrographic Examination of Hardened Concrete.

I. TMS 402/602 references for installation standards.

J. ASTM C 979 - Standard Specification for Pigments for Integrally Colored Concrete.

K. ASTM C 1194 - Standard Test Method for Compressive Strength of Architectural Cast Stone.

L. ASTM C 1195 - Standard Test Method for Absorption of Architectural Cast Stone.

M. ASTM C 1364 - Standard Specification for Architectural Cast Stone.

N. ASTM D 2244 - Standard Test Method for Calculation of Color Differences From Instrumentally Measured Color Coordinates.

O. Cast Stone Institute Technical Manual.

1.3 DEFINITIONS

A. Cast Stone: Highly refined architectural concrete stone product manufactured to simulate fine grain texture of natural stone.

B. Vibrant Dry Tamp (VDT) Casting Method: Vibratory ramming of damp, zero-slump concrete against rigid formwork until it is densely compacted and ready for immediate removal from form.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product data.

B. Shop Drawings: Submit manufacturer's shop drawings including profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, annotation of components, and their locations in project as indicated on the drawings.

C. Verification Samples: Submit pieces of actual Cast Stone components, 12 inches square, illustrating range of color and texture to be anticipated in components furnished for project.

D. Test Results: Submit manufacturer's test results of Cast Stone components made previously by manufacturer using materials from same sources proposed for use in project.

E. Mockup: Provide mockup of minimum 6 ft long coping on CMU/concrete brick masonry illustrating color, jointing, mortar, flashing, weeps, sealant, and workmanship for Architect approval prior to production.

1.5 QUALITY ASSURANCE

A. Standards: Comply with requirements of Cast Stone Institute Technical Manual.

B. Installer Qualifications: Installer shall have a minimum of 5 years of experience in cast stone work of similar scope.

C. Fabricator Qualifications: Fabricator shall be a current Producer Member of the Cast Stone Institute

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Deliver Cast Stone components secured to shipping pallets and protected from damage and discoloration.

2. Each edge of the pallet shall be protected by a pre- molded edge protector and covered with a clear plastic wrap.

3. Number each custom piece individually to match shop drawings and schedules.

4. Each unit shall be protected by a plastic protective layer.

B. Storage:

1. Store Cast Stone components and installation materials in accordance with manufacturer's instructions.

2. Cast Stone components shall be stored in single stacks on pallets on level ground and covered with nonstaining, waterproof covers.

3. Ventilate under covers to prevent condensation.

4. Prevent contact with dirt.

C. Handling: Protect Cast Stone components during handling and installation to prevent chipping, cracking, or other damage.

1.7 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Custom Units:

1. Continental Cast Stone
2. Reading Rock (Custom Cast)
3. Midwest Cast Stone
4. Capital Cast Stone

2.2 CUSTOM CAST STONE UNITS

A. Cast Stone: ASTM C 1364

1. Casting Method: Vibrant Dry Tamp.
2. Compressive Strength, ASTM C 1194: 6,500 psi minimum at 28 days.
3. Absorption, ASTM C 642 or C 1195: 6 percent maximum at 28 days.
4. Air Content Limit, ASTM C173: Air content not to exceed 6 percent.
5. Freeze-Thaw Durability: Demonstrate satisfactory performance when tested per ASTM C666, Procedure A, minimum 300 cycles, no scaling or cracking.

B. Materials:

1. Portland Cement: ASTM C 150, Type I, white or gray as required to match specified color.
2. Coarse Aggregate: ASTM C 33, except for gradation; granite, quartz, or limestone.
3. Fine Aggregate: ASTM C 33, except for gradation; natural or manufactured sands.
4. Pigments: ASTM C 979, inorganic iron oxides.
5. Admixtures:

a. ASTM C 494.

b. Integral water repellants and other chemicals for which no ASTM standard exists. Previously established as suitable for use in concrete by

proven field performance or through laboratory testing.

c. Admixtures: Calcium chloride admixtures are not allowed.

6. Water: Potable.

7. Reinforcing Bars: ASTM A 615/A 615M, stainless steel or epoxy coated.

C. Surface Texture:

1. Fine grained texture, similar to natural stone.

2. No bugholes, air voids, or other surface blemishes.

D. Color:

1. Color as selected by Architect – provide minimum of 8 color variations to choose from.

E. Color Variation:

1. Viewing Conditions: Compare in direct daylight at 10 feet, between components of similar age, subjected to comparable weathering conditions.

2. Maximum Variation, ASTM D 2244:

a. Hue: 2 units.

b. Lightness, Chroma, and Hue Combined: 6 units.

2.3 ACCESSORIES

A. Mortar: Provide colored mortar to match cast stone. Submit samples for approval.

1. Mortar to be Type S – TMS 602 Table 2, 1800 psi, severe weather exposure

B. Anchors: Non-corrosive type, sized for conditions. Type 304 stainless steel. Strap anchors or other type as recommended by cast stone manufacturer for each individual piece of stone. Indicate on shop drawings all locations.

1. Where indicated to receive split tail anchor, provide Hohmann & Barnard's "2-Seal Stone Anchor (Split-Tail)" in 304 stainless steel finish (lengths as required for thickness of cavity and insulation).

2. Provide Hohmann & Barnard's "#441 Stone Anchor" in 304 stainless steel finish where indicated.

C. Flashing Coordination: Reference Division 7 – Sheet Metal Flashing.

D. Weep tubes: as specified in Division 4 Section "Natural Stone Veneer". Provide minimum 2 per cast stone section where occurring in cavity walls.

E. Sealant: Provide color matched sanded sealant at all locations.

1. Installation of all sealants per Division 7 Section “Joint Sealants”.

F. Cleaner:

1. Manufacturer's standard-strength, general-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces.

2. Expressly approved for intended use by Cast Stone manufacturer and expressly approved by cleaner manufacturer for use on Cast Stone and adjacent masonry materials.

3. No acid or acid-based solutions shall be used.

2.4 CUSTOM CAST STONE UNIT FABRICATION

A. NO FIELD CUT UNITS WILL BE ALLOWED UNLESS SPECIFICALLY ALLOWED BY ARCHITECT (AND NOTED ON SHOP DRAWINGS).

B. Shapes: Unless otherwise indicated on drawings, provide:

1. Suitable wash on exterior sills, copings, projecting courses, and components with exposed top surfaces.

2. Drips on projecting components, wherever possible. Drip edge size to be ½” minimum projection.

C. Reinforcement:

1. As required to withstand handling and structural stresses.

2. Comply with ACI 318.

3. Minimum of 0.25 percent of cross-sectional area of panels which exceed 12 inches in width.

4. Minimum Reinforcing Cover: Twice diameter of reinforcing bars.

D. Curing:

1. Cure Cast Stone components with a direct fired steam generator at a minimum temperature of 105 degrees F (41 degrees C) for a minimum of 6 hours, within 12 hours of fabrication.

2. Cure Cast Stone components in presence of carbon monoxide and carbon dioxide to promote carbonation at surface, to minimize efflorescence.

E. Finishing: Remove cement film from exposed surfaces before packaging for shipment.

F. Tolerances: Fabricate Cast Stone components within tolerances in accordance with Cast Stone Institute Technical Manual, unless otherwise specified.

1. Dimensions: Plus or minus 1/8 inch.

2. Maximum Bow, Camber, or Twist: Length/360.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine construction to receive Cast Stone components. Notify Architect if construction is not acceptable. Do not begin installation until unacceptable conditions have been corrected.

B. Examine Cast Stone components for fit and finish before installation. Do not install unacceptable components.

C. The facing shall be free from chips, cracks, crazes or any other imperfection that would detract from the overall appearance of the finished wall. Architect has final judgment on appearance.

3.2 INSTALLATION

A. General: Install Cast Stone components in conjunction with materials specified in Division 4 Section “Concrete Unit Masonry”.

B. Comply with TMS 602 Article 3.3 and Cast Stone Institute Technical Bulletin #54.

C. Hot/Cold Weather Masonry Requirements: TMS 602 Article 1.8.

D. Shimming Restrictions: Use non-corrosive stainless or plastic shims only.

E. **NO FIELD CUT UNITS WILL BE ALLOWED UNLESS SPECIFICALLY ALLOWED BY ARCHITECT (AND NOTED ON SHOP DRAWINGS).**

F. **DO NOT USE CHALK OR PENCIL FOR MARKING AT ANY EXPOSED SURFACES.**

G. Setting:

1. Drench Cast Stone components with clear, running water immediately before installation.

2. Do not use pry bars or other equipment in a manner that could damage Cast Stone components.

3. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

4. Set Cast Stone components in a full bed of mortar, unless otherwise indicated on the drawings.

5. Fill vertical joints with mortar.

6. Make joints 3/8 inch, unless otherwise indicated on the drawings.

7. Leave head joints in copings and similar components open for sealant.

8. Rake mortar joints 3/4 inch for pointing. Sponge face of each stone to remove excess mortar.

9. Tuck point joints to a slight concave profile.

10. Provide weepholes at 24 inches o.c.

H. Sealant Joints:

1. Comply with requirements of Division 7 Section “Joints Sealants”.

2. Prime ends of Cast Stone components, insert properly sized foam backing rod, and install sealant using sealant gun.

3. Provide sealant joints at following locations and as indicated on the drawings.

a. Cast stone components with exposed tops.

b. Joints at relieving angles.

c. Control and expansion joints.
d. Other locations where recommended by Cast Stone Institute (Tech Bulletin #43).

3.3 TOLERANCES

A. Installation Tolerances: Comply with requirements of Cast Stone Institute Technical Manual.

1. Variation from Plumb: Do not exceed 1/8 inch in 5 feet or 1/4 inch in 20 feet or more.

2. Variation from Level: Do not exceed 1/8 inch in 5 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.

3. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch or 1/4 of nominal joint width, whichever is greater.

4. Variation in Plane Between Adjacent Surfaces: Do not exceed 1/8-inch difference between planes of adjacent components or adjacent surfaces indicated to be flush with components.

3.4 REPAIR

A. Surface Repair:

1. Repair any chipping and other surface damage noticeable when viewed in direct daylight at 10 feet.

    a. Any repair over 1/2 inch is not allowed. Replace damaged piece at no cost to the Owner. Feather-edge patches are not permitted.

2. Repair with matching touchup material provided by manufacturer and in accordance with manufacturer's instructions.

3. Repair methods and results to be approved by Architect. If repairs are not satisfactory in function and appearance, the piece shall be replaced at no cost to the Owner..

3.5 PROTECTION

A. Protect Cast Stone components from splashing and other damage.

B. Protect installed work with non-staining coverings until Substantial Completion.

3.6 CLEANING

A. In-Progress Cleaning:

1. Clean Cast Stone components as work progresses.

2. Remove mortar fins and smears before tooling joints.

3. Do not use pressure washing exceeding 400psi or acidic cleaners.

B. Final Cleaning:

1. Clean exposed Cast Stone, after mortar is thoroughly set and cured.

2. Cleaner:

    a. Wet surfaces with water before applying cleaner.
    b. Apply cleaner to Cast Stone in accordance with manufacturer's instructions.
    c. Remove cleaner promptly by rinsing thoroughly with clear water.

END OF SECTION

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Structural steel.

2. Grout.

B. Related Requirements:

1. Section 05 31 00 "Steel Decking" for field installation of shear connectors through deck.

2. Section 05 50 00 "Metal Fabrications" for steel lintels, steel grating and shelf angles not attached to structural-steel frame miscellaneous steel fabrications and other steel items not defined as structural steel. Reference for hot dip galvanizing as indicated on Contract Documents.

3. Section 09 90 00 "Paints and Coatings" for surface-preparation and priming requirements.

1.3 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.

2. Include embedment Drawings.

3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.

4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pre-tensioned and slip-critical, high-strength bolted connections.

C. Delegated-Design Submittal: For structural-steel connections indicated to comply with design loads, include analysis data certified by the qualified professional engineer responsible for their preparation, licensed in the State of Mississippi.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural steel, including chemical and physical properties.

E. Product Test Reports: For the following:

1. Bolts, nuts, and washers including mechanical properties and chemical analysis.

2. Tension-control, high-strength, bolt-nut-washer assemblies.

3. Shear stud connectors.

4. Shop primers.

5. Non-shrink grout.

F. Survey of existing conditions.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.

2. AISC 341 and AISC 341s1.

3. AISC 360.

4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.

2. Clean and re-lubricate bolts and nuts that become dry or rusty before use.

3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.9 BUILD AMERICA, BUY AMERICA (BABA) REQUIREMENTS

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple shear connections required by the Contract Documents.

1. Select and complete connections using schematic details indicated and AISC 360.

2. Use Load and Resistance Factor Design; data are given at service-load level.

3. Provide a minimum of two bolts per connection or bolts required for minimum of 3/4 depth of member or indicated load, which ever is greater.

B. Moment Connections: Type FR, fully restrained.

2.2 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M, unless noted otherwise.

B. Channels, Angles-Shapes: ASTM A 36/A 36M, unless noted otherwise.

C. Plate and Bar: ASTM A 36/A 36M.

D. Hollow Structural Sections: ASTM A 500/A 500M, Grade C, structural tubing.

E. Steel Pipe: ASTM A 500, Grade C.

F. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563,

Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers with plain finish.

C. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, round head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.

D. Anchor Rods: ASTM F 1554, Grade as indicated.

1. Configuration: Straight.

2. Nuts: ASTM A 563 heavy-hex carbon steel.

3. Plate Washers: ASTM A 36/A 36M carbon steel.

4. Washers: ASTM F 436, Type 1, hardened carbon steel.

5. Finish: Plain.

2.4 PRIMER

A. Primer: SSPC-Paint 25, Type I, zinc oxide, alkyd, linseed oil primer.

2.5 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.

3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.

4. Mark and match-mark materials for field assembly.

5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, "Hand Tool Cleaning."

F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.

2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.

2.7 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.8 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.

2. Surfaces to be field welded.

3. Surfaces to receive welded headed studs.

4. Surfaces of high-strength bolted, slip-critical connections.

5. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.9 HOT-DIP GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.

1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
2. Galvanize lintels, shelf angles and all exposed structural steel framing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Baseplates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.

2. Weld plate washers to top of baseplate.

3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.

4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened, unless otherwise noted.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Testing and Inspecting: A Special Inspector shall be employed by the Owner to perform inspections per Section 1704 and Section 1705 in accordance with the International Building Code. Special Inspection for structural steel shall be in accordance with the quality assurance inspection requirements of AISC 360. A Testing Agency shall be employed per Section 1703 in accordance with the 2018 International Building Code to perform field tests as required and outlined in the Contract Documents.

B. Inspect the steel frame and joint details for compliance with the Contract Documents.

1. Verify material identification for structural steel conform to AISC 360 criteria or other specified standards.

2. Member placement.

3. Application of joint details at each connection.

4. Bracing and stiffening details.

C. High Strength Bolting:

1. Verify material identification of bolts, nuts and washers with specified ASTM requirements. Review manufacturer’s Certificate of Compliance.

2. Inspect bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

3. Visually inspect bolt installation for all of bolted connections for general conformance with the Contract Documents. Confirm that all plies of connected elements have been brought into contact.

4. Test bolt tightening in ten percent (10%) of all slip critical and pre-tensioned bolts. Test a minimum of two (2) bolts in each connection. Verify that all tips are removed from “twist-off” bolts and direct tension indicators are properly installed.

D. Welding:

1. Verify qualifications of welders as AWS certified.

2. Verify material identification of weld filler materials conform to AWS specifications. Review manufacturer’s Certificate of Compliance

3. Verify proper weld procedures are being applied.

4. Verify adequate preparation of faying surfaces.

5. Verify preheat and inter-pass temperatures of steel, proper technique and sequence of welding, cleaning and number of passes are provided as required.

6. Visually inspect all fillet welds, plug or slot welds for size, length and quality in accordance with AWS D1.1.

7. Test 25% of all complete and partial penetration welds in accordance with the requirements of AWS D1.1 using Ultrasonic Inspection (ASTM E164). . Test each root layer of all tested complete and partial penetration welds using Magnetic Particle Inspection (ASTM E709), Liquid Penetrant Inspection (ASTM E165), or another acceptable NDT procedure.

8. Shear Stud Connector welds. Inspect size, number, placement and welding of all shear connectors. Visually inspect 100% of installed studs for full 360-degree flash. Ring test all shear connectors with a 3 lb hammer. Test all questionable studs, not showing full 360-degree flash, by bending studs 15 degrees from vertical away from the weld discontinuity in accordance with AWS D1.1. Randomly test all other studs by bending to 15 degrees from vertical.

9. Miscellaneous fasteners. Visually inspect all fasteners for specified size, spacing, embedment and location.

END OF SECTION 05 12 00

ECTION 05 31 00 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Composite floor deck.

B. Related Requirements:

1. Section 03 30 00 "Cast-in-Place Concrete" for normal-weight and lightweight structural concrete fill over steel deck.

2. Section 05 50 00 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of steel deck.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

C. Steel deck shall be placed on blocking or dunnage to prevent contact with soil and water.

1.7 BUILD AMERICA, BUY AMERICA (BABA) REQUIREMENTS

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

PART 2 - PRODUCTS

2.1 STEEL DECK

A. Composite Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 30, and with the following:

1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 50 minimum, G90 zinc coating.

2. Deck Profile, Depth, Attachment and Uncoated-Steel Thickness: As indicated.

3. Span Condition: Double span (minimum).

4. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.2 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

D. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

E. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth.

F. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

G. Galvanizing Repair Paint: ASTM A 780.

H. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install floor and composite deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Locate deck bundles to prevent overloading of supporting members.

C. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

D. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

E. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

F. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

G. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

3.3 DECK INSTALLATION

A. Fasten deck panels to steel supporting members as indicated on drawings.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports as indicated on drawings, but at intervals not exceeding 1/2 of the span.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 2 inches, with end joints as follows:

1. End Joints: Lapped 2 inches minimum.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 6 inches apart with at least one fastener at each corner.

E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

3.4 FIELD QUALITY CONTROL

A. Testing and Inspecting: A Special Inspector shall be employed to perform inspections per Section 1704 and Section 1705 in accordance with the International Building Code. A Testing Agency shall be employed per Section 1703 in accordance with the 2018 International Building Code to perform field tests as required and outlined in the Contract Documents.

1. Verify work is completed in accordance with the approved Contract Drawings and Shop Drawings in terms of;

a. Component placement and location.

b. Connection and anchorage details.

2. Visually inspect 100% of the metal deck arc spot (puddle) welds for size and quality in accordance with AWS D1.1 and AWS D1.3.

3.5 PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on top surface of prime-painted deck immediately after installation, and apply repair paint.

1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.

C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 31 00

SECTION 05 41 00 - COLD-FORMED STEEL STUD FRAMING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes cold formed (structural) interior and exterior metal studs and framing, including all engineering of framing and accessories.

B. Provide cold formed metal framing at interiors where framing heights exceed 14'-0".

C. Related Sections include the following:

1. Division 9 Section "Non-Structural Metal Framing"

1.2 REFERENCES

A. AISI S100-07 – North American Specification for the Design of Cold-Form Steel Structural Members.

B. AISI S200-07 – North American Standard for Cold-formed Steel Framing – General Provisions.

C. ANSI Z49.1 – Safety in Welding, Cutting, and Allied Processes.

D. ASTM A653 – Standard Specification for Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

E. ASTM A924 – Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

F. AWS D1.3 – Structural Welding Code: Sheet Steel.

G. SSMA – Steel Stud Manufacturers Association Product Technical Information.

1.3 DESIGN REQUIREMENTS

A. Design of the cold form steel framing is a delegated design. The General Contractor shall obtain the services of cold form metal Specialty Engineer licensed in the State of Mississippi. Delegated design to include:

1. Cold-formed interior steel studs including tracks, bridging, window and door framing.

2. Any required temporary and permanent restraint/bracing.

3. Connections of cold form members for the completed system including connections to the structure.

B. Design criteria includes, but not limited to, the following:

1. Deflection of steel studs shall not exceed L/600.

2. Wind pressure for Components and Cladding as indicated in the Structural Notes and wind pressure diagrams.

C. Cold-formed steel design, fabrication and erection shall conform to AISI S100 and AISI S200.

D. Stud depth, layout and configuration of cold-formed interior and exterior framing members shall be compatible with the plans, sections, and details of the Construction Documents.

1.4 BUILD AMERICA, BUY AMERICA (BABA) REQUIREMENTS

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered.**

1.5 SUBMITTALS

A. Shop Drawings

1. Shall include the following:

a. Plans, cross-sections, or elevations as necessary to adequately depict component locations.
b. Connection details showing screw types and locations, weld lengths or other fastener requirements.
c. Bracing locations and details. Any required bracing to the primary structure that is not shown in the Construction Documents shall be specifically identified.

2. Design load criteria.

3. Shall be signed and sealed by an Engineer licensed in the State of Mississippi.

B. Submit manufacturer's product information clearly describing quality, performance and finish for steel studs.

C. Submit signed and sealed calculations of the cold form steel framing design signed and sealed by an Engineer licensed in the State of Mississippi.

D. Submit manufacturer and Installer qualifications.

1.4 QUALITY ASSURANCE

A. Manufacturer shall have a minimum of three years documented experience in the manufacturing of products required by the Construction Documents.

B. Installer shall have a minimum of three years documented experience.

PART 2 PRODUCTS

2.1 MATERIALS

A. Studs and accessories which are 12, 14, or 16 gage shall meet the requirements of ASTM A446, Grade D with a minimum yield of 50,000 psi. Studs and accessories which are 18 or 20 gage shall meet the requirements of ASTM A446, Grade A with a minimum yield of 33,000 psi.

B. Studs and accessories shall have a G60 galvanized coating meeting the requirements of ASTM A525.

2.2 ACCESSORIES

A. Bridging: 1-1/2-inch deep by 16 gage minimum.

B. Strap Bracing: Minimum of 1-1/2-inch wide by 18 gage unless noted otherwise.

C. Tracks: Deep leg type, unpunched, same gage, size, and finish as studs with minimum 18 gage thickness.

D. Compensation Tracks / Slip Tracks: Deep leg type with a flange width of 2½ inches. Track shall be same nominal depth as stud/track with allowance for slip of standard deep leg track. Minimum 14 gage.

E. Plates, Gussets, Clip Angles: Minimum 14 gage. Clip angles shall be a minimum of 2 inches x 2 inches.

F. Self-drilling, Self-tapping Screws: Hot-dip galvanized conforming to values given in the referenced SSMA document.

G. Anchorage Devices:

1. Powder Actuated Fasteners shall be manufactured from AISI 1062 or AISI 1065 steel austempered to a minimum core hardness of 50-54Rc and possess the following properties:
   Tensile strength = 270,000 psi
   Shear strength = 162,000 psi
   All fasteners shall meet the requirements of ASTM B-633-78.
   Fasteners shall be a minimum 9/64-inch diameter.
   Fasteners shall be zinc plated.
   Fastener minimum design values shall be in accordance with manufacturer's recommendations.

2. Expansion anchors shall be stud type, and shall be zinc plated in accordance with ASTM B633, Type III Fe/Zn 5. Expansion anchors shall be a minimum of 3/8-inch diameter with 2-1/2-inch embedment into concrete unless noted otherwise in the Drawings.

H. Welding: AWS D1.3-8 Structural Welding Code-Sheet Metal (field welding of material shall not be permitted for 20 gage material or thinner).

I. Acoustical Sealant: USG, or approved equal.

J. Sizes and thicknesses are minimum acceptable, regardless of load. Actual sizes shall be determined by Steel Stud manufacturer in accordance with loads given in the Structural Notes. Minimum listed size shall not be construed to be the actual designed component size.

PART 3 EXECUTION

3.1 ERECTION

A. General:
1. Framing components shall be cut squarely for attachment to perpendicular members or, as required, for angular fit against abutting members.
2. Erect framing plumb, level, and square.
3. Studs shall be plumbed, aligned, and securely attached to the flanges or web of both the upper and lower tracks.
4. Fastening of components shall be with self-drilling screws or welds. Wire tying of components shall not be permitted. Touch-up field welds and scratched or damaged finish to studs with zinc rich paint.
5. Splices in framing components shall not be permitted other than in runner tracks.
6. Runner tracks shall be securely anchored to the supporting structure.

B. Studs Spacing: Stud manufacturer shall determine stud spacing at interior and corner zones to resist Component and Cladding Loads given in the Structural Notes. Stud spacing shall not exceed 16 inches, center-to-center, regardless of design loads.

C. Stud Tracks: Before installing stud tracks for exterior walls, apply two 1/2- inch round beads of acoustical sealant longitudinally under stud tracks to seal runner to floor.

D. Door Openings: Install multiple studs each side of door openings as required to resist design loads.

1. Install multiple studs horizontally between door jambs at top of doors as required to resist design loads.
2. On top of headers, install runners to receive bottom ends of studs over door openings.

E. Between Studs: Install framing for attachment of electrical boxes, mechanical and for other items to be anchored to walls.

F. At Butting Walls: Place studs not more than 2 inches from walls.

G. Insulation: In all multiple jamb studs and multiple headers not accessible to insulation contractors, insulation equal to that specified elsewhere shall be provided.

END OF SECTION

SECTION 05 50 00 – METAL FABRICATIONS

PART 1 – GENERAL

1.1 SUMMARY

A. Definition: Metal fabrications include items made from iron and steel shapes, plates, bars, strips, tubes, pipes and castings which are not a part of structural steel or other metal systems specified elsewhere. Among items included are:

1. Steel lintels (galvanized)
2. Steel weld plates and angles
3. Miscellaneous steel
4. Overhead sectional door head and jamb plates/angles – galvanized
5. Steel weld plates and angles
6. Stainless steel miscellaneous fabrications, including pipe beams, brackets, plates, angles, trim, embeds, anchors, and exposed supports at cantilevered sunshades and other locations exposed to weather, moisture, or public contact, as indicated.

B. Related Sections include the following:

1. Division 5 Section “Structural Steel Framing”
2. Division 9 Section “Painting and Coating”
3. Division 10 Section” Cantilevered Sunshades”

1.2 SUBMITTALS

A. Product Data: Submit manufacturers' product data of all manufactured items and products.

B. Shop Drawings:

1. Submit shop drawings for fabrication and erection of miscellaneous metal fabrications. Include plans, elevations and details of sections and connections. Show anchorage and accessory items. Provide templates for anchor and bolt installation by others.

a. Detailing Requirements: Detail steel components and items to be galvanized in accordance with applicable requirements of ASTM A384 and ASTM A385. Detail and fabricate work with suitable drain and vent holes to provide positive drainage and to prevent trapping of moisture and stagnant air.

1.3 QUALITY ASSURANCE

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrications where possible. Do not delay job progress; allow for trimming and fitting where taking field measurements before fabrication might delay work.

B. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitation. Clearly mark units for reassembly and coordinated installation.

1.4 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 MATERIALS

A. Ferrous Metals:

1. Metal surfaces, General: For Fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.

2. Steel Plates, Shapes and Bars: ASTM A36

3. Steel Tubing: Cold formed, ASTM A500; Class A or B.

4. Steel Pipe: ASTM A53; black finish, unless galvanizing is indicated; standard weight (Schedule 40), unless otherwise indicated.

5. Stainless Steel Sheet, Plate, Bars, Shapes, and Tubing:

    a. A240/A240M (plate, sheet), ASTM A276/A276M (bars and shapes), ASTM A554 (mechanical tubing), ASTM A312 (pipe), as applicable.

    b. Alloy/Grade: Type 316 for exterior exposure, coastal environments, high-humidity locations, or where corrosion resistance is critical. Type 304 for interior, dry locations unless otherwise indicated.

    c. Finish: Exposed stainless steel: No. 4 brushed finish unless otherwise indicated. Concealed stainless steel: Mill finish acceptable.

B. Nonferrous Metals:

1. Aluminum Extrusions: ASTM B 221, alloy 6063-T6.

2. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, alloy 6061-T6.

3. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

C. Fasteners:

1. General: Provide stainless steel fasteners for:
    a. Exterior installations
    b. Stainless steel fabrications
    c. Aluminum fabrications
    d. Locations subject to moisture, condensation, or public contact

2. Use Type 316 stainless steel for exterior applications and Type 304 stainless steel for interior applications unless otherwise indicated.

3. Zinc-plated fasteners complying with ASTM B633 may be used only for concealed, dry interior ferrous steel connections.

4. Cast-in-Place Anchors in Concrete (unless note otherwise): Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.

D. Miscellaneous Materials:

1. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal

modified-alkyd primer complying with MPI #79.

2. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.

3. Galvanizing Repair Paint: SSPC-Paint 20, high-zinc-dust-content paint for galvanizing welds in steel.

4. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, 5.

5. Concrete Materials and Properties: Comply with requirements in Section 03 30 00 "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

E. Galvanizing:

1. Steel and ferrous metal items on the exterior of buildings, items exposed to the weather and moisture, gratings, and items specifically indicated, shall be galvanized after fabrication by the hot-dip process in accordance with ASTM A123. Weight of the zinc coating shall conform with the requirements specified under "Weight of Coating" in ASTM A123. Provide high-quality galvanizing in conformance with ASTM A385. Items specified to be fabricated from stainless steel shall not be galvanized.

2. Seal-weld Overlapping Surfaces: Remove all weld flux. Plug vents provided in seal-welded overlapping surfaces to prevent entry of pickling acids. Remove such plugs before galvanizing.

3. Safeguarding against steel embrittlement shall conform with the applicable requirements of ASTM A143.

4. Safeguarding against warpage and distortion of steel members shall conform with the applicable requirements of ASTM A384.

5. Shop galvanized metalwork necessitating field welding which in any manner removes original galvanizing shall be restored by field galvanizing repair in accordance with ASTM A780.

6. Bolts and screws for attachment of galvanized items shall be galvanized in accordance with ASTM A153.

F. Paint:

1. Metal Primer Paint:

a. Free of lead and chromate and comply with State and Federal volatile organic compound (VOC) requirements.

b. Primer selected must be compatible with finish coats of paint. Coordinate selection of metal primer with finish paint requirements specified in Division 9.

c. Galvanizing Repair Paint: High zinc dust content paint for re-galvanizing welds in galvanized steel, complying with Military Specifications MIL-P-21035 (Ships).

2.2 FABRICATION, GENERAL

A. Workmanship: Use materials of size and thickness shown or, if not shown, of required size and thickness to produce strength and durability in finished product. Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components of work.

B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32" unless otherwise shown. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.

D. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.

E. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners, wherever possible. Use exposed fasteners of type shown or, if not shown, Phillips flat-head (countersunk) screws or bolts.

F. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

G. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware and similar items.

H. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.

I. joints which will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.

J. Stainless Steel Fabrication: Fabricate stainless steel items using methods and materials appropriate for stainless steel construction. Prevent contamination from carbon steel tooling or debris. Grind and finish exposed welds to match adjacent surfaces. Clean completed stainless steel surfaces to remove discoloration, scale, and fabrication residues.

2.3 METAL FABRICATIONS

A. Rough Hardware:

1. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures.

2. Manufacture or fabricate items of sizes, shapes and dimensions required.

3. Use galvanized steel hardware for galvanized steel members.

B. Steel Lintels:

1. Provide structural steel lintels for openings and recesses in masonry walls and partitions as shown. Weld adjoining members together to form a single unit where indicated. Provide not less than 8" bearing at each side of openings, unless otherwise shown.

a. Steel lintels in exterior walls shall be galvanized.

b. Paint in accordance with Division 9 Section “Painting and Coating”

C. Loose Bearing and Leveling Plates: Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts.

D. Miscellaneous Framing and Supports:

1. Provide miscellaneous steel framing and supports which are not a part of structural steel framework, as required to complete work.

2. Fabricate miscellaneous units to sizes, shapes and profiles shown or, if not shown, of required dimensions to receive adjacent other work to be retained by framing. Except as otherwise shown, fabricate from structural steel shapes and plates and steel bars, of welded construction using mitered joints for field connection. Cut, drill and tap units to receive hardware and similar items.

3. Exterior Miscellaneous Steel Trim: Galvanize.

4. Stainless steel shall be used in lieu of carbon steel where framing, supports, or trim are exposed to weather, moisture, or public view, or where indicated on Drawings.

2.4 FINISHES

A. Steel and Iron Finishes:

1. Hot-dip galvanize items as indicated to comply with ASTM A 123/A 123M or ASTM A 153/A 153M as applicable.
2. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with requirements indicated below for environmental exposure conditions of installed metal fabrications:

a. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
b. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

3. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting," for shop painting.

4. Stainless steel items shall not be painted or coated unless specifically indicated.

B. Shop Painting:

1. Shop paint miscellaneous metal work, except members or portions of members to be embedded in concrete or masonry, surfaces and edges to be field welded, and galvanized surfaces, unless otherwise specified.

2. Remove scale, rust and other deleterious materials before applying shop coat. Clean off heavy rust and loose mill scale in accordance with SSPC SP-2 "Hand Tool Cleaning", or SSPC SP-3 "Power Tool Cleaning", or SSPC SP-7 "Brush-Off Blast Cleaning".

3. Remove oil, grease and similar contaminants in accordance with SSPC SP-1 "Solvent Cleaning".

4. Immediately after surface preparation, brush or spray on primer in accordance with manufacturer's instructions, and at a rate to provide uniform dry film thickness of not less than 2.0 mils for each coat. Use painting methods which will result in full coverage of joints, corners, edges and exposed surfaces.

a. Ensure shop primer compatibility with Division 9 Section “Painting and Coating”. Primer per this Section shall be applied **in addition** to the shop primer as specified herein.

b. Apply one shop coat to fabricated metal items, except apply 2 coats of paint to surfaces inaccessible after assembly or erection.

5. Finish paint per Division 9 Section “Painting and Coating”.

C. Galvanized Metalwork:

1. Galvanized metal surfaces indicated to be painted shall be prepared for painting in accordance with ASTM D2092.

2. Galvanized metal surfaces shall then be given a shop coat of galvanized primer in accordance with SSPC-PA 1. Materials and application shall conform with SSPC-Paint 20, Zinc-Rich Primers, Type I – Inorganic or Type II - Organic.

PART 3 – EXECUTION

3.1 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions and directions for installation of anchorages, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.2 INSTALLATION

A. General:

1. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; including, threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.

2. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for item which are to be built into concrete, masonry or similar construction.

3. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch-up shop paint. Do not weld, cut or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.

4. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, and the methods used in correcting welding work.

B. Installing Bearing and Leveling Plates:

1. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

2. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

3. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.3 CLEANING

A. Touch-up Paint:

1. Immediately after erection, clean ground field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Galvanized surfaces which have become damaged from welding, handling, or installation shall be repaired immediately after installation with galvanizing repair material in accordance with ASTM A780.

C. Finish paint all exposed steel per Division 9 Section “Painting and Coating”

END OF SECTION

SECTION 05 73 00 – DECORATIVE METAL RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Stainless steel decorative metal railings, with vertical pickets.

2. Fasteners.

3. Miscellaneous materials.

1.2 PERFORMANCE REQUIREMENTS

A. General: For engineering decorative metal railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

1. Stainless Steel: 45 percent of minimum yield strength.

B. Structural Performance: Decorative metal railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
b. Infill load and other loads need not be assumed to act concurrently.

1.3 SUBMITTALS

A. Product Data:

1. Manufacturer's product lines of stainless steel decorative metal railings assembled from standard components.

2. Fasteners.

3. Post-installed anchors.

4. Handrail brackets.

5. Nonshrink, nonmetallic grout.

6. Metal finishes.

B. Shop Drawings: Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete.

C. Samples for Verification: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters

2. Fittings, end caps, and brackets.

3. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and guard infill. Sample need not be full height.

D. Delegated Design Calculations: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 QUALITY ASSURANCE

A. Installer Requirements: Installed by manufacturer or manufacturer-certified Installer.

B. Welding Qualifications: Qualify procedures and personnel in accordance with the following:

1. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.5 COORDINATION AND SCHEDULING

A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver items to Project site in time for installation.

B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not meet structural performance requirements.

1.6 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 BUILD AMERICA, BUY AMERICA (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered.**

1.8 WARRANTY

A. Warranty: Furnish railing manufacturer's standard one year warranty against defects in materials, fabrication, finishes, and installation commencing on Date of Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Decorative Metal Railing Components: Obtain from single source from single manufacturer for each component and installation method.

B. Stainless Steel Decorative Metal Railings:

1. Basis-of-Design Product: Subject to compliance with requirements, provide VIVA Railings, LLC; “CIRCA Picket Railing System” or comparable product by one of the following:

    a. Blum, Julius & Co., Inc.
    b. Tri Tech, Inc.
    c. Wylie Systems.
    d. Or equal

C. Drawings indicate size, profiles, and dimensional requirements of railings and are based on the specific system indicated.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.

1. Provide stainless steel wall brackets with flange tapped for concealed anchorage with vertical and horizontal adjustment capability.

2.3 STAINLESS STEEL DECORATIVE METAL RAILINGS

A. Tubing: ASTM A554, Grade MT 304.

B. Pipe: ASTM A312, Grade TP 304.

C. Castings: ASTM A743, Grade CF 8 or CF 20.

D. Sheet, Strip, Plate, and Flat Bar: ASTM A666, Type 304.

E. Bars and Shapes: ASTM A276, Type 304.

F. Posts: Tube, made from 2” diameter stainless steel.

G. Top Rail/Hand Rail: Tubular 2” diameter stainless steel pipe with round cross-section shape.

H. Vertical Pickets: 1/2-inch (38-mm) round stainless steel pickets. Attach vertical pickets to 1” diameter horizontal stainless steel tubes.

I. Fastener Materials: Unless otherwise indicated, provide the following:

1. For all Stainless Steel Railing Components: Type 304 stainless steel fasteners.

J. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction and capable of withstanding design loads.

K. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work unless otherwise indicated.

1. Provide hex, hex socket, or hex-button head machine screws for exposed fasteners unless otherwise indicated.

L. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, in accordance with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193.

2.4 MISCELLANEOUS MATERIALS

A. Handrail Brackets: Stainless steel.

1. Provide brackets with predrilled hole for bolted anchorage and with snap-on cover that matches rail finish and conceals bracket base and bolt head.

B. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for metal alloy welded.

1. Provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187.

2.5 FABRICATION

A. General: Fabricate decorative metal railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Shop assemble railings and guards to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.

1. Clearly mark units for reassembly and coordinated installation.

2. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately.

1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.

2. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

F. Connections: Fabricate railings with welded or mechanical connections unless otherwise indicated.

G. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove flux immediately.

4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 welds; ornamental quality with no evidence of a welded joint.

H. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings.

1. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

2. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.

I. Form changes in direction as follows:

1. By flush bends or by inserting prefabricated flush-elbow fittings.

J. Bend members in jigs to produce uniform curvature for each configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

K. Close exposed ends of hollow railing members with prefabricated cap and end fittings of same metal and finish as railings.

L. Provide wall returns at ends of wall-mounted handrails. Close ends of returns, unless clearance between end of rail and wall is 1/4 inch or less.

M. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, handrail brackets, miscellaneous fittings, and anchors to interconnect railing members to other Work unless otherwise indicated.

N. Provide inserts and other anchorage devices for connecting railings to concrete Work.

1. Fabricate anchorage devices capable of withstanding loads imposed by railings.

2. Coordinate anchorage devices with supporting structure.

2.6 METAL FINISH REQUIREMENTS, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

2.7 STAINLESS STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Stainless Steel Finishes:

1. Dull Satin Finish: ASTM A480/A480M, No. 6.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

B. Installation Tolerances: Structural steel and concrete slabs to be within 1/8 inch in 10 ft. horizontally and 1/8 inch vertically. Correct out-of-tolerance conditions to meet railing manufacturer's requirements.

3.2 INSTALLATION, GENERAL

A. Perform cutting, drilling, and fitting required for installing railings.

1. Fit exposed connections together to form tight, hairline joints.

2. Install railings level, plumb, square, true to line; without distortion, warp, or rack.

3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.

4. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.

5. Set posts plumb within a tolerance of 1/16 inch in 3 ft.

6. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 10 ft.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

C. Adjust railings before anchoring to ensure matching alignment at abutting joints.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 METAL RAILING CONNECTIONS

A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws, using plastic cement filler colored to match finish of railings.

B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article, whether welding is performed in the shop or in the field.

C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve, extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; and locate joint within 6 inches of post.

3.4 ANCHORING METAL POSTS

A. Form or core-drill holes in accordance with engineering requirements for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, non-metallic grout mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Completely conceal core-drill hole flange of same metal as post, welded to post after placing anchoring material.

C. Anchor posts to metal surfaces with flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:

1. For stainless steel railings, weld flanges to posts.

3.5 CLEANING

A. Clean stainless steel by washing thoroughly with clean water and soap, rinsing with clean water, and wiping dry.

B. Clean wood rails by wiping with a damp cloth and then wiping dry.

3.6 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period, so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION

SECTION 06 06 60 – TRANSLUCENT RESIN PANEL SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the backlit plastic fabrication as shown at entrances to the large public restrooms as shown on the drawings.

B. The extent of Solid Polymer Fabrication is shown on the drawings.

1.2 RELATED SECTIONS

A. Division 6 Section “Interior Architectural Woodwork”

1.3 ADMINISTRATIVE REQUIREMENTS

A. Project Pre-installation Meeting

1. Owner, Architect, Contractor, Installer to meet at project site within one week of scheduled installation.
2. Review mounting conditions, installation and storage instructions, fabrication requirements, seaming and protection measures.

1.4 SUBMITTALS

A. General: Submit the following in accordance with conditions of contact and Division 1 specification section 01 33 00 “Submittal Procedures”.

B. Product List: Minimum of 3 completed installations or 3 installations of similar materials and complexity. Include contact name and email address for each product.

C. Product Data: Submit manufacturer’s product data; include product description, fabrication information, and compliance with specified performance requirements.

D. Submit product test reports indicating each type and class of panel system complies with the project performance requirements, based on comprehensive testing of current products. Previously completed test reports will be acceptable if for current manufacturer and indicative of products used on this project.

1. Test reports required are:
    a. Rate of Burning (ASTM D 635)
    b. Self-Ignition Temperature (ASTM D 1929)
    c. Density of Smoke (ASTM D 2843)
    d. Steiner Tunnel (ASTM E84)
    e. Dynamic environmental testing (ASTM standards D 5116 or D 6670)
    f. Coefficient of Friction (ASTM 2047)

E. Shop Drawings: Include plans, elevations, sections, panel dimensions, details, and attachments to other work.

F. Samples for Initial Selection:

1. Submit minimum 2-inch by 2-inch samples. Indicate full color, texture and pattern variation.

G. Samples for Verification:

1. Submit minimum 4-inch by 4-inch sample for each type, texture, pattern and color of solid plastic fabrication.

H. Mockups:

1. Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects.
2. Build mockup 24-inches tall showing full jamb wrap-around condition including translucent / back-lit section.

I. Maintenance Data: Submit manufacturer's care and maintenance data, including care, repair and cleaning instructions. Include in Project closeout documents.

1.5 QUALITY ASSURANCE

A. Manufacturers Qualifications

1. Materials and systems shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials for a period of at least three (3) consecutive years and which can show evidence of those materials being satisfactorily used on at least three (3) projects of similar size, scope and location. At least one (1) of the projects shall have been successful for use one year or longer.

2. Completely PVC – Free product

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver Plastic Fabrications, systems and specified items in manufacturer's standard protective packaging.

B. Do not deliver Plastic Fabrications, system, components and accessories to Project site until areas are ready for installation.

C. Store materials in a flat orientation in a dry place that is not exposed to exterior elements. Materials are to be protected against damage from moisture and direct sunlight.

D. Store in area of installation minimum of 24 hours prior to installation.

E. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent damage or staining following installation for duration of project.

F. Before installing Plastic Fabrications, permit them to reach room temperature.

1.7 BUILD AMERICA / BUY AMERICA (BABA) REQUIREMENTS

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered.**

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install Solid Polymer Fabrications until spaces are enclosed and weatherproof, and ambient temperatures and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.9 WARRANTY

A. Manufacturer's Special Warranty on Plastic Fabrications: Manufacturer's standard form agreeing to repair or replace units that fail in material or workmanship within the specified warranty period.

B. Warranty Period: 1 year after ship date.

PART 2 - PRODUCTS

2.1 MANUFACTURER – BASIS OF DESIGN

A. Manufacturer: 3form, LLC., Salt Lake City, Utah, USA / telephone 801-649-2500

B. Or Equal: Other Manufacturer's complying with the requirements of this section.

2.2 MATERIALS

A. 3-Form Resin Preformed Portals:

1. 5 sided Chroma Lightbox | 3 fit lighting with push through lettering.
2. Light Box: Chroma ½" Graphite + Avalance – FF/BF: Vellum
3. Lettering: Chroma 1" powder (Center Layup) – FF/BF: Vellum
4. Engineered acrylic resin produced in the USA
5. Sheet Size: Maximum 4' x 10'
6. Thickness: Minimum 1/2"
7. Basis of Design Product: The design of Plastic Fabrications is based on Chroma as provided by 3form, Inc. Products from other manufacturers must be approved by the Architect in accordance with Section 10 60 00 "Product Requirements".

B. Sheet minimum performance attributes – 3 Form Chroma:

1. Rate of Burning (ASTM D635): Material shall achieve a CC2 rating.
2. Self-Ignition Temperature (ASTM D1929): Material shall have a self-ignition temperature of not less than 852°F.
3. Density of Smoke (ASTM D2843): Smoke density shall be 75 percent or less.
4. Coefficient of Friction (ASTM D2047): Material shall have a coefficient of friction of 0.73 dry and 0.79 wet.
5. Dynamic Environmental Testing: Material shall comply with indoor air-quality testing per ASTM D5116 or ASTM D6670.
6. Construction: Panel shall be a monolithic acrylic sheet with no adhesive-laminated layers.
7. Material Composition: Material shall be PVC-free acrylic with pigmented colorants; colors shall be UV-stable.
8. Surface Renewability: Selected finish shall be renewable/refinishable onsite per manufacturer's instructions (e.g., Renewable Matte finish).

2.3 FABRICATION

A. General: Fabricate Plastic Fabrications to designs, sizes and thicknesses indicated and to comply with indicated standards. Sizes, profiles and other characteristics are indicated on the drawings.

B. Comply with manufacturer's written recommendations for fabrication.

C. Machining: Acceptable means of machining are listed below. Ensure that material is not chipped or warped by machining operations.

1. Sawing: Select equipment and blades suitable for type of cut required.
2. Drilling: Drills compatible with plastic products.
3. Routing
4. Laser Cutting
5. Laser Etching

D. Forming: Form products to shapes indicated using the appropriate method listed below. Comply with manufacturer's written instructions.

1. Cold Bending
2. Hot Bending
3. Thermoforming: Acceptable only on uncoated material.
4. Drape Forming
5. Matched Mold Forming
6. Mechanical Forming

E. Laminating: Laminate to substrates indicated using adhesives and techniques recommended by manufacturer.

F. Bonding

1. Manufacturer must have an in-field seaming process and fabrication kit including necessary adhesive and tools.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide products of material, size, and shape required for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaner: Type recommended by manufacturer.

C. Adhesives: May be achieved with 2-part adhesives or silicones, suitable for use with product and application.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where installation of Plastic Fabrications will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for installation and comply with requirements specified.

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions for the installation of Plastic Fabrications. Sizes, profiles and other characteristics are indicated on the drawings, additional installation details can be found on the 3form Certified Installer, if applicable.

B. Manufacturer's shop to fabricate items to the greatest degree possible.

C. Utilize fasteners, adhesives and bonding agents recommended by manufacturer for type of installation indicated. Material that is chipped, warped, hazed or discolored as a result of installation or fabrication methods will be rejected.

D. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.

E. Form field joints using manufacturer’s recommended procedures. Locate seams in panels so that they are not directly in line with seams in substrates.

F. We recommend that installation is completed by a 3form Certified Installer. Contact 3form for more information or to get a quote.

3.3 CLEANING AND PROTECTION

A. Protect surfaces from damage until date of substantial completion. Repair work or replace damaged work, which cannot be repaired to Architect’s satisfaction.

END OF SECTION

SECTION 06 10 00 – ROUGH CARPENTRY

PART 1 – GENERAL

1.1 SUMMARY

A. Rough carpentry includes carpentry work not specified as part of other sections and which is generally not exposed, except as otherwise indicated. Types of work in this Section include rough carpentry for:

1. Framing lumber and plywood

    a. Typical, marine grade, and treated. Fire retardant if indicating on the drawings.

2. Wood nailers and blocking

    a. Typical, fire retardant, and treated.

3. Other rough carpentry indicated

B. *NOTE: This Section governs all blocking behind wall mounted items. Coordinate with other Sections to ensure blocking is provided at all of these locations whether blocking is shown on drawings or not.*

C. Related Sections include the following:

1. Division 6 Section “Interior Finish Carpentry”

2. Division 6 Section “Interior Architectural Woodwork”

3. Division 6 Section “Wood Decking”

4. Division 6 Section “Glue Laminated Construction”

5. Division 9 Section “Gypsum Board” for cementitious backer board at plumbing chases.

1.2 REFERENCES

A. Lumber Standards: Comply with PS 20

B. Plywood Performance Standards: Must comply with PS2-92 and APA Performance Rating Standards, including AWPA U1, ASTM E84.

C. Comply with IBC (current edition) for fire treated and preservative-treated wood.

D. Factory mark each piece of lumber and plywood with type, grade, mill and grading agency

1.3 SUBMITTALS

A. Wood treatment data as follows, including chemical treatment manufacturer's instructions for handling, storing, installing, and finishing treated materials:
   1. For each type of preservative-treated wood product, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.

   2. For fire-retardant-treated wood products, include certification by treating plant that treated materials comply with specified standard and other requirements as well as data relative to bending strength, stiffness, and fastener-holding capacities of treated materials.

B. Material test reports from a qualified independent testing agency indicating and interpreting test results relative to compliance of fire-retardant-treated wood products with requirements indicated.

1.5 BUILD AMERICA, BUY AMERICA (BABA) REQUIREMENTS

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

   1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

   2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

   3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

   1. Provide manufacturer’s certification of domestic origin for all products.

   2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

   3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

   1. **Waivers will not be considered.**

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for Fire-Retardant-Treated Wood: Obtain each type of fire retardant-treated wood product from one source and by a single producer.

B. Source Limitations for Engineered Wood Products: Obtain each type of engineered wood product through one source from a single manufacturer.

C. Grade Stamps for Concealed Lumber: Each piece of lumber, applied by inspection agency and showing compliance with each specified requirement.

D. Construction Panels: Comply with NBS PS 1 where veneer plywood is specified; comply with APA PRP-108 where APA rated panels are specified; bearing APA trademark showing compliance with each specified requirement.

1.5 DELIVERY STORAGE, AND HANDLING

A. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels off of the ground. Provide for air circulation within and around stacks and under temporary coverings.

B. Remove from the site any wood products that have been subjected to moisture or that do not comply with the specified moisture requirements.

C. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

1.6 PROJECT CONDITIONS

A. Fit carpentry work to other work; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, and similar supports to allow proper attachment of other work.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Framing Lumber:

1. Nominal sizes are indicated, except as shown by detail dimension.

2. Provide actual sizes as required by PS 20, graded in accordance with established grading rules for moisture content specified for each use.

3. Provide dressed lumber, S4S, unless otherwise indicated.

4. Provide kiln-dried lumber with 15% maximum moisture content at time of dressing.

5. Southern Yellow Pine or Douglas Fir of following species and grades:

   a. Structural Light Framing: Stress Group 1500 F, #2 or better, Dense KD Grade.

   b. Non-structural light framing: Standard Grade.

6. Miscellaneous Lumber:

   a. Provide wood for support or attachment of other work including bucks,

nailers, blocking, furring, stripping and similar members. Provide lumber of sizes shown or specified worked into shapes shown.

b. Grade: Standard or No. 2 Southern Pine.

B. Plywood:

1. General:

a. Minimum Construction Standards of Plywood are as follows (thickness as indicated on Drawings):

(1) 1/2” shall be 4 ply

(2) 5/8” shall be 5 ply

(3) 3/4” shall be 6 ply

b. Warped plywood panels are not acceptable.

2. Marine Grade plywood: APA 3/4" B-B Marine Grade for concealed fascia substrate only.

3. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E 84.

2.2 ACCESSORIES

A. Provide ALL fasteners and anchorages with a hot-dip zinc coating (ASTM A153).

B. Construction Adhesive: where called for, "Liquid Nails" by SCM Corp., MACCO Adhesives, or equal.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with firetest-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.

C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

E. For exposed items indicated to receive a stained or natural finish, use chemical

formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

F. Contact with treated wood does not promote corrosion of metal fasteners.

2.4 WOOD TREATMENT

A. Comply with applicable standards for the American Wood Preservers Association (AWPA). Each piece shall bear the quality mark of an independent agency or inspection service certified by these organizations to inspect treated materials.

1. All interior sill plates and miscellaneous blocking and lumber shall be southern pine lumber, treated with waterborne preservatives in accordance with AWPA Standard U1, Commodity Specification A, to the requirements of Use Category 2 (UC2).

2. All concealed roof blocking shall be southern pine lumber, treated with waterborne preservatives in accordance with AWPA Standard U1, Commodity Specification A, to the requirements of Use Category 3B (UC3B).

B. Retention levels shall be as follows for Use Category 2 and 3B:

1. Micronized Copper Azole (MCA – YellaWood®): 0.06

2. Micronized Copper Quaternary (MCQ): 0.15
3. Alkaline Copper Quaternary (ACQ): 0.25

4. Chromated Copper Arsenate (CCA) or other arsenic containing preservatives will not be accepted.

C. Where possible, all special cuts and holes should be fabricated before treatment. If cut after treatment, coat surfaces with liberal brushed solution of copper naphthenate containing a minimum of 2 percent metallic copper in solution in accordance with AWPA Standard M4.

PART 3 – EXECUTION

3.1 INSTALLATION

A. General Requirements:

1. Discard units of material with defects which might impair quality of work, and units which are too small to use in fabricating work with minimum joints or optimum joint arrangement.

2. Framing lumber and other rough carpentry shall be fitted closely, set accurately to the required lines and levels and shall be secured in place in a rigid and substantial manner.
3. All framing and support members, not indicated or specified, shall be provided as necessary for the proper completion of the work.

4. Spiking, nailing and bolting shall be done in an approved manner; spikes, nails and bolts shall be of the proper size, and care shall be used so as not to split

the members. Members shall be drilled accurately for bolting; and for nailing where necessary to avoid splitting. Suitable washers shall be provided under bolt heads, and nuts and bolts shall be drawn up tight.

5. Provide framing to support all edges of covering material.

B. Wood Nailers, and Blocking:

1. Provide wherever shown and where required for attachment of other work. Form to shapes as shown or required and cut as required for true line and level of work to be attached. Coordinate location with other work involved.

2. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise shown. Build into masonry during installation of masonry work.

3. Specifically, provide the following non-structural framing and blocking whether called out on the drawings or not, including but not limited to:

a. Cabinets and shelf supports.
b. Wall brackets.
c. Handrails.
d. Grab bars.
e. Towel and bath accessories.
f. Wall-mounted door stops.
g. Wall paneling and trim.
h. Joints of rigid wall coverings that occur between studs.
i. Owner furnished TV brackets
j. Other wall mounted equipment indicated on drawings.

C. Installation of Plywood:

1. General: Comply with applicable recommendations contained in Form No. E 304 "APA Design/Construction Guide – Residential & Commercial" for types of plywood products and applications indicated.

2. Apply sheathing with long dimension (face grain) perpendicular to framing. Apply with side edges 1/4 inch apart and end edges 1/8 inch apart. All end edges of sheathing shall bear on a support. Stagger end joints of sheathing.

3. Fastening:

a. For wall sheathing use #6 x 2” self-tapping screws at 6 inches on-center on panel edges, at 12 inches on-center along intermediate supports, and 3/8" minimum from panel edge.

END OF SECTION

06 17 13 – GLUE LAMINATED CONSTRUCTION

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes: Southern Yellow Pine (SYP) glued-laminated timber (glulam) trusses that penetrate the building envelope; pressure treatment with Chromated Copper Arsenate (CCA); kiln-dry-after-treatment (KDAT); re-milling; adhesive bonding; factory-applied penetrating stain; complete shop trial assembly; and final field-applied stain coats after erection.

B. Work includes temporary moisture protection of exposed glulam members during shipment, erection, and interim exposure prior to permanent enclosure.

C. Work includes full shop assembly of glulam trusses at the fabricator’s facility for quality control prior to disassembly and shipment for reassembly on site.

D. Work includes associated hardware, flashings, field treatment of cuts per AWPA M4, and finish maintenance guidance.

1.2 RELATED SECTIONS

A. Section 05 50 00 – Metal Fabrications.

B. Section 06 15 00 – Cross Laminated Timber Decking

C. Section 07 62 00 – Sheet Metal Flashing and Trim.

D. Section 07 92 00 – Joint Sealants.

E. Section 09 90 00 – Painting and Coatings

1.3 REFERENCES

A. AWPA U1 – Use Category System.

B. AWPA T1 – Treatment Requirements.

C. AWPA M4 – Field Treatment of Cuts.

D. ANSI/AITC A190.1 – Structural Glued Laminated Timber.

E. NDS – National Design Specification for Wood Construction.

F. ASTM D2559 (adhesives for structural laminated wood).

G. ASTM A123/A123M, A153/A153M, and F2329 – Hot-Dip Galvanizing Standards.

H. AITC and APA/EWS standards as applicable.

1.4 SUBMITTALS

A. Product Data:

1. Preservative treatment system (CCA), Use Category, and minimum retention values.

2. KDAT procedure and target moisture content.

3. Adhesive type (ASTM D2559 Type I).

4. Stain system (exterior/interior), compatibility with CCA, VOC data, and factory-finish plan.

B. Shop Drawings:

1. Member sizes, grades, connection geometry, drill patterns, access for field treatment of cuts, and interface details at envelope penetrations.

2. Adhesive type and compliance with ASTM D2559.

3. Stain system data demonstrating compatibility with CCA-treated, KDAT SYP; UV resistance; color range.

4. Professional Engineer: Glulam shop drawings, connection details, and supporting structural calculations shall be prepared under the responsible charge of a licensed Professional Engineer registered in the State of Mississippi. Engineer-sealed submittals are required to demonstrate conformance with the Structural Drawings and do not constitute delegated design.

C. Certificates:

1. Treatment plant certification of compliance with AWPA U1/T1 and third-party inspection.

2. Fabricator certification for producing CCA-treated glulam.

D. Samples:

1. Stain color samples on actual CCA-treated, KDAT SYP, minimum 8 in by 12 in.

2. Hardware finish samples.

E. Quality Assurance Submittals:

1. Shop Assembly Certification confirming each truss was fully assembled at the factory, verified for tolerances and connection fit, disassembled, and marked.

F. Closeout Submittals: Maintenance instructions for stain system and inspection of flashing and sealants at penetrations.

1.5 QUALITY ASSURANCE

A. Fabricator: Certified for producing CCA-treated glulam; minimum five similar projects.

B. Treatment Plant: AWPA-compliant with third-party inspection.

C. Applicators: Experienced in application of stain to CCA-treated surfaces.

D. Fabrication and installation shall be performed in accordance with applicable standards and approved shop drawings

E. Submit a written handling, shipping, storage, and erection protection plan specific to CCA-treated, KDAT glulam members. Plan shall describe wrapping, ventilation, lifting methods, temporary protection during erection, weather exposure limits, and corrective actions for wetting or damage.

1.6 DELIVERY, STORAGE, AND HANDLING

A Delivery: Deliver glulam members wrapped with breathable, UV-resistant protective coverings that shed liquid water while allowing ventilation. Non-vented polyethylene wraps that trap moisture are not permitted. Provide protection to exposed end grain during shipment.

B Handling: Lift glulam members using nylon slings or padded rigging only; chains, wire rope, or unpadded forks in direct contact with wood are prohibited. Support members at manufacturer-recommended lift points to prevent induced bending, torsion, or surface damage. Do not drag members across each other or across the ground.

C Storage: Store members off the ground on level blocking with continuous air circulation beneath and around members. Maintain factory-applied wrapping intact until erection where practical. Protect from standing water, precipitation, mud, and splash. Slope coverings to shed water and periodically inspect stored members for moisture intrusion.

D Moisture Control: Do not permit prolonged wetting of glulam members. If members become wet, immediately remove coverings, allow surfaces to dry uniformly, and do not enclose or apply finishes until moisture content has returned to levels consistent with KDAT material.

E Damage: Members exhibiting excessive checking, surface fiber damage, delamination, staining, or other defects resulting from improper delivery, storage, or handling shall be evaluated by the Structural Engineer and replaced if required at no cost to the Owner.

F. Protection of Factory Applied Stain: Protection of Factory-Applied Stain: Protect factory-applied stain during shipping, storage, handling, and erection. Do not allow abrasion, tearing of wraps, standing water, mud, oil, fuel, adhesives, sealants, or contact with alkaline materials to stain or damage finished surfaces. Repair of damaged factory-applied stain shall be limited to minor touch-up only; widespread

damage requiring re-staining is not acceptable.

G. Sequencing for Field-Applied Stain: Coordinate delivery, storage, erection, and enclosure sequencing to protect factory-applied stain and to provide suitable conditions for field-applied stain specified in Section 09 90 00. Do not erect glulam members until the Contractor can maintain protection from precipitation, prolonged wetting, and construction contamination.

1.7 WARRANTY

A. Manufacturer's standard structural warranty.

B. Provide stain manufacturer's warranty for finish performance in exterior exposure where applicable.

1.8 BUILD AMERICA, BUY AMERICA (BABA) REQUIREMENTS

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Basis of Design: SmartLam North America – Dothan, Alabama Plant.

2.2 MATERIALS

A. Species and Grade: Southern Yellow Pine (SYP) laminations graded in accordance

with ANSI/AITC A190.1.

B. Adhesives: Structural, waterproof adhesive complying with ASTM D2559, Type I; compatible with CCA-treated, KDAT stock.

C. Preservative Treatment and Fabrication Sequence (CCA Only):

1. Pressure-treat laminations with CCA to Use Category indicated:

a. UC3B (Exterior, Above Ground): 0.25 pcf CCA minimum.

b. UC4A (Ground Contact/Embedded): 0.40 pcf CCA minimum.

2. Kiln-dry after treatment (KDAT) to 12 percent ± 3 percent moisture content.

3. Re-mill laminations to restore dimensional accuracy, surface quality, and optimal bonding surfaces.

4. Glue and fabricate into glulam members after KDAT and re-milling.
5. No incising permitted on laminations intended for structural gluing.

D. Field Treatment of Cuts: Copper naphthenate solution containing a minimum of 2 percent copper metal, applied per AWPA M4; allow to dry before applying stain.

E. Fasteners and Connectors:

1. Fabricated steel connectors finished with hot-dip galvanizing (ASTM A123/A153/F2329) or stainless steel, Type 304 or 316.

2. Provide isolation between dissimilar metals and drainage for concealed pockets.

F. Accessories:

1. Flashings: Stainless steel or galvanized sheet metal coordinated with air/water barrier.

2. Sealants: Neutral-cure silicone or hybrid, UV-resistant, non-staining, and compatible with stain.

G. Finish – Factory and Field Stain:

1. Factory-Applied Stain: Provide one uniform coat of penetrating, UV-inhibiting stain, compatible with CCA-treated, KDAT SYP, applied to all faces, edges, and ends prior to packaging. Factory-applied stain shall be breathable and compatible with subsequent field-applied stain systems specified in Section 09 90 00.

2. Field Finish (After Erection):

a. Clean surfaces; lightly abrade to remove handling marks and raised grain uniformly.

b. Touch up all handling damage and AWPA M4 field-treated areas.

c. Apply final field stain coats (number of coats per stain manufacturer) to achieve the approved mock-up color, uniformity, and sheen.

3. Color/Sheen: As selected by Architect from manufacturer’s full range; provide approved mock-up on CCA-treated, KDAT SYP.

4. Compatibility: Stain manufacturer shall provide written confirmation of compatibility with CCA-treated, KDAT SYP and with adjacent sealants.

2.3 SHOP ASSEMBLY

A. Fully assemble each glulam truss at the fabricator’s facility using final hardware to verify geometry, camber, and connection fit.

B. Following QC inspection by Architect, Structural Engineer and MDOT Representative at the fabricator’s facility, disassemble into shippable components, mark, and package for delivery.

C. Provide a written factory quality-control report documenting trial assembly and inspection.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify bearing seats, anchors, and building envelope details are ready prior to erection.

3.2 INSTALLATION

A. Erect glulam members plumb and true in accordance with approved shop drawings and the NDS.

B. Avoid field cuts; obtain Engineer’s approval if unavoidable.

C. Reassemble trusses on site in accordance with factory markings and QC documentation.

D. Provide continuous air and water barrier transitions, flashings, and drainage at penetrations through the building envelope. Provide thermal breaks where detailed.

E. Temporary Protection During Erection: Provide temporary weather protection for glulam members during erection and prior to installation of permanent roofing, decking, or flashings. Protect exposed horizontal surfaces and end grain from precipitation and construction moisture. Remove temporary protection only when permanent enclosure or flashing is in place.

1. Maintain protection of factory-applied stain until permanent enclosure, roofing, decking, and flashings are complete and adjacent wet trades have concluded.

3.3 FIELD TREATMENT

A. Treat all field cuts, bores, and notches immediately with copper naphthenate solution per AWPA M4; allow to dry before stain touch-up and field coats.

3.4 MOCK-UPS (STAIN & APPEARANCE)

A. Provide a stain/appearance mock-up on actual CCA-treated, KDAT SYP representative of final members:

1. Minimum 24 in by 24 in flat panel and one linear sample showing an end grain and a factory edge.

2. Include factory stain process and proposed field topcoat schedule.

3. Demonstrate color, sheen, absorption uniformity (faces/edges/ends), and touch-up of a simulated field cut.

4. Do not proceed with production/field finishing until mock-up is accepted. Retain accepted mock-up as the quality benchmark.

3.5 FINISHING

A. Field-applied stain coats specified in this section are coordinated with Section 09 90 00 Painting and Coatings; this section establishes surface condition, protection, and sequencing requirements for glulam members.

B. Touch up handling marks and all AWPA M4 field-treated areas.

C. Apply final field stain coats to achieve the approved mock-up appearance on all exposed faces, edges, and ends; maintain uniform color and sheen.

D. Protect adjacent work from staining.

3.6 PROTECTION AND CLEANING

A. Protect glulam members at all times from standing water, prolonged wetting, UV degradation beyond normal exposure, staining, mechanical damage, and contact with incompatible materials. Do not allow glulam to be used for scaffolding, temporary bracing, or material storage.

B. Replace defective or damaged members.

C. Clean staining residues from adjacent materials immediately.

D. Repair of damaged members will not be permitted where appearance, durability, or structural integrity is compromised; replace affected members as directed by the Architect.

E. Damage to factory-applied or field-applied stain resulting from improper protection, sequencing, or handling shall be corrected at no cost to the Owner and to the satisfaction of the Architect.

3.7 MAINTENANCE

A. Provide Owner with written guidance on stain recoat intervals (typically 5 to 7 years for exterior exposure, or per stain manufacturer and site exposure).

B. Provide inspection checklist for flashing and sealant maintenance at penetrations.

END OF SECTION

SECTION 06 17 19 – CROSS-LAMINATED TIMBER (CLT) DECKING

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cross-Laminated Timber (CLT) roof deck panels, APA PRG-320 certified.
2. Work includes factory-applied temporary weather protection of CLT roof panels during shipment, erection, and interim exposure prior to permanent roofing installation.
3. Pressure-preservative treatment of CLT panels only where specifically indicated on the Drawings or where panel dimensions and manufacturer capabilities permit treatment in accordance with AWPA U1.
4. Connections, fasteners, and accessories required for installation.

B. Related Sections:

1. Section 01 60 00 – Product Requirements.
2. Section 01 73 00 – Execution Requirements. .
3. Section 06 10 00 – Rough Carpentry.
4. Section 06 17 13 – Glue Laminated Construction

1.2 REFERENCES

A. ANSI/APA PRG 320 – Standard for Performance-Rated Cross-Laminated Timber.

B. ANSI/AWC NDS – National Design Specification for Wood Construction.

C. ASTM D2559 – Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions.

D. ASTM A153/A153M – Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

E. AITC 111 – Protection of Structural Glued Laminated Timber During Transit, Storage, and Erection.

F. AWPA U1 – Use Category System: User Specification for Treated Wood.

G. AWPA M4 – Field Treatment of Preservative-Treated Wood.

H. ICC/IBC – International Building Code, most recent edition adopted by the Authority Having Jurisdiction.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate installation of CLT panels with structural steel framing, glulam beams, and roof openings.

B. Preinstallation Meeting: Conduct meeting with manufacturer’s technical representative, installer, and structural engineer.

1.4 SUBMITTALS

A. Product Data: Manufacturer’s technical literature, species and grade designations, and APA PRG-320 compliance.

B. Shop Drawings to include:

1. Panel layout and dimensions of roofs.
2. Panel major strength direction.
3. Species and stress grade of panels.
4. Appearance and applicable side (architectural vs industrial) as well as shop-applied finishes.
5. Connection details, shop-cut openings, fasteners, and connection hardware.
6. Relationship of CLT panels to adjacent material.
7. Include and locate openings 12 inches or greater.
8. Include and locate lifting points.
9. Indicate panel number, location and erection sequence with same mark as shop drawing.
10. Indicate special instruction (i.e. field trim or fit).
11. Label connection details.
12. Indicate locations, tolerances, and details of anchorage to supporting structure.
13. Stain system data demonstrating compatibility with CCA-treated, KDAT SYP; UV resistance; color range.

C. Certificates:

1. APA PRG-320 compliance certification.
2. BABA compliance letter verifying U.S. manufacture and domestic content.
3. Treatment certificates if preservative treatment is used.

D. Samples: Minimum 24 x 24-inch sample showing surface finish, grain, and edge profile. Provide up to 3 field mock-up samples for stain and finish approval.

E. Quality Assurance Submittals: Installation plan and field protection procedures.

F. Structural Design Calculations: Provide CLT shop drawings and accompanying structural calculations prepared under the responsible charge of a Professional Engineer registered in the State of Mississippi. Calculations shall demonstrate compliance with the Structural Drawings, applicable design loads, ANSI/APA PRG 320, and the National Design Specification (NDS) for Wood Construction.

   This requirement is for verification and documentation of the CLT panel system and does not constitute delegated design.

G. Do not fabricate until shop drawings (and calculations when applicable) are reviewed and approved by the Design Professional of Record without further changes.

H. Moisture and Finish Protection Plan: Installer shall submit a moisture and finish protection plan indicating stages of transportation, storage, erection, and temporary

enclosure. Plan shall describe procedures for limiting excessive moisture, liquid water, UV exposure, abrasion, and construction contamination from contacting CLT panels, including factory-applied sealers or stains. Include products and methods for breathable wraps, temporary membranes, edge protection, and corrective actions for wetting or surface damage.

I. Factory-Applied Temporary Weather Protection: Submit product data and installation details for any factory-applied, vapor-permeable weather protection membrane intended to remain on CLT panels during erection and prior to installation of permanent roofing. Indicate membrane type, vapor permeance, water-resistance characteristics, UV exposure limits, compatibility with factory sealers or stains, attachment method, lap/seam treatment, and removal or integration requirements.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: APA PRG-320 certified manufacturer with at least 3 years of experience producing CLT panels.

B. Installer Qualifications: Minimum 3 years of experience in mass timber or heavy timber installation.

C. Professional Engineer: Design CLT layout under the supervision of a licensed Professional Engineer in the state of the project.

D. Product Marking: CLT panels shall be identified with a tag or stamp indicating layup, mill name, approved agency, and the symbol of ANSI/APA PRG 320 (2019). All identification shall be on the nonexposed side of CLT.

1.6 BUILD AMERICA, BUY AMERICA (BABA) REQUIREMENTS

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver CLT panels wrapped with breathable, weather-resistant protective coverings that shed liquid water while allowing vapor transmission. Non-vented polyethylene wraps that trap moisture are not permitted. Protect exposed faces and panel edges during shipment.

B. Handling: Lift CLT panels using manufacturer-approved lifting points, rigging, and spreader beams as indicated on shop drawings. Use nylon slings or padded lifting devices only. Do not allow chains, wire rope, forks, or unpadded equipment to contact panel faces or edges. Prevent panel distortion, edge damage, or abrasion during handling.

C. Storage: Store CLT panels flat on level blocking, fully supported, with continuous air circulation beneath and around panels. Protect panels from ground contact, standing water, precipitation, mud, and splash. Maintain factory-applied wrapping intact until erection where practicable. Slope coverings to shed water and inspect stored panels regularly.

D. Protection of Factory-Applied Sealer / Stain: Protect factory-applied sealers or stains from abrasion, standing water, UV over-exposure, concrete slurry, sealants, adhesives, fuels, oils, or alkaline materials. Factory-applied finishes are not sacrificial. Widespread damage requiring re-finishing is not acceptable.

E. Moisture Control: Do not permit prolonged wetting of CLT panels. If panels become wet, immediately remove coverings, allow surfaces to dry uniformly, and do not enclose or apply finishes until moisture content has returned to levels consistent with manufactured panels.

.F. Damage: Panels exhibiting staining, surface checking beyond appearance-grade limits, delamination, edge damage, or finish degradation resulting from improper delivery, storage, or handling shall be evaluated by the Architect and Structural Engineer and replaced if required at no cost to the Owner.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Basis of Design: SmartLam North America – Dothan, Alabama Plant.

B. Substitutions: Not permitted without prior written approval of Architect and Owner.

2.2 CROSS-LAMINATED TIMBER MATERIALS

A. Species Class: E4 – Southern Yellow Pine (SYP) per SmartLam CLT Design Guide and APA PRG-320.

B. Grade:

1. Longitudinal Layers: Visually graded No. 2 SYP. Architectural Grade.
2. Transverse Layers: Visually graded No. 3 SYP.

C. Adhesive: PURBOND polyurethane adhesive meeting ASTM D2559 for exterior exposure.

D. Panel Configuration: As indicated on Structural Drawings; minimum 3-ply alternating layup.

E. Moisture Content: 12 ± 3 percent at time of manufacture.

F. Appearance Grade: Architectural Visual Grade – one sanded exposed face with minimal knots and checks; non-exposed face industrial grade.

G. Dimensions and Tolerances: Per APA PRG-320; ±1/16 inch thickness, ±1/8 inch width, ±1/4 inch length.

H. Design Values: Per manufacturer's published properties for E4 CLT panels and structural drawings.

I. Fire Rating: Comply with NDS Chapter 16 and SmartLam fire test data where required.

J. Shop Sealer: Sansin KP-12W or approved equal.

K. Stain system (exterior/interior), compatibility with CCA, VOC data, and factory-finish plan.

L. Factory-Applied Temporary Weather Protection Membrane: Where CLT roof panels will be exposed during erection and prior to installation of permanent roofing, provide a factory-applied, highly vapor-permeable, water-resistive membrane specifically intended for temporary protection of mass timber panels.

1. Performance Requirements:

    a. Minimum vapor permeance: ≥ 20 perms (ASTM E96).
    b. Liquid water resistance suitable for temporary exterior exposure.
    c. Compatible with factory-applied sealers or stains and with subsequent roofing underlayments.
    d. UV exposure rating adequate for the anticipated construction duration.

2. Application:

    a. Apply membrane at factory prior to shipment, beneath exterior shipping wrap.
    b. Membrane shall remain in place during handling, erection, and interim exposure until permanent roofing or underlayment is installed.

3. Continuity:

    a. Provide factory-applied laps suitable for field taping or sealing to maintain temporary weather protection.
    b. Coordinate membrane continuity at panel joints, penetrations, and transitions.

4. Limitations:

    a. Temporary membrane is not a substitute for permanent roofing or waterproofing systems.
    b. Repair damage to membrane incurred during handling or erection prior to continued exposure.

2.3 FABRICATION

A. Fabricate panels to sizes and shapes indicated, including openings and penetrations.

B. Factory sand exposed face smooth to 150-grit or finer.

C. Protect exposed face during shipping with manufacturer’s standard wrap.

D. Factory-seal end grain if recommended by manufacturer for moisture control.

2.4 PRESERVATIVE TREATMENT – LIMITED APPLICATIONS

A. Applicability: Pressure-preservative treatment of CLT panels shall be provided only where specifically indicated on the Drawings and only where panel dimensions and manufacturer facilities permit treatment in accordance with AWPA U1. Where full-panel pressure treatment is not feasible, provide alternative protection measures as specified herein.

B. Where preservative treatment is feasible: Provide preservative treatment meeting AWPA U1 Use Category UC3 SBX, retention 0.28 pcf minimum, followed by kiln drying to 19 percent maximum moisture content.

C. Field Treatment: Treat cuts and bores with copper naphthenate solution per AWPA M4.

D. Label treated panels per AWPA U1 and ICC requirements.

E. Alternative Protection Where Pressure Treatment Is Not Feasible: Where pressure treatment of full CLT panels is not feasible due to panel size or manufacturing limitations, provide protection through a combination of factory-applied sealers, factory-applied temporary weather protection membranes, detailing to prevent prolonged wetting, and field treatment of all cuts, edges, and penetrations in accordance with AWPA M4, as accepted by the Architect.

    All factory-applied sealers, temporary membranes, and protection measures shall be compatible with and shall not inhibit subsequent field-applied stain systems specified in Section 09 90 00. Do not apply film-forming coatings or non-breathable treatments that would interfere with stain absorption, adhesion, or appearance.

2.5 FASTENERS AND ACCESSORIES

A. Fasteners: Type 316 stainless steel for untreated CLT; hot-dip galvanized per ASTM A153/A153M for treated wood.

B. Connectors: Steel plates, angles, and screws as indicated on drawings; hot-dip galvanized or stainless steel.

C. Sealants and Gaskets: Manufacturer’s recommended materials compatible with wood substrate.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify supporting structure, bearing lines, and elevations prior to CLT installation.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install CLT panels true to line and grade; orient major strength direction as shown on drawings.

B. Provide full bearing at supports; shim and align as necessary to maintain plane.

C. Fasten panels per engineer’s design and manufacturer recommendations.

D. Seal panel-to-panel joints per manufacturer’s requirements to maintain structural diaphragm action.

E. Protect exposed surfaces from staining, abrasion, or damage during construction.

F. Temporary Protection During Erection: Provide temporary weather and contamination protection for CLT panels during erection and prior to installation of permanent roofing, membranes, or enclosure. Protect exposed faces and panel edges from precipitation, construction moisture, and staining. Remove temporary protection only when permanent enclosure or roofing is in place.

3.3 FIELD MODIFICATIONS

A. Do not field cut, notch, or drill panels except where indicated on approved shop drawings.

B. Obtain manufacturer’s and engineer’s approval for any field modification prior to execution.

C. Treat field cuts as specified under Section 2.4 for treated or sealed panels.

3.4 FIELD QUALITY CONTROL

A. Inspect installation for alignment, bearing, and attachment per approved drawings.

B. Verify exposed face meets appearance grade requirements.

C. Replace damaged or stained panels prior to acceptance.

3.5 TOLERANCES

A. Alignment: ±1/8 inch in 10 feet.

B. Surface Flatness: 1/4 inch in 10 feet; 1/2 inch in 30 feet maximum.

3.6 CLEANING AND PROTECTION

A. Clean exposed CLT surfaces of dust and debris after installation using methods that do not damage the wood surface or factory-applied finishes.

B. Protect exposed CLT surfaces from construction traffic, abrasion, staining, and moisture until occupancy.

C. Damage to CLT panels or factory-applied or field-applied finishes resulting from improper protection, handling, or sequencing shall be corrected or panels replaced at no cost to the Owner.

3.7 MOCK-UPS (STAIN & APPEARANCE)

A. Provide a stain/appearance mock-up on actual CCA-treated, KDAT SYP representative of final members:

1. Minimum 24 in by 24 in flat panel and one linear sample showing an end grain and a factory edge.

2. Include factory stain process and proposed field topcoat schedule.

3. Demonstrate color, sheen, absorption uniformity (faces/edges/ends), and touch-up of a simulated field cut.

4. Do not proceed with production/field finishing until mock-up is accepted. Retain accepted mock-up as the quality benchmark.

5. Accepted mock-ups establish the minimum acceptable standard for finish protection during delivery, storage, and installation.

END OF SECTION

SECTION 06 20 23 – INTERIOR FINISH CARPENTRY

PART 1 – GENERAL

1.1 SUMMARY

A. Definition: Finish carpentry includes carpentry which is exposed to view is non-structural, and which is not specified as part of other Sections. Types of finish carpentry work in this section include:

1. Standing and Running Trim

2. Other finish wood work indicated.

B. Related Sections include the following:

1. Division 6 Section “Rough Carpentry”

2. Division 6 Section “Wood Veneer Faced Panels”

3. Division 6 Section “Interior Architectural Woodwork”

4. Division 9 Section “Resilient Tile Flooring” (Base)

5. Division 9 Section “Gypsum Board” (Fry-Reglet Base)

1.2 SUBMITTALS

A. Shop Drawings – Submit shop drawings showing location of each item, dimensioned plans and elevations, large scale details, surface grain directions, profiles, assembly methods, joint details, attachment devices and other components

B. Samples

1. Samples shall be on material representative of that used for the project and bear a label identifying the date, project name, design professional, general contractor, manufacturer/supplier, finisher, finish technology name and number, and steps used.

2. Opaque Finish:

a. Provide 12” long for solid wood products, for each species and cut.

1.3 BUILD AMERICA, BUY AMERICA (BABA) REQUIREMENTS

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered.**

1.3 QUALITY ASSURANCE

A. Quality standards - except as otherwise shown or specified, comply with AWI's Architectural Woodwork Quality Standards for grades of interior architectural woodwork, construction, finishes and other requirements.

1.4 DELIVERY, STORAGE AND HANDLING

A. Protect finish carpentry materials during transit, delivery, storage and handling to prevent damage, soiling and deterioration.

B. Do not deliver finish carpentry materials until painting, wet work, grinding and similar operations which could damage, soil or deteriorate woodwork have been completed in installation areas. If due to unforseen circumstances, finish carpentry materials must be stored in other than installation areas, store only in areas meeting requirements specified for installation areas.

1.5 PROJECT CONDITIONS

A. Conditioning: Installer shall advise Architect of temperature and humidity requirements for woodwork installation areas. Do not install woodwork until required temperature and relative humidity have been stabilized and will be maintained in installation areas.

B. Maintain temperature and humidity in installation area as required to maintain moisture content of installed woodwork within a 1.0 percent tolerance of optimum moisture content, from date of installation through remainder of construction period. The fabricator of woodwork shall determine optimum moisture content and required temperature and humidity condition.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Wood Moisture Content:

1. Provide kiln-dried (KD) lumber with an average content range of 6% to 11%. Maintain temperature and relative humidity during fabrication, storage and finishing operations so that moisture content values for woodwork at time of installation do not exceed the following:

2. Interior Wood Finish: 8% - 13%.

B. Interior Wood for Opaque Finish (Softwood):

1. Solid Wood: Yellow-Poplar or any softwood rated "good" or "excellent" for paint finishing in AWI "Guide to Wood Species", and meeting requirements for specified woodwork grade.

2. Refer to Finish Key – MB-1 Paint Grade Mill Wood Base

3. Size: Exactly 4” high x ½” thick

2.2 ACCESSORIES

A. Rough Hardware:

1. Provide all necessary nails, screws and other hardware to properly secure members in place. Use finish or casing nails and trim head screws as appropriate where exposed.

2.3 FABRICATION

A. General

1. Wood Moisture Content: Comply with requirements of referenced quality standard for moisture content of lumber at time of fabrication and for relative humidity conditions in the installation areas.

2. Fabricate woodwork to dimensions, profiles and details indicated with openings and mortises precut, where possible, to receive hardware and other items and work.

3. Complete fabrication, assembly, finishing, and other work before shipment to project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming and fitting.

4. Measurements: Before proceeding with fabrication of woodwork required to be fitted to other construction, obtain field measurements and verify dimensions and shop drawing details as required for accurate fit.

B. Standing and Running Trim:

1. Fabricate to AWI Premium Standards.

2. Shop prepare and identify components for grain matching during site erection.

3. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

4. Sand work smooth and set exposed nails.

5. Apply wood filler in exposed nail indentations.

a. Wood filler to match surrounding surfaces and of type recommended for applied finish.

2.4 FINISHES

A. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling.

B. Opaque Finish:

1. Finish per Division 9 Section “Painting and Coating”.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Condition woodwork to average prevailing humidity conditions in installation areas prior to installing.

B. Prior to installation of Finish Carpentry, examine shop fabricated work for completion, and complete work as required, including removal of packing.

3.2 INSTALLATION

A. Grade: Install solid wood components to comply with requirements of AWI Premium Grade.

B. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

C. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Scarf running joints and stagger in adjacent and related members. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and matching final finish where transparent finish is indicated.

3.3 ADJUSTING

A. Repair damaged and defective work wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace work. Adjust joinery for uniform appearance.

3.4 CLEANING

A. Clean work on exposed and semi-exposed surfaces.

3.5 PROTECTION

A. Installer of Finish Carpentry shall advise Architect of final protection and maintained conditions necessary to ensure that work will be without damage or deterioration at time of acceptance.

END OF SECTION

SECTION 06 30 23 – WOOD VENEER FACED PANELS

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes factory-fabricated wood veneer–faced panels applied over MDF plywood substrates for use as interior finish wall panels where indicated on drawings.

B. Related Sections:

1. Section 06 20 03 – Interior Finish Carpentry.
2. Section 06 40 23 – Interior Architectural Woodwork
3. Section 09 91 00 – Painting (for field finishing).

1.2 REFERENCES

A. AWI / AWS – Architectural Woodwork Standards, latest edition.

B. HPVA HP-1 – Hardwood and Decorative Plywood.

C. ANSI / A208.2 – MDF for Interior Applications.

D. ASTM E84 – Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

A. Product Data: Manufacturer’s data for each type of panel, substrate, and adhesive.

B. Shop Drawings: Indicate the following:

1. Panel sizes, joint locations, reveals, and grain direction.

2. Flitch number, leaf numbering, and sequence assignment for each panel.

3. Diagrammed veneer-matching layout showing book-match within each panel and sequence-match continuity across the full elevation.

4. Orientation of grain (vertical or horizontal) and alignment requirements at joints.

5. Edge conditions and backer veneer type.

C. Samples:

1. Minimum 12" x 12" veneer panel sample on specified substrate, finish applied.

2. Edge detail and reveal sample, minimum 12" length.

D. Certificates: Compliance with AWI premium grade requirements.

E. Maintenance Data: Cleaning and repair instructions.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications:

1. Minimum 5 years' experience in fabrication of architectural wood veneer panels.

2. Certified participant in AWI Quality Certification Program (QCP) for Premium Grade work.

B. Mockup: Provide one representative installed veneer-faced panel mockup for Architect's review and approval. Mockup shall be full thickness and include typical edges, joints, reveals, and mounting method. Mockup size shall be as required to adequately evaluate appearance and quality and shall be approved by the Architect prior to fabrication of production panels.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's unopened packaging with labels intact.

B. Do not deliver veneer panels until painting, wet work, grinding, or similar operations that could damage or soil woodwork have been completed in installation areas

B. Store flat, in conditioned space, protected from moisture and sunlight.

C. Acclimate panels at project site not less than 72 hours prior to installation.

1.6 PROJECT CONDITIONS

A. Do not install until building is enclosed, HVAC operating, and ambient conditions stabilized.

B. Installer shall advise Architect of required temperature/humidity; do not install until stabilized. Maintain conditions to keep installed woodwork moisture content within ±1.0% of optimum

C. Maintain temperature and humidity per AWI standards.

1.7 BUILD AMERICA, BUY AMERICA (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Veneer:

1. Brookside Veneers, Product: Braewood Quartered Ash 2-323/XV PF, or equal.

B. Acceptable Manufacturers:

1. Brookside Veneers.
2. Oberflex.
3. FormWood Industries.
4. Or equal.

2.2 MATERIALS

A. Panel Core:

1. MDF Core, ANSI A208.2 Grade 155, meeting HPVA HP-1.

a. MDF core substrates are permitted for vertical veneer-faced panel applications only and shall not be used where panels serve as structural backing, cabinet carcasses, horizontal surfaces, or substrate for countertops. Where veneer-faced panels occur within 2'-0" of plumbing fixtures or in areas subject to incidental moisture, provide moisture-resistant MDF core or an alternate substrate approved by Architect

2. Thickness: 3/4 inch nominal, unless otherwise indicated as 5/8” or 1//2”.

3. Fire Rating: Class A per ASTM E84 (if required).

B. Veneer Facing:

1. Species: Quartered Ash.

2. Cut: Quartered.

3. Matching: Provide book-matched veneer within each individual panel. Arrange all panels within each elevation as a sequence-matched set, using consecutive leaves from the

same flitch so that grain and color flow continuously horizontally across the panel width and vertically through the panel height of the elevation.

4. Finish: Field applied transparent finish. See Section 09 90 00 Painting and Coating.

5. Edges where exposed shall be wrapped with same surface veneer finish.

C. Adhesives:

1. Type II water-resistant adhesive, compatible with veneer and substrate.

D. Edge Banding:

1. Matching solid ash edge, 1/8" thick minimum.

E. Backer Veneer:

1. Balance veneer, same species or phenolic backer to ensure panel stability.

2.3 FABRICATION

A. Fabricate panels to sizes indicated on approved shop drawings. Obtain field measurements prior to fabrication for accurate fit.

B. Veneer Layout and Matching:

1. Book-Matching: Provide book-matched veneer within each individual panel, using adjacent leaves from the same flitch.

2. Sequence-Matching: Arrange all panels within each elevation as a sequence-matched set using consecutively sliced leaves from a single flitch to maintain uniform grain and color flow horizontally across the four-panel width and vertically through the three-panel height of the elevation.

3. Maintain flitch integrity; mixing leaves from different flitches within the same elevation is not permitted.

4. Clearly identify flitch numbers, leaf sequence, and panel assignments on shop drawings.

5. Where individual panel widths exceed the width of a single veneer leaf, fabricate panels using multiple adjacent leaves while maintaining book-matched pairs within the panel. Under no circumstances shall veneer matching default to slip-match, random match, or non-symmetrical patterns unless specifically approved by the Architect. Maintain leaf order and flitch continuity for all multi-leaf panels.

C. Panel Construction:

1. Fabricate panels with reveals, edges, and profiles consistent with design intent and approved shop drawings.

2. Wrap exposed edges with matching veneer or solid lumber edge per 2.2.B.5.

3. Provide balanced panel construction with backer veneer to minimize warping.

D. Surface Preparation:

1. Sand all surfaces smooth and ready for field finishing; ensure no telegraphing of core through veneer.

2. Maintain uniform surface preparation across all panels within the elevation to ensure consistent final appearance.

E. Quality Control:

1. Maintain consistent veneer color, figure, and grain direction across all sequence-matched panels.

2. Panels exhibiting mismatched veneer, off-sequence leaf placement, or visible fabrication defects shall be rejected and replaced.

2.4 ACCESSORIES

A. Mounting Clips and Z-Clips: Aluminum, prefinished, by PanelClad, Monarch Metal, or equal.

B. Reveal Trims: Extruded aluminum or PVC per design.

C. Sealants: Low-VOC, color to match adjacent finishes.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify substrates are smooth, clean, dry, and level prior to installation.

B. Notify Architect in writing of unsatisfactory conditions.

3.2 INSTALLATION

A. Install panels true, level, and plumb per approved shop drawings and AWI Premium Grade requirements.

B. Maintain veneer sequence and orientation as shown on approved flitch-mapping shop drawings. Install panels in exact numerical sequence to preserve continuous grain flow across the full elevation. Panels installed out of sequence shall be removed and replaced.

C. Maintain uniform reveal widths and flushness per specification. Align grain direction consistently across joints.

D. Scribe to adjacent surfaces to maintain tight, uniform joints without interrupting apparent veneer continuity.

E. Provide aluminum Z-clip concealed panel-hanger system, by Monarch Metal, PanelClad, or equal, providing secure attachment and field-adjustable alignment. Face fasteners are not permitted."

3.3 FIELD QUALITY CONTROL

A. Inspect completed installation for uniform appearance, alignment, and finish.

B. Replace panels exhibiting damage, mismatched veneer, or visible defects.

3.4 FIELD FINISHING

A. Field finish per Section 09 90 00 – Painting and Coating.

B. Coordinate finish schedule, stain, and topcoat with Architect's selections.

C. Apply finish uniformly across all panels; maintain continuous appearance across matched flitches.

C. Lightly sand and clean surfaces prior to finish application.

D. Back-seal field-cut edges and penetrations with compatible sealer. Where a wood balance veneer (not phenolic) is used on back, apply one sealer coat to back of panels to limit moisture exchange

3.5 CLEANING AND PROTECTION

A. Remove adhesive residues and fingerprints.

B. Protect finished work from damage until Substantial Completion.

END OF SECTION

SECTION 06 40 23 – INTERIOR ARCHITECTURAL WOODWORK

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Plastic-laminate cabinets and shelving
2. Architectural cabinets and shelving
3. Quartz countertops
4. HDPE
5. Metal toe-kick at architectural cabinets
6. Cable suspended glass shelving and picture hanging cable system
7. Woodwork accessories (hinges, pulls, brackets, stand-offs, etc.)

B. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips unless concealed within other construction before woodwork installation.

C. Related Section include the following:

1. Division 6 Section “Rough Carpentry”.
2. Division 6 Section “ Translucent Panel Resin System” – Resin panel systems
3. Division 6 Section “Interior Finish Carpentry”.
4. Division 6 Section “Wood Veneer Faced Panels”.
5. Division 8 Section “Glazing”. Display cabinet glazing and aluminum channels.

1.2 SUBMITTALS

A. Product Data:

1. Plastic laminate: Exposed, semi-exposed, and concealed surface materials. Indicate thickness, panel core type and thickness, and edge banding material and thickness.
2. Quartz
3. All adhesive types being used in field.
4. All cabinet hardware (except fasteners).

5. Finishing requirements.

B. Shop Drawings:

1. General:

a. Shall show each component of Product in plan, elevation, and section view as needed to clearly indicate the Product being provided, its location, and its method of construction and attachment.

b. Illustrate wall or ceiling-applied surfacing and/or standing and running trim, wall mounted shelf standards, door and window frames, and the attachment methods.

2. Millwork:

a. Trim and/or scribe shown in full-sized profile; casework shown in plan, elevation, and section view; dimensions necessary to construct cabinets; dimensions and attachment method of face frame members.

b. Type and thickness of drawer members (including heights and depths), type and thickness of cabinet doors, and section of each cabinet type or configuration.

c. Details of all joinery and connections, specification and location of special metal work and/or specialty items, and provision for field dimensions.

d. Details showing method of cabinet attachment to walls and floors.

e. Blocking or strapping requirements and their locations (blocking to be furnished by others) shown on cabinet elevations with dimensions above finished floor.

f. Details need not be drawn if properly referenced to a supplementary document.

3. Standing and Running Trim

a. Trim in detail with elevations as necessary for coordination with other trades.

b. Column, pilaster, cornice, finial, and/or pediment construction details, sufficient in scale to clearly indicate unique features in construction.

c. Sections for corners (inside and outside), joints (within the Product and between Product and other trim), relationship to features provided by other trades, attachment, and relationship to adjacent trim members or features.

4. Countertops, sills, etc.

a. Each countertop in plan view, including indication of field joints and type, quantity, and layout of joint fasteners.

b. Sink size, type, mounting, and location if provided to manufacturer/supplier prior to shop drawing submittal.

c. Attachment of casework (including fastener type, quantity, and layout).

d. For wall-mounted tops without cabinets below, plan view indicating build up locations and support bracket locations.

e. Method of attachment to supports for wall mounted tops (including fastener type and quantity).

f. Elevation view and interface to casework and support brackets.

g. Detail showing front and/or end overhang, front and/or end edge types, splash type and height, drip groove, and end splash return.

C. Cable Suspended Glass Shelving:

1. Product Data:

a. Manufacturer’s product sheets for cable suspension components, clips, and accessories.

b. Data indicating materials, finishes, dimensions, and load capacities of cable and shelf supports.

2. Shop Drawings:

a. Indicate shelf locations, mounting details, attachment to structure, and coordination with wall and ceiling assemblies.

b. Identify each shelf’s size, glass type, and number of suspension cables.

3. Samples:

a. Submit one each of cable, attachment fitting, and shelf clip showing finish and fabrication quality.

b. Submit one sample of glass edge and finish treatment.

D. Samples:

1. Plastic laminate and quartz for each type, color, pattern, and surface finish.

2. Thermoset decorative panels, for each type, color, pattern, and surface finish.

3. Cabinet hardware: one sample of each decorative and functional item in finish specified.

4. Transparent and opaque finish samples are to be submitted per Division 6 Section “Interior Finish Carpentry”.

1.3 QUALITY ASSURANCE

A. <u>Where conflicts exist between this Specification and the Drawings, the more stringent or higher-quality requirement shall govern.</u>

B. Design changes / substitutions during submittal phase:

1. The manufacturer/supplier is encouraged to make technical suggestions and raise questions with the Architect. Changes and/or substitutions incorporated into shop drawings do not constitute a request for approval. Changes to material and/or design must be specifically identified within the submittal package. The manufacturer/ supplier must then request approval of the suggested changes by submitting a formal request for approval. Means and methods of manufacturing, such as joinery details, are not considered material changes unless otherwise detailed in the specifications.

2. Descriptions of substitutions and/or change requests from Contract Documents shall be itemized separately from the shop drawings and shall be submitted no later than the time of shop drawing submittal. Descriptions of substitutions shall include notation of the reason for the change request and a statement of the anticipated impact to schedule, cost, and possible impact to other trades.

C. Quality standards – except as otherwise shown or specified, comply with AWI's Architectural Woodwork Quality Standards, including installation, for grades of interior architectural woodwork, construction, finishes and other requirements.

D. Manufacturer Qualifications: Minimum 5 years' experience producing similar cable-suspended glass display systems.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.5 BUILD AMERICA, BUY AMERICA (BABA) REQUIREMENTS

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 MATERIALS

A. Wood Products:

1. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing **no urea formaldehyde**.

a. Moisture-resistant MDF or exterior-grade / moisture-resistant plywood is required within 2'-0" of sinks, faucets, ice makers, drinking fountains, or other plumbing fixtures. Standard MDF is not permitted in these locations.

b. Particleboard is not an acceptable substrate. Plywood substrates shall be used where required for structural performance, load resistance, moisture resistance, or support of countertops, shelving, and wall-mounted cabinetry..

B. Plywood:

1. Provide plywood complying with AWI and ANSI requirements, suitable for intended use.

2. Use plywood substrates where required for structural performance, load resistance, moisture resistance, or support of countertops, shelving, and wall-mounted cabinetry.

3. Plastic Laminate Substrates: Where plastic laminate is applied over plywood, provide a smooth, non-telegraphing overlay substrate, minimum 1/4 inch thick MDF, HDF, or approved equal, shop- or factory-laminated to the plywood core. Direct application of plastic laminate to raw plywood is not permitted.

4. Provide hardwood products per Division 6 Section “Interior Finish Carpentry”.

5. Provide veneer facing products per Division 6 Section “Wood Veneer Faced Panels”.

6. Where veneer-faced panels are incorporated into cabinetry, substrates shall comply with the requirements of this Section governing structural performance, moisture exposure, and load conditions.

C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard. Provide both standard-core high-

pressure laminate and through-color Color-Core) laminate as required by design and as indicated on the Drawings.

1. Through-color (Color-Core) laminate: Provide where PLAM-3 is indicated on the drawings.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Wilsonart International

   b. Formica Corporation

   c. Abet Laminati

   d. Pionite

   e. Or equal

C. Thermoset Decorative Panels (Melamine): medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

1. Provide at interior locations of cabinets and drawers **only**. All other surfaces to be plastic laminate whether called out on the drawings or not.

D. Quartz Surfacing:

1. Acceptable Products:

   a. Wilsonart

   b. Cambria

   c. Dupont - Zodiaq

   d. Silestone by Cosentino USA

   e. Diresco

   f. Hanstone

   g. Or equal

2. Composition: Quartz aggregate, resin, and color pigments formed into flat slabs,

3. Anti-microbial protection integral to sheet.

4. Substrate: Provide exterior-grade or moisture-resistant plywood substrate where quartz countertops are installed, including at wall-mounted or cantilevered conditions. MDOT substrates are not permitted beneath quartz countertops.

E. HDPE

1. High-Density Polyethylene (HDPE) Sheet:

   a. Material: Solid high-density polyethylene sheet, non-porous, moisture-resistant, impact-resistant, and chemical-resistant.

   b. Thickness: 3/4 inch nominal, unless otherwise indicated.

   c. Color: White.

   d. Finish: Smooth, factory-finished surfaces.

   e. Use: Cabinet bottoms, liners, and base components at locations subject to moisture exposure, cleaning, or waste handling, including trash receptacle cabinets.

F. Metal Toe-Kick

1. Black PVD Stainless Steel Toe-Kick

   a. 14-gauge (0.075") Type 304 stainless
   b. PVD finish – satin brushed sheen - Black
   c. Height: 4"

G. Glazing:

1. Product Description: Based on display cabinet details, provide glazing materials required by Section 08 80 00 Glazing.

H. Cable Suspended Glass Shelving:

1. Basis of Design: Nova Display Cable Suspended Glass Shelving Kit:

   a. Or Equal complying with requirements and BABA compliant.

2. Glass Shelf Suspension System to comprise of:

   a. Product # CA4-3: 3mm cable set including (1) each: 3mm diameter cable, top attachment, & bottom attachment. Provide (4) for each shelf. Weight capacity per cable shall be 400#. Four (4) to handle up to 1600#.

   b. Product # CG15-3: Shelf support for ½" glass. Edge grip. Provide (4) for each shelf. Weight capacity for each clip shall be 25#. Four (4) to handle up to 100#.

   c. Quantities: As shown on drawings.

3. Art Hanging System:

   a. Product # CA-4 Cable with ceiling to floor fixings: 1.5mm Cable set including (1) each: 1.5mm cable, top attachment, & bottom attachment. Quantity: As shown on the drawings.

b. Product # PA-8 Toggles: Connects CA-4 to Rebate Channel (AC-6). Quantity: Twelve (12).

c. Product AC-6 Rebate Channel: Rebate channel in 6' length. Length as shown on the drawings.

d. Product CF-125: Picture Hook Support. Quantity: Twelve (12) hooks.

4. Glass Shelves:

a. Glass shelves shall be 15" x 48" x ½" clear low-iron tempered glass.

b. Quantity: As shown on the drawings.

5 Accessories: Provide accessories for cable glass shelving system as required for a complete and functioning system.

2.2 ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural woodwork. Manufacturer listed is Basis of Design.

B. Hinges:

1. All locations except Display Cabinets: Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, self-closing, 160 degree.

2. At Display Cabinets: SOSS or equal heavy-duty Model 218 Invisible Hinge, high strength plated steel and heavy duty zinc alloy castings, matt black, 180 degree. Provide four per leaf, unless otherwise indicated on the drawings. Provide number of hinges per leaf as recommended by the manufacturer for door size and weight.

3. At Millwork in Corridor 104 and Pocket Door at "Architectural Coiled Wire Grilles and Screens": SuGatsune or equal heavy-duty steel concealed overlay hinge, Model J95-C24/25T-BN, matt black, spring loaded self close. Provide number of hinges per leaf as recommended by the manufacturer for door size and weight.

C. Pulls: "DP3-90M" Drawer Pull, matt black (J-Style) by Doug Mockett & Company.

1. Length: provide 6" unless noted otherwise to be full length of drawer.

2. At Pocket Door at "Architectural Coiled Wire Grilles and Screens": Rockwood or equal 94C Flush Pull concealed mounting, matt black.

D. Drawer Slides: Side mounted; full-extension type; zinc-plated steel ball-bearing slides, 100 pound rated.

E. Door Locks – all locations except Display Cabinet: BHMA A156.11, E0712, matte black.

1. At Display Cabinet Doors: At each inactive pair of door leaves, provide two hidden latch gate latch (one top and one bottom) flush bolts, as manufacturered by Rustica

or equal. Components shall be concealed from view on the display case side. Locks shall be Recogwood or equal stainless steel hidden manager tubewell mortise door lock with key and screw – part number NPPS54G.

2. At Millwork in Corridor 104 and Pocket Door at “Architectural Coiled Wire Grilles and Screens”: Provide concealed magnetic catches at each self-closing millwork door to ensure positive closure; self-closing hinges alone shall not be relied upon to hold doors in the closed position. Coordinate magnetic holding strength with door size and weight.

F. Drawer Locks: BHMA A156.11, E07041, matte black.

G. Shelf Supports: Where shelving is indicated as "adjustable shelf standards", provide Hafele standard, 25mm, silver anodized aluminum finish or equal. Include metal shelf supports in matching finish.

H. Shelf Supports: Where shelving is indicated as “cantilevered or floating shelving with concealed hangers” in Break Room, provide concealed floating shelf bracket systems consisting of a minimum 1.25-inch-high steel backplate with minimum 3/4-inch-diameter solid steel support rods, sized to accommodate 1.75-inch to 2.0-inch finished shelf thicknesses.

1. Support rod lengths shall be manufacturer-recommended for indicated shelf depths and loading conditions.

2. Brackets shall be designed for structural support, not decorative use, and shall be rated for a minimum uniformly distributed load of 40 psf, unless otherwise indicated.

3. Install brackets anchored directly to structural backing or framing; installation into gypsum board only is not permitted.

4. Provide brackets of a single manufacturer per project, with concealed components fully recessed within the shelf and wall.

5. Shelves supported on concealed or cantilevered brackets shall be fabricated with plywood cores or solid lumber substrates. MDF substrates are not permitted in load-bearing or cantilevered shelf conditions.

I. Counter Support Bracket:

1. Concealed Mount: L-shaped millwork powder coated black countertop support steel bracket equal to Ekena, ½” thick by D x H required to support the millwork counter openings.

J. Round Grommets:

1. Typical Locations: “TG Flip Top Series, 2" hole”, by Doug Mockett & Company. Color to be selected by Architect.

a. Provide 1 per 36” of countertop area with open area below whether shown on drawings or not.

2. Final locations as directed by Architect.

K. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Polished Stainless Steel, 629

L. Adhesives, General: Do not use adhesives that contain urea formaldehyde.

2.3 FABRICATION

A. General: Complete fabrication to maximum extent possible before shipment to Project site. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.

1. Interior Woodwork Grade: AWI Premium

2. Shop cut openings to maximum extent possible. Sand edges of cutouts to remove splinters and burrs. Seal edges of openings in countertops with a coat of varnish.

B. Plastic-Laminate Cabinets:

1. AWI Type of Cabinet Construction: Flush overlay.

2. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate as follows:

a. Horizontal Surfaces Other Than Tops: Grade HGS.

b. Vertical Surfaces: Grade HGS.

c. Edges: PVC edge banding, 0.12 inch (3 mm) thick, matching laminate in color, pattern, and finish.

3. Materials for Semi-exposed Surfaces Other Than Drawer Bodies: Thermoset decorative panels (melamine).

4. Drawer Sides and Backs: Thermoset decorative panels (melamine).

5. Drawer Bottoms: Thermoset decorative panels (melamine).

6. Colors, Patterns, and Finishes: As selected by Architect from laminate manufacturer's full range.

7. Cabinet Bottoms at Trash Receptacles and Wet or Service Locations:

a. Provide cabinet bottoms constructed of two (2) layers of 3/4 inch HDPE sheathing, mechanically fastened and fully supported.

b. HDPE layers shall be continuous, non-absorbent, and resistant to moisture, impact, and cleaning chemicals.

c. Seal perimeter joints between HDPE and adjacent cabinet components with continuous waterproof sealant.

d. Do not substitute plywood, MDF, particleboard, or other wood-based products for HDPE at these locations.

C. Architectural Cabinets and Shelving, Paneling, Standing and Running Trim, Transparent and Opaque Finish:

1. As specified in Division 6 Section “Interior Finish Carpentry”.

D. Quartz Countertops:

1. General: Except as otherwise indicated, provide separate quartz countertops and other quartz components (installed on support system as indicated).

2. Colors: As indicated on Drawings, or if not indicated, as selected from manufacturer’s full line.

3. Accessories: provide manufacturer’s approved joint sealer and other accessories for a complete installation.

E. Metal Toe-Kick:

1. Fabricate toe-kick as long continuous sections where possible (8–10 ft typical) to minimize joints.

2. Provide 1-inch return flange at top for mechanical fastening to millwork base or blocking. All edges to have ½” hemmed edge.

a. Hidden mechanical fastening; continuous concealed attachment to millwork base frame.

3. Miter inside and outside corners. Weld and grind smooth for seamless appearance.

4. Match grain direction on adjoining faces.

5. Maintain 1/16″ reveal or compressible gasket joint where toe-kick meets floor for expansion.

a. Seal bottom edge continuous with black silicone sealant to prevent water intrusion under terrazzo maintenance.

PART 3 – EXECUTION

3.1 INSTALLATION

A. General:

1. Before installation, condition woodwork to average prevailing humidity conditions in installation areas. Examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

2. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

3. Install woodwork level, plumb, true, and straight to a tolerance of 1/8 inch in 96 inches. Shim as required with concealed shims.

4. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

   a. Touch-up shop finishes at field cuts.

5. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork.

6. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation.

7. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c.

8. Provide cutouts for electrical panels and grommet holes. Verify locations of cutouts from on-site dimensions. Prime paint cut edges on openings; provide grommet covers per Architect's selection for exposed surfaces.

9. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

   a. Caulk space between backsplash and wall with sealant specified in Division 7 Section "Joint Sealants."

   b. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

   c. All counter heights shall be maximum 34" above finish floor to comply with ADA requirements unless indicated otherwise on Drawings.

      NOTE: If a sink is present in the countertop, the maximum measurement is to the highest surface of the sink rim, NOT the countertop.

   d. Countertops without base cabinets for support shall not violate ADA minimum knee clearances.

10. Repair damaged and defective woodwork to eliminate visual and functional defects; where repair is not possible, replace woodwork.

3.2 CABLE SUSPENDED GLASS SHELVING

A. EXAMINATION

1. Verify that supporting substrates, attachment points, and adjacent construction are plumb, level, and capable of supporting imposed loads indicated for the cable-suspended shelving system.

2. Report defects in substrates or framing that may adversely affect installation or performance.

3. Do not proceed until unsatisfactory conditions have been corrected.

B. PREPARATION

1. Coordinate locations of ceiling and floor anchor points with architectural drawings.

2. Verify alignment with wall finishes, casework, and lighting prior to layout.

3. Protect adjacent materials from damage during drilling, fastening, and glass handling.

C. INSTALLATION

1. Install complete cable-suspended shelving system in accordance with manufacturer’s written instructions and approved shop drawings.

2. Provide all hardware, fittings, and accessories required for a secure, true, and level installation.

3. Adjust vertical cables for equal tension and alignment.

4. Set glass shelves level, square, and true to plane, with uniform bearing in edge grips.

5. Provide isolation washers or gaskets between dissimilar metals and glass where recommended by manufacturer.
6. Install art-hanging components (rebate channel, toggles, picture hooks) straight, level, and aligned with shelving system.

7. Anchor hardware to structural framing or substrate capable of supporting design load of 100 lb minimum per shelf or as indicated on drawings.

8. Install in compliance with the Build America, Buy America (BABA) requirements specified in Part 1.

D. ADJUSTING AND CLEANING

1. After installation, adjust cable tension to eliminate sag and ensure uniform appearance.

2. Replace damaged or defective components.

3. Clean exposed metal surfaces and glass per manufacturer's recommendations; remove fingerprints, dirt, and debris without scratching surfaces.

4. Touch up minor finish damage to match adjacent surfaces.

E. PROTECTION

1. Protect installed shelving and hanging systems from damage during remainder of construction.

2. Do not load shelves until installation is accepted by Architect.

F. TRAINING

1. Provide on-site training to Owner's designated representatives upon completion of installation and prior to Completion.

2. Training shall include a demonstration of the installed cable-suspended shelving and art-hanging system, including:

   a. Proper loading limits and distribution for glass shelves and hanging components.

   b. Identification of adjustment points, fittings, and tensioning hardware.

   c. Explanation of manufacturer-recommended procedures for minor adjustments to shelf elevation and cable tension, if permitted.

3. Clearly identify adjustments that require specialized tools, technical expertise, or partial disassembly, and advise Owner that such adjustments are not intended to be routinely performed by untrained personnel.

4. Provide written instructions and manufacturer documentation outlining adjustment limitations, recommended maintenance practices, and conditions under which manufacturer or installer service should be engaged.

5. Emphasize that improper adjustment, over-tensioning, or modification by the Owner may compromise system performance, appearance, or safety and may void applicable warranties.

6. Submit training sign-in sheet and written materials to Architect as part of closeout documentation.

G. TESTING

1. Test installed work for rigidity and ability to support loads.

2. Adjust moving or operating parts to function smoothly and correctly

3.3 CLEANING

A. Clean exposed and semi exposed surfaces, including debris in cabinets and drawers.

3.4 PROTECTION

A. Protect woodwork from damage and maintain design environmental conditions.

END OF SECTION

SECTION 07 14 30 –LIQUID APPLIED WATERPROOFING

PART 1 – GENERAL

1.1 SUMMARY

A. Provide a cold liquid-applied polymethyl methacrylate (PMMA) waterproofing system only at the tops of exterior board formed concrete columns/pilasters and walls where indicated on the drawings.

1. Work includes flashing and sealing tops of board-formed exterior columns/pilasters including conduit penetrations, glulam base plates and similar details associated with tops of columns at both the main building and picnic pavilions.

2. Work includes flashing and sealing tops of board-formed exterior cast-in-place concrete walls where indicated.

3. No roofing or weather-exposed deck surfaces are included in this scope, and no weathertight roof system or roofing warranty is required.

B. Work shall include, but is not limited to, the following:

1. Preparation of top of columns/pilasters and wall substrates and other flashing substrates.
2. Liquid applied, reinforced flashings.
3. Liquid applied, reinforced waterproofing membrane.
4. Associated accessories and labor to provide a continuous, durable, watertight seal around conduit penetrations and base plates

C. Related Sections include the following:

1. Division 7 Section “Sheet Metal Flashing and Trim”

1.2 SUBMITTALS

A. Product Data Sheets: Submit manufacturer’s product data sheets, installation instructions and/or general requirements for each component.

B. Shop Drawings:

1. Construction details of all conditions
2. Thickness of materials

C. Safety Data Sheets: Submit manufacturer’s Safety Data Sheets (SDS) for each component.
D. Written certification from the PMMA system manufacturer certifying the applicator is currently authorized for the installation of the specified system.

E. Warranty: Installer’s and manufacturer’s warranty certificates and inspection reports shall be included in Close-Out Documents.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall have a minimum of 10 years’ experience producing PMMA or similar cold liquid-applied waterproofing materials in the United States and shall provide technical support for the installer.

B. Installer Qualifications: Installer shall be trained or approved by the membrane manufacturer and experienced in applying PMMA waterproofing on similar projects.

C. Mock-Up: Prior to general application, install a representative sample area on one of the mock-up column tops for review by Architect to verify appearance and workmanship.

D. Manufacturer’s Observation: Manufacturer’s representative shall visit the site at least once during installation to verify proper mixing, fleece embedding, and film thickness. Provide written confirmation of inspection and compliance.

1.4 DELIVERY, STORAGE AND HANDLING

A. Refer to each product data sheet or other published literature for specific requirements.

B. Deliver materials and store them in their unopened, original packaging, bearing the manufacturer's name, related standards, and any other specification or reference accepted as standard.

C. Protect and store materials in a dry, well-vented, and weatherproof location. Only materials to be used the same day shall be removed from this location. During cold weather, store materials in a heated location, removed only as needed for immediate use.

D. When materials are to be stored outdoors, store away from standing water, stacked on raised pallets or dunnage, at least 4 in or more above ground level. Carefully cover storage with “breathable” tarpaulins to protect materials from precipitation and to prevent exposure to condensation.

E. Properly dispose of all product wrappers, pallets, cardboard tubes, scrap, waste, and debris. All damaged materials shall be removed from job site and replaced with new, suitable materials.

1.5 PROJECT / SITE CONDITIONS

A. Safety:

1. The Contractor shall be responsible for complying with all project-related safety and environmental requirements.

2. The Contractor shall review project conditions and determine when and where conditions are appropriate to utilize the specified liquid applied or semi-solid roofing materials. When conditions are determined by the contractor to be unsafe or undesirable to proceed, measures shall be taken to prevent or eliminate the unsafe or undesirable exposures and conditions, or equivalent approved materials and methods shall be utilized to accommodate requirements and conditions.

3. The contractor shall refer to product Safety Data Sheets (SDS) for health, safety, and environment related hazards, and take all necessary measures and precautions to comply with exposure requirements.

B. Environmental Conditions:

1. Monitor substrate and material temperature, as well as all environmental conditions such as ambient temperature, moisture, sun, cloud cover, wind, humidity, and shade. Ensure conditions are satisfactory to begin work and ensure conditions remain satisfactory during the installation of specified materials. Materials and methods shall be adjusted as necessary to accommodate varying project conditions. Materials shall not be installed when conditions are unacceptable to achieve the specified results.

2. Precipitation and dew point: Monitor weather to ensure the project environment is dry before, and will remain dry, during the application of roofing materials. Ensure all roofing materials and substrates remain above the dew point temperature as required to prevent condensation and maintain dry conditions.

1.6 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.6 WARRANTY

A. Installer's Warranty: At completion of work, provide a written and notarized warranty from the applicator guaranteeing that the PMMA waterproofing installation at column tops will remain free from defects in materials and workmanship and watertight for a period of two (2) years from date of Substantial Completion.

B. Warranty shall cover:

1. Cracking, delamination, or loss of adhesion of the PMMA membrane.

2. Leakage at conduit or other penetrations treated under this Section.

C. Corrective Work: During the warranty period, repair or replace any defective areas or reapply waterproofing as necessary to restore watertightness at no cost to the Owner.

D. No roof system or "No Dollar Limit" warranty is required. This warranty applies only to localized waterproofing at column tops and associated penetrations.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Soprema, USA (Basis of Design)

B. Siplast

C. Johns Manville

D. Kemper

E. Or equal providing PMMA-based materials meeting requirements and BABA compliance

2.2 PMMA WATERPROOFING SYSTEM FOR CONCRETE COLUMN TOPS

A. Description:

1. Two-component, reinforced liquid-applied PMMA waterproofing system used to encapsulate the tops of concrete columns and seal around base plates, electrical and conduit penetrations exposed to weather.

B. Flashing Membrane:

1. Polymethyl Methacrylate Flashing Membrane (PMMA):

a. Soprema “Alsan RS 230 Flash” (or equal): Rapid curing, polymethyl methacrylate (PMMA) liquid resin with an embedded polyester reinforcing fleece fully embedded between two resin coats to form a monolithic seal used for monolithic waterproofing flashing membranes.

(1) VOC content: 4.2 g/L
(2) Color: As selected by Architect from manufacturer’s standard range.

b. Soprema “Alsan RF 287 Color Finish Base: Colorless PMMA resin designed to be mixed with Alsan RS color additive.

(1) Color to match concrete columns: light grey, pebble grey, window grey or stone grey. Final color to be determined in field on mockup column.

2.3 ACCESSORIES

A. Primers:
1. Soprema “Alsan RS 276 Primer” (or equal): Rapid curing, polymethyl methacrylate (PMMA) liquid resin used to promote adhesion of PMMA membranes over various substrates.

a. VOC content: 2.6 g/L
b. Color: Clear

B. Catalyst: Soprema “Alsan RS Catalyst Powder” (or equal): Reactive agent used to cure PMMA/PMA liquid resins.

C. Reinforcing Fabric:

1. Soprema “Alsan RS Fleece” (or equal): Woven polyester reinforcement used in PMMA/PMA liquid applied membrane and flashing applications.

a. Thickness: 30-40 mils
b. Weights: 110 g/m^2

D. Cleaner:

1. Soprema “Alsan RS Cleaner” (or equal): Clear, blended solvent used to clean and prepare plastic and metal surfaces, and used to clean existing ALSAN RS surfaces prior to the application of PMMA/PMA liquid applied membrane and flashings.

a. VOC content: 900 g/L
b. Color: Clear

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that concrete column tops are clean, dry, sound, and free from curing compounds, laitance, grease, or loose material.

B. Verify that conduit and penetration sleeves are securely in place and properly spaced to allow full membrane coverage around each item.

C. Do not begin work until unsatisfactory conditions have been corrected. Starting application constitutes acceptance of substrate conditions.

3.2 PREPARATION

A. Grind, fill, and smooth surface irregularities and voids greater than 1/16 inch with manufacturer-approved repair mortar or epoxy filler.
B. Mask adjacent finished surfaces to prevent resin staining.

C. Ensure substrates are completely dry and free of frost or condensation before priming.

D. Conduct a manufacturer-approved adhesion test as required to confirm proper bonding to substrate.

3.3 APPLICATION – PMMA WATERPROOFING

A. Primer Application:

1. Mix primer resin and catalyst per manufacturer’s instructions.

2. Apply evenly with brush or roller at recommended coverage rate.

3. Allow primer to cure fully before proceeding.

B. Membrane Installation:

1. Precut reinforcing fleece to fit over column top and around individual conduit penetrations and top of wall

2. Mix PMMA resin (Alsan RS 230 Flash or equal) with catalyst for 2 minutes at low speed; do not aerate.

3. Apply base coat to substrate using brush or roller.

4. Immediately embed fleece into wet resin, smooth side up, ensuring full contact and no wrinkles.

5. Saturate fleece with a second coat of resin until fully encapsulated.

6. Overlap fleece a minimum of 2 inches at joints.

7. At penetrations, form finger flashings and extend membrane vertically a minimum of 2 inches up conduit sides.

C. Curing and Protection:

1. Allow membrane to cure per manufacturer’s published schedule before exposing to moisture.

2. Protect finished work from damage until permanent fixtures or coverings are installed.

3.4 FIELD QUALITY CONTROL

A. Inspect finished membrane for uniform coverage, full fleece saturation, and absence of voids, pinholes, or wrinkles.

B. Touch up and repair deficient areas immediately using fresh resin and fleece.

C. Submit manufacturer’s inspection report verifying installation compliance with published requirements.

3.5 CLEANING

A. Clean uncured resin from tools and adjacent surfaces using manufacturer’s recommended cleaner.

B. Properly cure and dispose of unused materials in accordance with local regulations.

END OF SECTION

SECTION 07 19 00 – WATER REPELLENTS

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes penetrating water-repellent coatings for the following vertical surfaces:

1. **All** masonry at new construction, including architectural unit masonry and cast stone.

B. Related Sections include the following:

1. Division 4 Section “Architectural Unit Masonry”

2. Division 4 Section “Cast Stone Masonry”

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Indicate clearly on the submittal if the manufacturer recommends an additional coat per the type of substrate condition.

B. pH level test results prior to application.

C. Product test reports.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer

B. Mock-up: after cleaning of mock up panel per Division 4 Section “Architectural Unit Masonry”, coat entire surface of panel for review by Architect. Do not proceed with permanent Work until acceptance in writing.

1.4 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer and Applicator agree(s) to repair or replace materials that fail to maintain water repellency within two years from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 PENETRATING WATER REPELLENTS

A. **Siloxane**, Penetrating Water Repellent: Clear, oligomerous alkylalkoxysiloxanes containing 10 percent or more solids; with alcohol, ethanol, mineral spirits, water, or other proprietary solvent carrier; and with more than 5 lb/gal of VOCs. Provide one of the following or approved equal:

1. Tnemec; Series 660, Prime-A-Pell 200

2. ProSoCo, Inc.; Sure Klean Weather Seal Siloxane PD

3. Umaco; Siloxane 12

4. Or equal

PART 3 – EXECUTION

3.1 PREPARATION

A. Clean substrate of substances that might interfere with penetration or performance of water repellents. Test for moisture content, according to water-repellent manufacturer's written instructions, to ensure that surface is dry enough.

1. Masonry: Clean brick masonry per Division 4 Section "Architectural Unit Masonry."

2. Cast Stone: Clean cast stone per Division 4 Section "Cast Stone Masonry."

B. Test for pH level, according to water-repellent manufacturer's written instructions, to ensure chemical bond to silicate minerals.

C. Curing and Conditioning:

1. Do not apply water repellent until new concrete, masonry, or mortar has cured a minimum of 28 days, or as recommended by manufacturer.

2. Verify that surfaces are sound, clean, and free from laitance, efflorescence, or curing compounds that could inhibit penetration.

D. Verify Substrate Conditions: Confirm that substrate moisture content and surface temperature meet manufacturer’s written requirements prior to application. Do not proceed with application when moisture content exceeds manufacturer’s recommended maximum, or when surface temperature is outside of acceptable limits.

E. Protect adjoining work, including sealant bond surfaces, from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent being deposited on surfaces. Cover live plants and grass.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATION

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of water repellent and to instruct Applicator on the product and application method to be used.

B. Application Method: Apply a heavy-saturation spray coating of water repellent on surfaces indicated for treatment using low-pressure spray equipment. Comply with manufacturer's written instructions for using airless spraying procedure, unless otherwise indicated.

C. Second Coat: If second coat is required by the manufacturer, apply a second saturation spray coating, repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

D. Environmental Conditions:

1. Apply only when ambient and substrate temperatures are within the range recommended by the manufacturer, typically between 40°F and 100°F (4°C and 38°C), and rising.

2. Do not apply during precipitation or when precipitation is expected within 24 hours following application.

3. Do not apply to wet or frozen surfaces, or when wind conditions could cause overspray onto adjacent areas.

4. Provide temporary protection as required to prevent rainwater from contacting treated surfaces before curing is complete.

3.3 CLEANING AND CLOSEOUT

A. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Repair damage caused by water-repellent application. Comply with manufacturer's written cleaning instructions.

B. Post-Application Review: Following completion, verify treated areas for uniform coverage, absence of visible residue, and beading effect when tested with water.

C. Maintenance / Reapplication: Provide Owner with manufacturer’s written recommendations for inspection intervals, maintenance procedures, and approximate reapplication schedule based on expected service life of the product (typically 7–10 years under normal exposure conditions).

END OF SECTION

SECTION 07 21 00 – THERMAL INSULATION

PART 1 – GENERAL

1.1 SUMMARY

A. Extent of insulation work is shown on Drawings, by generic names or by abbreviations.

B. Applications of insulation specified in this section include:

1. Sound attenuation batts

2. Rigid Insulation

C. Related Sections include the following:

1. Division 7 Section “Vapor Retarders”

2. Division 7 Section “Standing Seam Metal Roof Panels” for insulation under low slope roof system.

3. Division 7 Section “Spray Applied Insulation”

1.2 SUBMITTALS

A. Product Data: Product literature, samples and installation instructions for specified insulation.

1.3 QUALITY ASSURANCE

A. Use insulation of thickness required to provide specified Resistance "R" value.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Insulation shall be protected in the transit by plastic covers and by truck tarps. When material is stored at the jobsite, a reasonably level, drained storage area shall be provided. The insulation shall rest on firm blocking and shall be covered with tarps.

B. Do not allow insulation materials to become wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage and protection during installation.

1.5 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Fiberglass Batts:

1. Johns Manville (Basis of Design)

2. Knauf (EcoBatt)

3. CertainTeed (Sustainable Insulation)

4. Or equal

B. Rigid Extruded Polystyrene:

1. Owens Corning (Basis of Design)

2. Dupont (Styrofoam Brand Cavitymate Ultra XPS)
3. Kingspan (GreenGuard Type IV 25 PSI XPS)

4. Or equal

2.2 MATERIALS

A. Sound Attenuation Batts:

1. Sound Attenuation Batts, Johns Manville Formaldehyde-free Sound Control Fiber Glass Batts (or equal).

a. Provide in interior stud walls, above ceilings and in other locations indicated on the Drawings.

2. ASTM Standard C665, Type 1

3. Surface burning Characteristics (ASTM E84)

a. Flame Spread 25 or less

b. Smoke Developed 50 or less

4. Minimum 20% recycled content

5. Size:

a. Thickness:

(1) Walls: unless otherwise noted, provide same thickness as that of the wall.

(2) Ceilings: 3-1/2" minimum thickness

b. Width: unless otherwise noted provide same as framing spacing indicated.

B. Rigid Insulation:

1. Extruded Polystyrene Board Insulation: Comply with ASTM C 578, Type IV, 25 psi minimum compressive strength, 1.55 lb/cu. ft.

a. Size: 16" wide x 96 inches long x thickness as indicated on Drawings.

b. Thermal Resistance: (180 day real-time aging as mandated by ASTM C578, measured per ASTM C 518 at mean temperature of 75F): R-5.0 per inch of thickness, with 90% lifetime limited warranty on thermal resistance.

c. Edge Condition: Square.

d. Surface Burning Characteristics (ASTM E 84): Flame spread less than 25, smoke developed less than 450, certified by independent third party such as Underwriters Laboratories (UL).

e. Insulation tape for ALL joints shall be as recommended by the manufacturer for a complete system.

2. Low expansion foam: provide "Quad Foam" as manufactured by OSI or equal (www.ositough.com)

PART 3 – EXECUTION

3.1 EXAMINATION

A. Installer must examine substrate and conditions under which insulation work is to be performed and must notify Architect in writing of unsatisfactory conditions. Do

not proceed with insulation work until unsatisfactory conditions have been corrected in a manner acceptable to installer.

3.2 INSTALLATION

A. General

1. Comply with manufacturer's instructions for particular conditions of installation in each case. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with work.

a. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation.

b. Apply a single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness.

B. Sound Attenuation Batts:

1. Interior Walls:

a. Position to fit snugly between studs.

b. Install low expansion foam at all cracks around doors in lieu of batts.

c. Staple unfaced insulation to gypsum board with a least five 9/16 inch long staples driven through 1-1/2 inch long pieces of gypsum board joint reinforcement placed on face of insulation to hold insulation in place, or use proprietary fastening system manufactured for this purpose.

d. In areas where it will be applied in heights over 8 feet, use wire, metal straps, or other proprietary fastening system to hold the product in place until the interior finish is applied.

2. Interior Ceilings:

a. Lay on top of ceiling panel and suspension system. Fit tightly together to reduce the amount of heat loss. Do not install on top of or within 3 inches of recessed light fixtures unless the fixtures are approved for such use.

C. Rigid Insulation:

1. Place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose.

2. Fit courses of insulation between confining obstructions in cavity, with edges butted tightly both ways.

3. Press units firmly against construction as shown. **Tape all joints.**

D. Accessories:

1. Low expansion foam:

a. Cover surfaces not intended to be foamed.

b. Perimeter seal all openings. Fill to only 30% of area

c. Cured foam can be trimmed with a sharp knife or sanded.

END OF SECTION

SECTION 07 23 00 – SPRAY APPLIED INSULATION

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes **closed-cell, medium-density AND open celled**, 100 percent water blown polyurethane foam insulation to be provided in areas indicated on the Drawings as spray foam insulation.

B. Related Sections include the following:

1. Division 7 Section “Thermal Insulation”

2. Division 9 Section “Gypsum Board”

1.2 SUBMITTALS

A. Submit product data and manufacturer's certificate that the product meets or exceeds specified requirements.

B. Product test reports performed by a qualified independent testing agency evidencing compliance of insulation products with specified requirements including those for thermal resistance, fire-test-response characteristics, water-vapor transmission, water absorption, and other properties, based on comprehensive testing of current products.

C. Manufacturer's written certification that product contains no asbestos.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered in original, unopened drums bearing name of manufacturer, and product identification.

B. Store both components in a temperature controlled area between 60 and 90 degrees F. Do not allow product to freeze.

C. Store materials off ground, under cover and away from damp surfaces and keep material dry at all times.

1.4 PROJECT CONDITIONS

A. Do not expose to sunlight, except to extent necessary for period of installation and concealment.

1.5 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.5 WARRANTY

A. Manufacturer's standard limited lifetime warranty.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Icynene Inc. (Basis of Design)

B. BASF Polyurethane Foam Enterprises, LLC (Spraytite180)

C. NCFI Polyurethanes (InsulBloc)

D. Or equal.

2.2 MATERIALS

A. Closed Cell Polyurethane Spray Foam Insulation:

1. Product equal to "MD-C-200 Spray Foam Insulation" as manufactured by Icynene, Inc. or equal.
2. Product equal to "MD-C-200 Spray Foam Insulation" as manufactured by Icynene, Inc. or equal.

3. Medium-density (closed cell), water-blown, with recycled content, conforming to the following:

a. Thermal Resistance value: R=6.0 per inch.

b. Air Permeance (for 2 inches of material): ASTM E 283; <0.02 L/S.m2 @75 Pa

c. Water Vapor Transmission (for 3 inches of material): ASTM E 96; 1.3 perms

d. Water Absorption: 1.7% per ASTM D2842

e. Flame Spread and Smoke Developed Rating: ASTM E 84

1.) Flame Spread: Less than 25

2.) Smoke Development: Less than 450

B. Open Cell Polyurethane Spray Foam Insulation:

1. Product equal to “Icynene Classic Plus (LD-C-70)” as manufactured by Icynene, Inc. or equal.

2. ICC Evaluation Service (ICC/ES) Report No. ESR-1826

3. Light density, open celled, 100% water-blown polyurethane foam.

4. Vapor permeable, insulation and air barrier material.

5. Low-density, water-blown, conforming to the following:

a. Thermal Resistance (R-Value/inch @75 deg F): ASTM C 518; 4.0 hr/sq ft/degree F/BTU

b. Air Permeance (for 2 inches of material): ASTM E 2178; < 0.019 L/s.m^2 @ 75 Pa

c. Water Vapor Transmission (for 2 inches of material): ASTM E 96; 20.7 perms

d. Flame Spread and Smoke Developed Rating: ASTM E 84

1.) Flame Spread: Less than 20

2.) Smoke Development: Less than 450

e. Fungal Growth: ASTM C1338; no growth.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, under which work is to be performed. Do not proceed until unsatisfactory conditions have been corrected.

1. Review placement area to determine final location will not be within 3 inches of any heat source where the temperature will exceed 180 deg F per ASTM C 411 or in accordance with authorities having jurisdiction.

B. Prime substrates where recommended by manufacturer. Apply prier to comply with manufacturer's written instructions. Confine primers to areas to be installed. Do not allow spillage onto adjoining surfaces.

3.2 PREPARATION

A. Examine surface scheduled to receive insulation for voids, projections, foreign substances on surfaces, lack of caulking at plates, or other items, which might interfere with integrity of complete wall system.

B. Assure that rough plumbing, electrical conduit and boxes, and other items required to penetrate the insulation are installed before applying.

C. The work shall be coordinated with other trades whose work may be affected or have an effect on the installation of the sprayed insulation.

3.3 INSTALLATION

A. Do not install spray insulation prior to building being dried-in.

B. Apply insulation to substrates in compliance with manufacturer's written instructions.

C. Apply insulation to produce thickness required for indicated R Value.

D. Extend insulation in thickness indicated to envelop entire area to be insulated.

E. Spray material into all cracks, holes, seams; seal around electrical receptacles, communication jacks, ducts and plumbing.

F. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

3.4 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse.

3.5 CLEANING

A. Installation, clean-up and curing shall be accomplished according to the manufacturer's recommendations and common construction standards.

B. Provide natural or mechanical ventilation continuously to properly cure the insulation.

END OF SECTION

SECTION 07 26 00 – VAPOR RETARDERS

PART 1 – GENERAL

1.1 SUMMARY

A. Provide total air/vapor barrier systems to complete the Work as shown on the Drawings and as specified herein to bridge and seal air leakage pathways and gaps:

1. Under Slab Vapor Barrier
2. Liquid Applied Waterproofing Membrane System
    a. Waterproof barrier
    b. Joint and seam filler
    c. Liquid flashing (liquid applied detailing compound)
3. Self-adhering Flashing Membrane

B. Related Sections include the following:

1. Division 3 Section “Cast-in Place Concrete”
2. Division 6 Section “Rough Carpentry”
3. Division 7 Section “Standing Seam Metal Roof Panels” for self adhering roof membrane.
4. Division 7 Section “Sheet Metal Flashing and Trim”

1.2 SUBMITTALS

A. Product Data:

1. Submit Spec-Data, details and installation procedures.
2. Manufacturer’s installation instructions for placement, seaming and penetration repair instructions.

B. Shop Drawings: Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.

C. Include details of interfaces with other materials that form part of air barrier.

D. Test Reports: Indicating compliance with the performance requirements of this section.

E. Samples: Submit representative samples of all components as specified herein for approval.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with manufacturer's written instructions and this specification.

B. Maintain one copy of manufacturer's written instructions on site.

C. Systems used shall contain components from one manufacturer only (example: sheet membrane, air barrier sealants, primers, mastics, and adhesives). NOTE: Different manufacturers may be used for different systems.

D. Provide products which comply with all federal, state and local regulations controlling use of volatile organic compounds (VOCs).

E. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Preinstallation conference shall include the Installer, Architect, and system manufacturer's field representative. Agenda for meeting shall include but not be limited to the following:

1. Detailed review of all submittals.

2. Review of surface preparation including primer applications, minimum curing period and installation procedures.

3. Review of special details and flashings.

4. Sequence of construction, responsibilities and schedule for subsequent operations.

5. Review of inspection, testing, protection and repair procedures.

F. <u>Provide an independent laboratory per Division 1 Section "Testing Laboratory Services" to perform field tests as specified herein in Part 3 (does not apply to under slab vapor barrier).</u>

G. Perform qualitative air leakage detection testing utilizing the bubble test method per ASTM E1186 – Air Leakage Site Detection in Building Envelopes and Air Barrier Systems.

1. Conduct initial testing on the mockup assembly to verify substrate preparation, detailing methods, and installation procedures prior to commencing full production.

2. Perform additional field testing on representative completed areas of new work to confirm continuity of the installed air barrier system. Minimum of one test

per building elevation or as directed by the Architect or Independent Testing Agency.

3. All testing shall be performed by the Independent Testing Agency with the Manufacturer’s Field Representative present during initial testing.

4. Testing is intended to identify discontinuities, pinholes, voids, and other defects prior to concealment or application of subsequent cladding systems.

5. Correct deficiencies and retest until acceptable results are achieved.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's recommendations for storage and handling of each product.

B. Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.

C. Store roll materials on end in original packaging. Protect rolls from direct sunlight until ready for use.

D. Store air barrier membranes, adhesives and primers at temperatures of 40 degrees F and rising.

E. Keep solvent away from open flame or excessive heat.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Apply vapor and air barriers within the range of ambient and substrate temperatures recommended by manufacturer. Protect substrates from environmental conditions that affect performance.

B. Liquid Applied Waterproofing Membrane System

1. If air or surface temperatures exceed 95 degrees Fahrenheit (35 degrees Celsius), apply to shaded surfaces and before daytime air and surface temperatures reach their peak.

1.6 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered.**

1.6 WARRANTY

A. Material Warranty:

1. Manufacturer's standard form in which manufacturer agrees to replace membrane materials that fail within specified warranty period when installed and used in strict conformance with written manufacturer's instructions.

a. Minimum 10 year product warranty required.

PART 2 – PRODUCTS

2.1 UNDER SLAB VAPOR BARRIER

A. Products:

1. Basis of Design:

a. Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC., (877) 464-7834 www.stegoindustries.com.

2. Approved products:

a. Vaporguard by Reef Industries, 713-507-4250. www.reefindustries.com.

b. PMPC by WR Meadows, 800-342-5976. http://www.wrmeadows.com/pmpc/

c. Equal as approved

B. Vapor Barrier System

1. Vapor Barrier must have the following qualities:

a. Permeance of less than 0.01 Perms as tested in accordance with ASTM E 1745 Section 7.

b. Other performance criteria:

(1) Strength: ASTM E 1745 Class A.

(2) Thickness: 15 mils minimum

(3) Warranty: (a) compliance with the designated ASTM E1745 classification, and (b) no manufacturing defects in the product for, at least, the Life of the Building.

C. Accessories:

1. Provide **all accessories under the system** for a complete, seamless, vapor-proof installation:

a. Seam Tape (at all sheet seams):

(1) Basis of Design: "Stego Tape"

(2) Thickness: 6 mil

(3) Permeance: 0.03 perms

(4) Tensile strength: >12 lbf/in

b. Vapor Proofing Mastic (required at **all** penetration locations):

(1) Basis of Design: "Stego Mastic"

(2) Tensile/Elongation, ASTM D412: 32 psi, 3860%

(3) Permeance, ASTM E96: 0.17 perms

(4) Hydostatic Water Pressure, ASTM D751: 28 psi

c. Perimeter/terminated edge seal:

(1) Basis of Design: "Stego Crete Claw" (textured tape)

(2) Thickness: 26 mil

(3) Permeance: 0.03 perms

2.2 LIQUID APPLIED WATERPROOFING MEMBRANE SYSTEM

A. Waterproofing and air and water barrier membrane.

1. "R-Guard" full system as manufactured by Prosoco (Basis of Design). System to include all components to ensure a complete, monolithic, watertight building envelope. Equal systems include the following:

    a. W.R. Meadows (Air Shield TMP all liquid system)

    b. Soprema, Inc. (Sopraseal 202VP all liquid system)

    c. Sto Corp (Gold Coat w/ RapidGuard)

    d. Or equal (must be a complete liquid system, NO sheet goods will be allowed).

B. Basis of Design Membrane System Components (system shall be a monolithic air barrier system):

1. Fluid-applied air and water-resistive barrier:

    a. "R-Guard Spray Wrap MVP" as manufactured by Prosoco or equal.

    b. A fluid applied air and water-resistive barrier that dries into a rubberized, highly durable, water-resistant, vapor-permeable membrane.

    c. Technical Data:

        (1) Form: batter like semi-gel liquid, pink color

        (2) Specific Gravity: 1.26

        (3) pH: 8.5 to 9.5

        (4) Total Solids: 63 to 68 percent

        (5) Freeze Point: 32 degrees Fahrenheit (0 degrees Celsius)

2. Joint and Seam Filler:

    a. "R-Guard Joint & Seam Filler" as manufactured by Prosoco or equal.

    b. Use to fill openings and create transitions where flexible reinforcement is required (including but not limited to all surface defects and over driven fasteners (seams and cracks measuring up to ½ inch), all inside and outside corners, and open joints) to bridge gaps and provide continuous support of fluid-applied flashing membrane, waterproofing or air barrier components.

    c. Single component, fiber-reinforced Silyl-Terminated-Polymer (STP) gun-grade detailing compound.

3. Liquid Flashing (liquid applied detailing compound)

    a. "R-Guard Fast Flash" as manufactured by Prosoco or equal.

b. Provide at inside of all rough openings, and at all locations where a liquid flashing membrane is indicated (or required per system).

c. Single component, fiber-reinforced Silyl-Terminated-Polymer (STP) gun-grade detailing compound.

4. At all raw edges of exterior sheathing:

a. "R-Guard Porous Prep" as manufactured by Prosoco or equal.

2.3 SELF ADHERING FLASHING MEMBRANE

A. Location: Provide at locations as indicated on Drawings to receive "self-adhering flashing membrane" – 40 mils minimum.

1. Provide "Lastobond Shield HT" as manufactured by Soprema or equal.

B. Accessories: manufacturer's recommended primers, termination mastic, sealants, and other accessories for a complete installation.

2.4 ACCESSORIES

A. Provide all accessories for a complete system application.

B. Provide stainless steel termination bars per Division 7 Section "Flashing and Sheet Metal" where sheet goods terminate.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that substrates and conditions are ready to accept the Work of this section. Notify architect in writing of any discrepancies. Commencement of the Work or any parts thereof shall mean acceptance of the prepared substrates.

B. All surfaces must be sound, dry, clean and free of oil, grease, dirt, excess mortar or other contaminants detrimental to the adhesion of the membranes. Fill voids, gaps and spalled areas in substrate to provide an even plane. Strike masonry joints full-flush.

3.2 PREPARATION

1. Refer to manufacturer's literature for requirements for preparation of substrates. Surfaces shall be sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from surfaces. Remove dust, dirt, loose stone and debris. Use repair materials and methods that are acceptable to manufacturer of the system.

2. At changes in substrate plane, apply joint and seam filler or liquid flashing

membrane at sharp corners and edges to form a smooth transition from one plane to another.

3. Cover gaps greater than 1 inch and form a smooth transition from one substrate plane to another with min 22 gauge stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

4. Apply primer at rate recommended by manufacturer to all areas to receive self-adhering sheet air/vapor barrier membrane as indicated on drawings by roller and allow minimum 30 minute open time. Primed surfaces not covered by self-adhering membrane during the same working day must be re-primed.

3.3 INSTALLATION

A. General: Install air & vapor barrier to dry surfaces at air and surface temperatures of -25°F and above in accordance with manufacturer's recommendations, at locations indicated on Drawings.

1. Do not allow rubberized asphalt surfaces to come in contact with polysulfide sealants, creosote, uncured coal tar products or EPDM.

B. Under Slab Vapor Barrier:

1. Installation shall be in accordance with manufacturer’s instructions and ASTM E 1643.

a. Apply seam tape/textured tape/mastic to a clean and dry vapor barrier.

2. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.

3. Extend vapor barrier to the perimeter of the slab. Seal vapor barrier to the entire slab perimeter using textured tape (basis of design Stego Crete Claw) with a surface that creates a mechanical seal to freshly-placed concrete, per manufacturer's instructions.

4. Overlap joints 6 inches and seal with manufacturer’s seam tape.

5. Seal all penetrations (including pipes) using mastic per manufacturer’s instructions.

a. No penetration of the Vapor Barrier is allowed except for reinforcing steel and permanent utilities.

6. Repair damaged areas by cutting patches of Vapor Barrier, overlapping damaged area 6 inches (minimum) and taping all four sides with tape.

7. Do not schedule concrete pour until approval of vapor barrier has been obtained by the Architect.

a. **Schedule observation no less than 48 hours prior to concrete pour.**

8. Liquid Applied Waterproofing Membrane System:

9. Apply air barrier membrane system to achieve a continuous, monolithic air barrier according to air barrier manufacturer's written instructions.

10. Apply air barrier membrane system within manufacturer's recommended application temperature ranges.

11. Joint and Seam Filler:

    a. Apply a bead of joint and seam filler to all sheathing joints, seams and cracks then strike smooth with a DRY tool. Detail over wood knots, deep cracks or surface irregularities to complete the surface preparation.

        (1) Joint widths up to 3/8 inch may be treated without backer rod. Treat joints ranging from 3/8 to 1 inch with backer rod before applying. Joints larger than 1 inch cover with stainless steel per “Preparation” paragraph.

    b. Use a DRY knife, trowel or spatula to spread the product 1 inch beyond the sheathing seams on each side to a thickness of 20 to 30 mils.

    c. Spot fastener heads and strike with a DRY tool.

    d. Allow to skin before installing other waterproofing or air barrier components.

12. Liquid Flashing – Openings:

    a. Apply a bead of liquid flashing in each corner of the rough opening and at the sheathing-to-stud transition, then strike smooth with a DRY tool and allow to skin.

    b. Apply liquid flashing over the exterior inside framing of the rough opening and onto the exterior vertical wall surface 4 to 6 inches to create a 12 to 15 mil thick monolithic, pinhole-free flashing surface.

    c. Apply treated surfaces to skin over before installing windows, doors and other wall assembly components.

13. Waterproof Barrier:

14. Roller apply barrier to exterior wall assembly using vertical strokes with a slight diagonal slant ensuring coverage that is free of pinholes, voids and gaps.

15. Seal ties and other penetrations as work progresses.

16. Allow product to cure and dry. Apply an additional coat to all surfaces.

17. Inspect membrane before covering to ensure a void- and pinhole-free surface. Repair any deep gouges, punctures, or damaged areas with liquid flashing or joint and seam filler.

18. Overlap repairs, penetration treatments, transitions, rigid flashing and other air barrier components to ensure positive drainage and continuity of the air and water-resistive barrier.

19. Do not cover air barrier until it has approved by Independent Testing Agency in writing. Refer to field tests required as specified herein.

a. Correct deficiencies or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.

C. Self-adhering Flashing Membrane:

1. Installation: All surfaces to receive the flashing shall be reasonably smooth, free from irregularities and deleterious materials.

2. Prime all surfaces to receive the flashing membrane.

3. On all horizontal surfaces the flashing shall be laid in a fresh trowel coat of mastic. Vertical surfaces shall be pressed firmly in place by hand roller.

4. Ensure that all surfaces are adequately covered.

5. Joints: The material shall be lapped at least 2" and rolled with a steel hand roller.

3.4 FIELD QUALITY CONTROL

A. Field Testing and Inspections: Air barrier materials and installation shall be verified by an Independent Testing Agency for compliance with the manufacturer's requirements and this Specification.

1. Field Air Leakage Testing:

a. Perform qualitative air leakage detection testing in accordance with ASTM E1186 – Bubble Test Method.

b. Conduct testing on the mockup assembly to confirm proper installation procedures prior to commencing full production.

c. Perform additional field testing on representative completed areas of new work, minimum one per building elevation or 5 percent of total wall area, whichever is greater, prior to concealment or application of cladding.

d. Testing shall be performed by the Independent Testing Agency with the Manufacturer's Field Representative present during initial testing.

e. Testing is intended to identify discontinuities, pinholes, voids, and other defects. Correct deficiencies and retest until acceptable results are achieved.

f. Document test locations, ambient conditions, observations, and corrective actions.

2. Visual Inspections: In addition to field testing, perform inspections to verify that installation complies with manufacturer and project requirements, including but not limited to the following:

   a. Continuity of air barrier system has been achieved throughout the building envelope with no gaps or holes.

   b. Continuous structural support of air barrier system has been provided.

   c. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.

   d. Site conditions for application temperature and dryness of substrates have been maintained.

   e. Maximum exposure time of materials to UV deterioration has not been exceeded.

   f. Surfaces have been primed.

   g. Laps in strips and transition membrane comply with minimum requirements and are shingled in the correct direction (or mastic has been applied on exposed edges), with no fish-mouths.

   h. Termination sealant has been applied on cut edges.

   i. Strips and transition membrane have been firmly adhered to substrate.

   j. Compatible materials have been used.

   k. Transitions at changes in direction and structural support at gaps have been provided.

   l. Connections between assemblies (membrane and sealants) comply with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.

   m. All penetrations have been sealed.

B. Correction: Remove and replace deficient air barrier components and retest as specified above at no additional cost to the Owner.

3.4 PROTECTION

A. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

   1. Flashing membrane: Repair holes, fishmouths, tears, and damage to sheet membrane with a round patch of membrane extending past the damaged area 6 inches in all directions. If fasteners are removed leaving holes in the membrane, they must be patched.

2. Liquid applied waterproofing membrane system: Repair any deep gouges, punctures, or damaged areas with liquid flashing or joint and seam filler. Overlap repairs, penetration treatments, transitions, rigid flashing and other air barrier components to ensure positive drainage and continuity of the air and water-resistive barrier.

B. Protect products from exposure to UV light and harmful weather exposure as required by manufacturer.

1. **Remove and replace self-adhering flashing membrane material exposed for more than 30 days, liquid applied waterproofing membrane system 180 days.**

C. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.

D. Remove any masking materials after installation.

END OF SECTION

SECTION 07 41 13 – STANDING-SEAM METAL ROOF PANELS

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes standing-seam metal roof panels and all accessories for a complete installation.

B. Related Sections include the following:

1. Division 7 Section “Vapor Retarders”
2. Division 7 Section “Sheet Metal Flashing and Trim”
3. Division 7 Section “Aluminum Composite Wall Panels ”

1.2 SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.

2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 3 inches per 12 inches.

C. Calculations:

1. Include calculations with registered engineer seal (licensed to practice structural engineering in the State of Mississippi), verifying roof panel and attachment method resist wind pressures imposed on it pursuant to applicable building codes.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Metal Panels: 12 inches long by actual panel width. Include clips, fasteners, closures, and other metal panel accessories.

E. Warranty: Provide unexecuted specimen warranty documents as required.

F. Qualification Data: For Manufacturer and Installer.

G. Product Test Reports: For each product, for tests performed by a qualified testing agency.

H. Field quality-control reports.

I. Maintenance Data: For metal panels to include in maintenance manuals.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in architectural sheet metal products.

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

C. Where panels are roll-formed on site, the forming equipment, setup, and operation shall be approved by the panel manufacturer and shall produce panels equivalent in profile, performance, and warranty to factory-formed panels.

D. Mockups: Build mockups to verify selections made under submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical eave condition; approximately 24 inches in length by full thickness, including attachments, underlayment, and accessories.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

E. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of roof accessories and roof-mounted equipment.

2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.

4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.

5. Review structural loading limitations of deck.

6. Review flashings, special details, drainage, penetrations, equipment curbs, and condition of other construction that affect metal panels.

7. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.

8. Review temporary protection requirements for metal panel systems during and after installation.

9. Review procedures for repair of metal panels damaged after installation.

10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 DESIGN AND PERFORMANCE CRITERIA

A. Installed roof system shall withstand negative wind uplift pressures complying with the following criteria.

1. Design load application shall be in accordance with ASCE-7, current version and requires the stamp of a licensed engineer to verify the assembly meets the design load requirements.

2. Provide safety factor of 1.67 in determining allowable safe working load of the system (ultimate wind uplift capacity (ASTM E1592) divided by safety factor).

B. Wind Uplift Resistance:

1. Roofing System Design: Provide a roofing system designed to resist uplift pressures calculated according to the current edition of the ASCE-7-16 Specification *Minimum Design Loads for Buildings And Other Structures*.

a. Refer to structural drawings for pressure diagrams.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels until installation. Remove as panels are being installed. Verify film is not left on installed panels.

1.6 PROJECT / SITE CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.7 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.8 BUILD AMERICA, BUY AMERICA (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.9 WARRANTY

A. Special Galvalume Substrate Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Structural failures including rupturing, or perforating.

    b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: 20 years and 6 months from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

    a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.

    b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.

    c. Cracking, chipping, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

C. Special Watertightness Warranty: Manufacturer's no dollar limit form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain watertight, including leaks, within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

2. Shop drawings must be provided to, reviewed, and approved by panel manufacturer prior to panel system installation.

3. Inspections by panel system manufacturer technical representative are required. Perform first inspection when underlayment and flashing are in place and second inspection when the roof is complete.

D. Special Installer Warranty: Furnish a written warranty signed by the Panel Applicator guaranteeing materials and workmanship for watertightness of the roofing system, flashings, penetrations, and against all leaks.
1. Warranty Period: Two years from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Berridge Manufacturing (Basis of Design)

1. Note: Drawings and Specifications based upon.

B. Imetco - Innovative Metals Company (Series 300)

C. Merchant & Evans (Zip-Rib)

D. McElroy Metals (238T Series)

E. Equal as approved

2.2 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.

B. Vertical-Rib, Seam Cap Seamed Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and panel striations between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of the panels, aligning vertical ribs and seaming on seam cap.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Berridge Manufacturing Company; Tee-Lock or comparable product by one of the approved manufacturers listed herein.

a. Panels shall be full length from ridge to eave. On-site roll forming, where required due to panel length or shipping limitations, shall produce panels identical in profile, material, finish, and performance to factory-formed Tee-Lock panels and shall be fully covered by the manufacturer’s standard warranties without limitation.

b. The Tee-Lock seam caps shall have vinyl weatherseal and be mechanically seamed in the field with power driven seamer.

2. Metallic-Coated Steel Sheet: Aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

a. Nominal Thickness: 22 gauge

b. Unless otherwise specified, all exposed adjacent flashing shall be of the same material, thickness and finish as panel system.

3. Clips: continuous Berridge “Tee-Lock Clip” to accommodate thermal movement.

a. Material: 0.064-inch nominal thickness, aluminum-zinc alloy-coated steel sheet.

4. Panel Coverage: 18 inches.

5. Panel Height: 2.375 inches.

2.3 ACCESSORIES

A. Insulation:

1. Insulation shall be a rigid polyisocyanurate board with facing material acceptable to the membrane manufacturer for the system specified.

2. Meets or exceeds ASTM C1289, Type II, Class 1, Grade 2 (20 psi).

3. Minimum R-Value: R-5 per inch

B. Cover Board (provide primed):

1. General:

a. Gang Fasten ISO and Recover Board simultaneously. **Ensure fasteners do not penetrate thru the bottom of the wood deck.**

2. "Dens-Deck"; Georgia Pacific

3. "Securock Roof Board"; USG

4. "Dexcell FA Plus"; National Gypsum

5. Thickness:

a. Above insulation: minimum 1/2 inch

C. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 40 mils (1.02 mm) thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.

3. Manufacturers: Subject to compliance with roof panel manufacturers requirements, provide products by one of the following:
   a. Mid-States Asphalt Quick Stick HT Pro

   b. Soprema Lastobond Shield HT

   c. Polyglass Polystick MTS

   d. Tamko TW Underlayment or TW Metal & Tile Underlayment

D. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fascia, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.

2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

E. Panel Fasteners: Zinc-coated steel, corrosion resisting steel, zinc cast head, or nylon capped steel, type and size as approved for the applicable loading requirements.

F. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Joint Sealant: Silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.

G. Flashing and Trim:

1. General: Form and fabricate sheets, seams, strips, cleats, edge treatments, integral flashing, and other components of flashing & trim to profiles, patterns, and drainage arrangements shown and as required to resist water infiltration without excessive use of sealants (dry joints) while also allowing any water infiltration behind the finished wall panels to weep out.

2. Miscellaneous flashings: prefinished sheet metal, 22 gauge in finish to match metal roof panels.

3. Provide 24 gauge “beauty caps” over plumbing penetrations to match gauge and color of roof.

4. Hanging Gutters:

a. Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness, spaced a maximum of 36 inches. Fabricate expansion joints, expansion-joint covers and gutter accessories from same metal as gutters. Provide wire ball strainers of compatible metal at outlets.

b. Fabricate from the following materials:

(1) Pre-finished metal: prefinished sheet metal, 20 gauge in finish to as selected by Architect.

(2) Gutters shall have inside finish of factory applied polyester with a coating resistant to weathering.

5. Downspouts:

a. Formed from same material as roof panels. Fabricate in 10-foot long sections, complete with formed elbows and offsets.

b. Fabricate from the following materials:

(1) Pre-finished metal: prefinished sheet metal, 20 gauge in finish to as selected by Architect.

(2) Downspouts shall have inside finish of factory applied polyester with a coating resistant to weathering.

6. Downspout Adapter:

a. Provide "Model SO" offset downspout shoe as manufactured by Piedmont Pipe Construction, Inc.

b. Length: 60 inch minimum

c. Materials:

(1) Downspout Adapter Body: 3/16" Stainless Steel, ASTM A 240, Type 316. Size to be coordinated with corresponding downspouts as indicated on documents. Provide fastening brackets as recommended by manufacturer.

(2) Provide powder coat finish in color to match downspout.

d. Downspout Adapter Collar: Provide 1/8" thick Stainless Steel, ASTM A 240, Type 316, to accept rectangular downspouts sized per this Section.

e. Cleanout Cover:

(1) 1/8" thick stainless steel, ASTM A 240, Type 316.

(2) Neoprene gasket w/ stainless steel screws

f. Fasteners: Self-tapping concrete screws, pan head bolts, and other suitable fasteners designed to withstand design loads. Provide Type 316 stainless-steel fasteners for exterior use.

g. Provide hubs to connect to subsurface drainage.

2.4 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using factory set, non-adjustable, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, for full length of panel.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

2. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.

3. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

2.5 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Steel Panels and Accessories:

1. Exposed Finish: Factory-applied two-coat PVDF fluoropolymer system meeting AAMA 621, containing minimum 70 percent Kynar 500® or Hylar 5000® resin, applied by continuous coil coating line. Provide primer and color coat with total top-side dry film thickness of 0.95 ± 0.10 mil.

2. Color: selected by Architect from Standard color chart.

3. Concealed Finish: Manufacturer’s standard light-colored polyester or urethane backer coat, 0.35 ± 0.05 mil total dry film thickness.

4. Accessories and Flashings: Match material, color, and finish of roof panels unless otherwise indicated.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.

a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 INSTALLATION – INSULATION AND COVER BOARD

A. Install rigid insulation and cover board in accordance with manufacturer’s requirements.

B. Use only fasteners, stress plates and fastening patterns accepted for use by the roof manufacturer. Fastening patterns must meet applicable design requirements.

1. Install fasteners in accordance with the roof manufacturer’s requirements. Fasteners that are improperly installed must be replaced or corrected.

2. Attach boards in parallel courses with end joints staggered 50% and adjacent boards butted together with no gaps greater than ¼ inch.

3. **Ensure fasteners do not penetrate thru the bottom of the deck.**

3.4 INSTALLATION – UNDERLAYMENT

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation.

Apply at locations indicated on Drawings (entire roof surface), wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 36 inches. Extend underlayment into gutter trough. Roll laps with roller. Cover underlayment within 14 days or as directed by the underlayment product manufacturer.

B. Flashings: Install flashings to cover underlayment and EIFS in profiles indicated on Drawings.

3.5 INSTALLATION – METAL PANELS

A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels to be level to 1/4 inch in 20 ft.

2. Flash and seal metal panels at perimeter of all openings. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.

3. Locate and space fastenings in uniform vertical and horizontal alignment.

4. Install flashing and trim as metal panel work proceeds.

5. Panels should be continuous without end laps.

6. Align bottoms of metal panels and fasten.

7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.

C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.

1. Install clips to supports with self-tapping fasteners.

2. Install pressure plates, if required, at locations indicated in manufacturer's written installation instructions.

3. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied vinyl weatherseal are completely engaged.

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.

G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.

2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

H. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches o.c. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

I. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.

J. Roof Curbs: Install flashing around bases where they meet metal roof panels.

K. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.

B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.

C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

3.7 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 42 00 – ALUMINUM COMPOSITE WALL PANELS (ACM)

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes aluminum composite wall panel system (ACM) with concealed fastener subframing and dry-joint, drained and back-ventilated rainscreen attachment.

B. System includes:

1. Factory-fabricated ACM wall panels with fire-retardant (FR) core. PE core panels are prohibited.
2. Perimeter extrusions, subframing, stiffeners, anchorages, shims, and fasteners.
3. Panel seal components including gaskets, back pans (if applicable), and joint components.
4. Flashings, trim, closures, reinforcement, and accessories required for a complete installation.
5. Components shall be part of a tested NFPA 285 compliant wall assembly. Mixing panel brands with untested attachment systems is prohibited.

C. Related Sections include the following:

1. Division 1 Section “Mockup Requirements”
2. Division 3 Section “Concrete Unit Masonry”
3. Division 7 Section “Vapor Retarders”
4. Division 7 Section “Joints Sealants”
5. Division 7 Section “Thermal Insulation”

1.2 SYSTEM DESCRIPTION

A. Provide a dry-joint aluminum composite wall panel system, drained and back-ventilated, designed to function as an exterior rainscreen assembly.

1. Face sealed and wet-seal ACM attachment systems are not acceptable.

B. Visible design requirements:

1. Joint Width**:** 1/2 inch typical unless noted otherwise on drawings.
2. No exposed fasteners permitted on exterior panel faces.
3. No continuous field-applied caulking at panel joints.

4. Horizontal and vertical joints shall align uniformly with adjacent façade elements as indicated on the drawings.

C. System Performance:

1. Rainscreen ventilation cavity behind panels.

2. Pressure moderation and drainage channel design at panel joints.

3. System shall be designed to accommodate **thermal movement** without warping panel surface.
4.
5. Subframing metals shall be thermally compatible with aluminum panel construction and shall include galvanic isolation from dissimilar metals.

1.3 SUBMITTALS

A. Product Data/Shop Drawings: Manufacturer’s data for panel system, including:

1. Panel layout, dimensions, and joint location.

2. Panel support system and concealed fastening locations.

3. Details of inside/outside corners, terminations, penetrations, base and head conditions.

4. Identify thermal movement joints.

5. Dry-joint attachment system details.

6. Fire performance data (NFPA 285 assembly listing required).

7. Structural test data including deflection, wind load and thermal movement characteristics.

C. Samples:

1. Custom PVDF metallic finish samples – minimum 2 options for review.

2. Joint and extrusion sample – minimum 12" long section.

D. Engineering Calculations:

1. Signed and sealed by a professional engineer registered in the State of Mississippi**.**

2. Demonstrate compliance with design wind pressures under IBC and ASCE 7.

E. Mock-Up:

1. As specified in other Sections. Refer to Section 01 43 39 Mockup Requirements.

F. Submit panel system fabricator's installation manual, indicating the procedures to be followed by the installer in forming, sealing and installing the attachment system.

G. Test Reports: submit certified test reports which meet or exceed the requirements as specified herein.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Minimum 10 years of experience manufacturing ACM panel systems.
2. Capable of providing NFPA 285 tested wall assemblies**.**

B. Fabricator Qualifications:

1. Approved by ACM manufacturer.
2. Minimum 5 completed ACM projects of similar scope.
3. Field fabrication of ACM panels is not permitted except for minor fitting adjustments.

C. Installer Qualifications:

1. Minimum 5 years experience installing ACM systems.
2. Installer shall demonstrate successful completion of at least **3 ACM projects** of similar type.
3. Installer shall be approved by the fabricator and ACM manufacturer.
4. OSHA compliant.

D. Preinstallation Conference:

1. Required prior to field installation.
2. Include installer, GC, architect, ACM installer, ACM fabricator and weather barrier subcontractor.

1.5 DELIVERY, STORAGE, & HANDLING

A. Deliver materials in original, unopened factory packaging, labeled with manufacturer’s name, product identification, and production date.

B. Store panels in a dry, ventilated, weather-protected area, stacked flat on pallets to prevent bowing.

C. Do not store panels vertically or lean against walls—this causes permanent distortion and will result in rejection. Protect edges and corners from damage during shipment, storage, handling, and installation.

D. Manufacturer’s protective film shall remain on panels during fabrication and installation but shall be removed within 45 days of installation to prevent adhesive transfer.

E. Do not expose stacked ACM panels to direct sunlight or heat buildup, which may cause bowing.

F. Handle materials using clean gloves only to avoid surface staining prior to installation.

G. Reject and remove from site any panels that exhibit warp, surface deformation, edge damage, or finish defects.

1.6 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.6 WARRANTY

A. Manufacturer Warranty:

1. Provide 20-year finish warranty for 70% PVDF coated ACM panels.

2. Warranty shall include:

a. Fade ($\Delta E \leq 5.0$)
b. Chalk (Rating 8 per ASTM D4214)
c. Peeling, cracking, and delamination of finish

3. Warranty shall apply to coastal exposure conditions.

4. Warranty shall not exclude panel edges, panel curvature, or vertical wall installations.

B. System Warranty:

1. Provide 10-year manufacturer system warranty covering panel flatness, bond integrity, and delamination.

2. Warranty shall cover fabrication and attachment system compatibility.

C. Installer Warranty:

1. Provide 2-year installation warranty covering water tightness, panel alignment, joint integrity, and anchorage performance.

2. Warranty shall be in addition to and not in lieu of manufacturer warranties.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturer

1. ALPOLIC®/fr, Mitsubishi Chemical America, Inc., Chesapeake, Virginia

- Website: www.alpolic-americas.com
- Basis of Design System: Dry-Joint Rainscreen ACM System
- Core: Fire-Retardant (FR) Mineral-Filled Core
- Finish: Custom PVDF Metallic – 70% Kynar

B. Substitutions

1. No substitutions during bidding.

2. After contract award, proposed substitutions must comply with the following:

a. Must meet Build America, Buy America Act (BABA) for manufactured products.

b. Must be manufactured in the United States and demonstrate 55% U.S. component cost minimum.

c. Must provide documented NFPA 285 compliance for the complete wall assembly.

d. Must meet or exceed all requirements of this Section.

e. Must submit complete structural calculations, test data, shop drawings, and BABA documentation.

f. Substitutions that restrict joint ventilation, eliminate the rainscreen cavity, or use exposed sealant systems will be rejected.

g. Substitutions using foreign ACM products (e.g. China, Mexico, France, Korea) are not permitted.

2.2 SYSTEM DESCRIPTION

A. Panel Construction

1. Aluminum Composite Material (ACM) with 0.020" aluminum skins bonded to fire-retardant (FR) thermoplastic mineral core.
2. Standard panel thickness: 4 mm.
3. Panel assembly must comply with ASTM D1781 peel strength of 22.5 in-lb/in minimum.

B. Rainscreen Attachment System

1. Type: Fully drained and back-ventilated dry-joint rainscreen assembly.
2. Joints: ½ inch nominal open joint with vented profile.
3. Subframing: Manufacturer-approved aluminum extruded carrier system with concealed fastening.
4. Ventilation cavity: Minimum ¾ inch behind panels.
5. No continuous exterior sealant joints allowed.
6. System shall accommodate all thermal movement without creating oil-canning or face distortion.
7. Field fabrication of panels is not allowed.

2.3 MATERIALS

A. Aluminum Sheet Faces

1. Alloy**:** 3003-H14 or 3105-H14
2. Thickness: 0.020" (each face sheet)
3. Tolerances per ASTM B209

B. Core

1. Mineral-filled fire-retardant thermoplastic core.
2. Must meet Class A flame spread per ASTM E84.
3. Must comply with NFPA 285 requirement as part of tested assembly.

C. Finish

1. 70% PVDF Architectural Coating (Kynar 500 or Hylar 5000).
2. Custom Metallic Finish per Architect selection.
3. Anodized finish or polyester paint systems are no acceptable.\
4. Minimum 2-coat system with UV-resistant clear coat.
5. Coil-coated finish meeting AAMA 2605 performance standard.

D. Production Tolerances:

1. Width: +/- 2.0 mm.

2. Length: +/- 0.012” per ft (1 mm/meter).
3. Thickness (4 mm Panel): +/- 0.008 inch (0.2 mm).
4. Thickness (6 mm Panel): +/- 0.012 inch (0.3 mm).
5. Bow: Maximum 0.5% length or width.
6. Squareness: Maximum 0.2 inch (5.1 mm).
7. Edges of sheets shall be square and trimmed with no displacement of aluminum sheets or protrusion of core material.

2.4 COASTAL ENVIRONMENT PERFORMANCE REQUIREMENTS

A. Aluminum components exposed to exterior shall receive marine-grade finishing.

B. Use stainless steel fasteners (minimum Type 304, Type 316 at severe exposures).

C. Aluminum in contact with dissimilar metals shall be isolated to prevent galvanic corrosion.

D. Do not use mill finish aluminum on exterior components.

2.5 PERFORMANCE REQUIREMENTS

A. Wind Loads

1. Design per Project Structural Notes and ASCE 7 wind pressures.

B. Air and Water Resistance

1. AAMA 508 or 509 compliance for rainscreen performance.

C. Fire Performance

1. Wall assembly must comply with NFPA 285.
2. Panel core shall meet ASTM E84 Class A.

D. Thermal Movement

1. Design for ±0.0025 in./in./100°F movement.

2.6 ACCESSORIES

A. Panel Extrusions

1. Aluminum extruded components, Alloy 6063-T5.
2. Provide non-conductive isolators where aluminum comes into contact with dissimilar metals.

B. Flashing and Closure Trim

1. Provide flashings fabricated from 0.040-inch aluminum with matching factory finish.

2. Exposed closures shall be minimum 24-gauge aluminum.

3. Match color and sheen of ACM panel finish.

C. Fasteners

1. Stainless steel Type 304 concealed fasteners; no exposed fasteners allowed.

C. Sealants and Tapes

1. Manufacturer-approved joint backing and air seals only; no caulked exterior joints.

2. Use vent strips or baffles at open joints to restrict insect entry.

2.7 FABRICATION

A. General: Shop fabricate to sizes and joint configurations indicated on drawings.

1. Where final dimensions cannot be established by field measurements, provide allowance for field adjustment as recommended by the fabricator.

2. Form panel lines, breaks and angles to be sharp and true, with surfaces that are free from warp or buckle.

3. Fabricate with sharply cut edges and no displacement of aluminum sheet or protrusion of core.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates, backing, and framing to verify:

1. Substrates are plumb, level, and within tolerances.

2. Weather barrier installation is complete and continuous.

3. Required blocking, girts, or subframing is installed correctly.

4. Penetrations, flashings, and termination conditions are in place.

B. Report in writing to Contractor and Architect any substrate conditions that will adversely affect panel installation.

C. Do not begin installation until unsatisfactory conditions are corrected.
Starting work constitutes acceptance of substrate conditions.

3.2 PREPARATION

A. Coordinate installation with adjacent materials to ensure proper sequencing and weather-resistant continuity.

B. Verify field dimensions and panel layout prior to fabrication.
Field measuring shall take precedence over shop drawings where discrepancies occur.

C. Protect adjacent surfaces from panel installation operations.

3.3 INSTALLATION

A. General

1. Install ACM wall panels in strict accordance with:
    - Approved shop drawings
    - Manufacturer’s instructions
    - This specification
    - NFPA 285 tested assembly details
2. Do not modify panel system or attachment methods without written approval.

B. Subframing Installation

1. Install aluminum subframing level and aligned to required tolerances.
2. Provide minimum ¾-inch continuous ventilation cavity behind panels.
3. Anchor framing to structure without creating thermal bridging.

C. Panel Installation

1. Install panels with uniform joint alignment in both directions.
2. Provide ½-inch open joint unless otherwise indicated.
3. Maintain proper drainage at horizontal joints.
4. Install panels to allow for expansion and contraction.
5. No exposed fasteners permitted on exterior face unless specifically indicated.

D. Rainscreen Performance

1. Maintain clear ventilation path at cavity.
2. Keep drainage path clean of sealant and debris.
3. Do not apply continuous joint sealant in panel joints.
4. Provide bug screen or vent strip where shown.

3.4 TOLERANCES

A. Maximum deviation from intended plane:

1. 1/8 inch in 10 feet
2. 1/4 inch in 20 feet

B. Maximum offset between adjacent panel surfaces:

1. 1/32 inch

C. Maximum panel bow:

1. 1/8 inch per 5 feet panel length

3.5 FIELD QUALITY CONTROL

A. Manufacturer’s Field Service:

1. Upon request, engage panel manufacturer’s representative to inspect installation, once at start of installation and once at 50% progress.

2. Correct deficiencies prior to Substantial Completion.

B. Field Test (If required by Architect):

1. Perform field water penetration test per ASTM E1105 at selected areas.

3.6 CLEANING AND PROTECTION

A. Remove protective film immediately after installation. Do not leave protective film exposed to sunlight longer than 45 days.

B. Clean finished surfaces with manufacturer-recommended cleaner only.

C. Replace damaged or scratched panels.

D. Protect installed work from damage until project completion.

END OF SECTION

SECTION 07 62 00 –SHEET METAL AND FLASHING TRIM

PART 1 – GENERAL

1.1 SUMMARY

A. The extent of each type of flashing and sheet metal work is indicated on the drawings and by provisions of this section.

B. The types of work specified in this section include the following:

1. Miscellaneous sheet metal accessories.

2. Coatings and sealants as required for this application

C. Related Sections include the following:

1. Division 7 Section “Standing Seam Metal Roof Panels” for all trim associated with roof panels, including gutters and downspouts.

1.2 DESIGN REQUIREMENTS

A. Thermal movement: Completed system shall be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling, producing excess stress on structure, anchors or fasteners, or reducing performance ability.

1.3 SUBMITTALS

A. Product data including product specifications, standard details, performance data, and general recommendations.

B. Shop Drawings: indicate location of all fabricated sheet metal flashing & trim shapes on roof plans and exterior wall elevations included in the Work. Include detail of profile attachment, terminations, joints, corners, supports, anchorage points/ slot locations, cleats, hooks/ hems/ edge conditions, closures, and special details. Provide anticipated profile dimensions & bend angles for all critical sheet metal profiles. Indicate profiles that are “custom fabricated” and those that are “prefabricated” profiles.

1. Show all shop fabricated sheet metal fabrications including seam pattern/ alignment, seam configuration and dimensions.

2. Indicate metal type, thickness, and surface finish for all sheet metal profiles.

3. Show all accessory products to be provided including but not limited to: mechanical fasteners, VHB tape, clips, sealant, & sealant tape.

4. Details for joining and securing sheet metal components, including layout, number of fasteners, clip spacing, & soldered connections.

5. Detail of expansion provisions including sliding joints, use of clips/ prepunched slotted holes, anticipated direction(s) of movement, maximum allowable movement, and fixed-point location.

6. Details of coordinated trades: provide flashing details for integrating mechanical, electrical and plumbing conditions.

7. Show all concealed cleats (keepers) and clip material, size, & gauge.

8. Termination Details of connections to adjoining work.

C. Profile Samples: when further shop drawing clarification is required by Architect, provide 12" min. fabricated profile (full width).

1.4 QUALITY ASSURANCE

A. Industry Standard: Except as otherwise shown or specified, comply with applicable recommendations and details of SMACNA Architectural Sheet Metal Manual, 7th Edition. Conform to dimensions and profiles shown or as approved on shop drawing submittal.

B. Field Measurements: Prior to fabrication of sheet metal flashing & trim, compare architectural drawings, approved shop drawings, and actual field measurements of substrates to receive sheet metal flashing & trim. Make necessary minor adjustments to satisfy design intent and functional performance. Notify Architect of any major discrepancies to structure and substrate that deviate from the original intent of the Contract Drawings.

C. Pre-Installation Conference: convene an installation conference to include the Architect, roofing contractor, and Architectural Sheet Metal installer in order to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

1. Review methods and procedures for installation including, but not limited to: substrates, sub framing, penetrations and other preparatory work.

2. Review drawings, specifications, submittals and other contract documents.

3. Review construction schedule verifying availability of all materials, personnel and equipment needed to proceed and avoid delays.

4. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including cold temperatures.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials in a dry, protected, well-vented area. The contractor shall report damaged material immediately to the delivering carrier and note such damage on the carrier's freight bill of lading.

B. Remove protective plastic surface film immediately after installation (if applicable).

1.6 PROJECT CONDITIONS

A. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of the work and protection of materials and finishes.

1.7 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.7 WARRANTY

A. Refer to Division 7 Section "Standing Seam Metal Roof Panels" for specific information regarding roof (w/ metal rider) watertightness warranty required where sheet metal and flashing trim occurs in these areas.

1. Roofing manufacturer must accept the metal as part of their system warranty.

B. Sheet metal finish warranty: Provide manufacturer's warranty warranting fluoropolymer coating to remain free, from peeling, checking or cracking (except for slight crazing as may occur on tightly roll-formed edges or brake bends at time of forming pre-painted sheet), chalking in excess of numerical rating of 8 when measured in accordance with ASTM D659-86, or fading in excess of 5 N.B.S. units during warranty period.

1. **Warranty period shall be twenty years.**

C. Fabrication Warranty: provide 2-year fabrication warranty against sharp bends that fracture the metal, tears, and equipment induced damage to the sheet or coil.

D. Installation Warranty: provide 3-year guaranty covering the proper material or product application preventing failure due to corrosion, damage due to inappropriate clip methods, corrosive separation material, or other installer induced failure.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality.

2. Exposed Finish: Factory-applied two-coat PVDF fluoropolymer system meeting AAMA 621, containing minimum 70 percent Kynar 500® or Hylar 5000® resin, applied by continuous coil coating line. Provide primer and color coat with total top-side dry film thickness of 0.95 ± 0.10 mil. Color shall match the Standing Seam Metal Roof.

a. Thicknesses as indicated.

3. Color:

a. Color to be custom to match roof panels.

B. Stainless-Steel Sheet: Type 304, dead soft, fully annealed; 2D (dull, cold rolled) finish.

C. Reglets:

1. Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with interlocking counterflashing on exterior face, of same metal as reglet.

a. Material: Pre-finished galvanized steel, 0.040 inch thick.

2. Provide “Springlok Flashing System” as manufactured by Fry Reglet where indicated on Drawings.

a. End caps required where reglet does not terminate at a wall (open end).

D. Fasteners:

1. General: Same metal as flashing/sheet metal or, other noncorrosive metal as recommended by sheet manufacturer.

2.2 ACCESSORIES

A. Metal Accessories: Provide sheet metal clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gage required for performance.

B. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

C. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

D. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

E. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.3 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.

1. Obtain field measurements for accurate fit before shop fabrication.

2. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.

3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

1. Fabricate flashing & trim to allow for expansion in running work sufficient to prevent leakage, damage, and deterioration of the Work. Form exposed sheet metal work to fit substrates without excessive oil canning, buckling, and tool marks, true to line and levels indicated, and with exposed edges folded back to form hems.

2. Lay out sheet metal flashing & trim work so cross seams, when required, are made in direction of flow with higher profile overlapping lower profile. Stagger cross seams when aesthetics are critical.

C. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.

D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

E. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.

2.4 FABRICATION, COMPONENTS

A. Base Flashing: Pre-finished galvanized steel: 20 gauge thick.

B. Counterflashing and Flashing Receivers: Pre-finished galvanized steel: 22 gauge thick.

C. Miscellaneous Flashing:

1. Pre-finished galvanized steel: 22 gauge thick.

2. Stainless Steel: 22 gauge thick.

PART 3 – EXECUTION

3.1 INSPECTION

A. Contractor shall inspect all surfaces, areas and other contingent construction in or to which his work is to be installed and insure himself that they are in proper condition to receive the work to be performed under this Section.

1. Verify that sheathing surfaces are sound, dry, properly secured and that provision has been made for flashings, anchorage, and all other interface items attaching to or penetrating through the Work of this Section has been completed.

2. The Contractor shall notify the Architect in writing, before any work is installed, of any condition requiring correction. Failure to make such a report shall be construed as acceptance of the existing conditions and the responsibility to provide an acceptable installation.

3.2 PREPARATION

A. Verify field dimensions before fabrication. Notify Architect of any discrepancies between field measurements and dimensions indicated in Construction Documents.

3.3 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement so that

completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.

2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.

4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.

5. Install sealant tape where indicated.

6. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

D. Fastener Sizes: Use fasteners of sizes that will penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal joints as shown and as required for watertight construction.

3.4 INSTALLATION

A. General: Install sheet metal roof drainage items and flashing to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system. Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

B. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant.

1. Counterflashings shall be designed for independent installation from base flashing to allow for thermal movement.

3.5 CLEANING

A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturers written installation instructions.

B. Clean exposed metal surfaces, removing substances which might cause corrosion of metal.

3.6 PROTECTION

A. Protection: Installer shall advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction, to ensure that work will be without damage or deterioration, other than natural weathering, at time of substantial completion.

END OF SECTION

SECTION 07 92 00 – JOINT SEALANTS

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes sealants as indicated on the drawings and for the following applications, including those specified by reference to this Section:

1. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:

   a. Control and expansion joints in cast-in-place concrete, except pavement, walkway and curbing that are covered in other specification sections.
   b. Control and expansion joints in unit masonry.
   c. Joints between different materials indicated.
   d. Perimeter joints between materials and frames of doors and windows.
   e. Control and expansion joints in ceiling and overhead surfaces.
   f. Preformed exterior sealant expansion joint
   g. Other locations indicated or required to properly seal buildings.

2. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:

   a. Perimeter joints of exterior openings where indicated.
   b. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
   c. Perimeter joints between interior wall surfaces and frames of interior/exterior doors, windows, and entrances.
   d. Joints between plumbing fixtures and adjoining walls, floors, and counters.
   e. Acoustical sealant
   f. Other joints as indicated.

3. Interior joints in the following horizontal traffic surfaces:

   a. Control and expansion joints as indicated.

B. Field Adhesion Testing **is required prior to application** of any final sealant work.

C. Related Sections include the following:

1. Division 1 Section “Testing Laboratory Services”

1.2 PERFORMANCE REQUIREMENTS

A. Provide joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

1.3 SUBMITTALS

A. Product Literature

1. Submit product data sheets and the manufacturer's installation instructions. If two or more different sealants are to be in physical contact with each other, obtain from each manufacturer confirmation that its product is compatible with the proposed and adjacent products, including any other products which may be used by other sub-contractors.

a. Include primer literature with the submittal document unless the manufacturer's sealant submittal specifically eliminates the need for a primer.

b. If a stain type primer is required for the sealant selected, such information shall be specifically included on submittal documents calling attention to the need for such staining type primer and noting the planned precautions to prevent exposed stain residue.

2. Include Safety Data Sheets for sealants.

3. Preparation instructions and recommendations.

4. Standard drawings illustrating manufacturer's recommended sealant joint profiles and dimensions applicable to Project.

B. Color Samples: Submit manufacturer's standard color chart. Submit actual cured samples of each chosen color for verification of actual color to be installed. Multiple cured samples may be required for selection.

C. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.

2. Joint-sealant manufacturer and product name.

3. Joint-sealant formulation.

4. Joint-sealant color.

D. Preconstruction compatibility and adhesion test reports.

E. Preconstruction field-adhesion test reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Experienced Installer equipped and trained for application of joint sealants required for this Project with record of successful completion of projects of similar scope.

B. Single Source Responsibility: Provide exterior joint sealants by a single manufacturer responsible for testing of Project substrates to verify compatibility

and adhesion of joint sealants.

C. Preconstruction Manufacturer Laboratory Compatibility, Staining, and Adhesion Testing: Submit four samples of each material that will be in contact with or affect joint sealants. Test sealants with substrate materials using either ASTM C 1087 or manufacturer's standard test methods to determine requirements for joint preparation, including cleaning and priming. Test sealants with related materials to verify compatibility.

D. Preconstruction Field-Adhesion Testing: Prior to installing joint sealants, field test adhesion to joint substrates using ASTM C 1193 Method A or method recommended by manufacturer. Verify adhesion is adequate. Modify joint preparation recommendations for failed joints and retest. Submit written report to Architect.

E. Mockups: Provide joint sealant application within mockups required in other Sections identical to specified joint sealants and installation methods.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver in manufacturer's original unopened container, clearly identifying each product specified, relating it to the product literature submitted.

B. Store in accordance with manufacturer's recommendation, with proper precautions concerning shelf life, temperature, humidity, and similar storage factors to ensure the fitness of the material when installed.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.

2. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 deg F.

3. When joint substrates are wet.

B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.8 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.7 WARRANTY

A. Special Installer's Warranty: Original statement on Installer's letterhead in which Installer agrees to repair or replace joint sealants that demonstrate deterioration or failure within warranty period specified.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint sealant manufacturer agrees to furnish joint sealants to repair or replace those that demonstrate deterioration or failure under normal use within warranty period specified.

1. Warranty Period for exterior Silicone Sealants: 20 years date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Dow Corning Corp

B. BASF Construction Chemicals

C. Tremco Sealants and Waterproofing

D. Pecora Corporation

E. Or equal.

2.2 MATERIALS

A. General:

1. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

2. Colors of Exposed Joint Sealants: Manufacturer's standard color that is the closest to the lightest adjacent substrate.

3. Continuous-Immersion-Test-Response Characteristics: Where elastomeric sealants will be immersed continuously in water, provide products that have undergone testing according to ASTM C 1247, including initial six-week immersion period and additional immersion periods specified below, and have not failed in adhesion or cohesion when tested with substrates indicated for Project.

   a. Three additional four-week immersion periods.

4. Do not block weep holes or interfere with concealed drainage path when using sealant.

B. Exterior General Use: single-component, nonsag, neutral-curing silicone joint sealant, non-staining, with Class 100/50.

1. Provide equal to Dow Corning 790 Silicone Building Sealant.

C. Exterior Concealed Joints and Under Thresholds: One-part butyl rubber caulk conforming to FS TT-S-001657, Type I

D. Exterior Concealed Joints between two assembled rigid surfaces in compression: Polyisobutylene sealant tape conforming to AAMA 804.1

E. Exterior and Interior Horizontal Joints subject to pedestrian traffic: Two-part polyurethane conforming to ASTM C920, Class 25, Type M; self-leveling.

F. Interior Non-wet Areas: One-component acrylic latex water-based sealant conforming to ASTM C834.

G. Interior Wet Areas: One-part, mildew-resistant silicone rubber conforming to ASTM C920, Type S, Class 25, Grade NS.

H. Acoustical Sealant:

1. Acoustical sealant shall be a non-hardening, non-skinning, non-staining sealant that maintains the specified STC rating of the partition, floor/ceiling assembly, door, or window to which it is applied.

2. Acoustical Sealant shall be one of the following, or approved equal:

a. For non-fire rated assemblies:

(1) AIS-919 Acoustical Sealant from Pecora Corporation, www.pecora.com

(2) Acoustical Sealant from The Tremco Manufacturing Company, www.tremcosealants.com

(3) Or equal

I. Foam Sealants: Blown with hydrocarbon or HFC-134a.

J. EMSEAL ColorSeal w/ Secondary Seal for Exterior Cavity Walls:

1. Provide "ColorSeal" as manufactured by EMSEAL Joint Systems.

a. Color to be selected by Architect from manufacturer's full line.

b. Widths as indicated on Drawings.

c. Corner beads to be silicone sealant as recommended by the manufacturer for a watertight installation.

2. Preformed sealant shall be silicone pre-coated, preformed, pre-compressed, self-expanding, sealant system. Expanding foam to be cellular foam impregnated with a water-based, non-drying, 100% acrylic dispersion. Seal shall combine factory-applied, low-modulus silicone and a backing of acrylic-impregnated expanding foam into a unified hybrid sealant system.

3. Material shall be capable of movements of +25%, -25% (50% total) of nominal material size

2.3 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

1. Type C: Closed-cell material with a surface skin.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.4 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints. Leave no residue.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Inspect substrate surface to assure that no bond breaker materials contaminate the surface to which the sealant is to adhere and to ensure that unsound substrates are repaired. Installation of sealant shall be evidence of acceptance of the substrate.

B. Verify joint dimensions prior to installation of the sealant to ensure that all dimensions are within tolerance established in the manufacturer's literature. Unacceptable variations shall be called to the Architects attention for resolution prior to installing any material.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:

   a. Concrete.

   b. Masonry.

3. Remove laitance and form-release agents from concrete.

4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

a. Metal.

b. Glass.

c. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

D. Preformed Sealant Preparation:

1. Clean the joint opening of all contaminants immediately prior to installation of expansion joint system. Repair spalled, irregular or unsound joint surfaces using accepted industry practices for repair of the substrates in question. Remove protruding roughness to ensure joint sides are smooth. Ensure that there is sufficient depth to receive the full depth of the size of the preformed sealant being installed plus at least ¼-inch (6mm) for the application of sealant corner beads.

2. No drilling, or screwing, or fasteners of any type are permitted to anchor the sealant system into the substrate.

3.3 INSTALLATION

A. General: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.

2. Do not stretch, twist, puncture, or tear sealant backings.

3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.

E. Install sealants by proven techniques to comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.

2. Completely fill recesses provided for each joint configuration.

3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.

2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

G. Curing: Cure sealants and caulking compounds in compliance with manufacturer's instructions and recommendations to obtain high early bond strength, internal cohesive strength and surface durability.

H. Preformed Sealant:

1. Install per below and Manufacturers Installation Guide.

2. After removal from packaging, lightly, quickly and thoroughly wipe the cured silicone facing with a lint-free rag made damp with acetone or other solvent to remove the release agent.

3. Apply thin bead of sealant to the end of the silicone facing only. Use correct grade and color of sealant as supplied.

4. Remove adhesive-release paper & install into joint.

a. Join successive sections together by applying a thin bead of sealant to the end of the silicone facing.

5. Once material is expanded fully against both sides of the joint, and material and joint sides are dry if water spray was used to facilitate installation, gun a sealant bead where the sealant facing meets the substrate. Tool the corner bead firmly against the substrate and silicone facing.

3.4 FIELD QUALITY CONTROL

A. Inspecting Agency: The Contractor will engage a qualified testing agency to perform tests and inspections.

1. **No sealant work is to be completed without prior written authorization from the Architect that the field adhesion test has been completed.**

B. Field-Adhesion Testing: Perform adhesion tests in accordance with manufacturer's instructions and with ASTM C1193, Method A.

1. Perform 5 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate, and one test for each 1000 feet of joint length thereafter or 1 test per each floor per building elevation, minimum.

2. For sealant applied between dissimilar materials, test both sides of joint.

C. Remove sealants failing adhesion test, clean substrates, reapply sealants, and re-test. Test adjacent sealants to failed sealants.

D. Submit report of field adhesion testing to Architect indicating tests, locations, dates, results, and remedial actions taken.

3.5 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

END OF SECTION

SECTION 08 11 13 – HOLLOW METAL DOORS AND FRAMES

PART 1 – GENERAL

1.1 SUMMARY

A. Extent of metal doors and frames is shown and scheduled on drawings and includes the following:

1. Hollow metal doors and frames, field finished.
2. Thermally broken hollow metal frames, field finished.

B. Related Sections include the following:

1. Division 8 Section “Flush Wood Doors”

2. Division 8 Section “Door Hardware”

3. Division 9 Section “Paints and Coatings”

a. Coordinate with Painting Contractor to ensure all frames/doors are painted prior to application of hardware.

1.2 SUBMITTALS

A. Shop Drawings - Submit for fabrication and installation of hollow metal frames. Include details of construction, location and installation requirements of finish hardware and reinforcements and details of joints and connections. Show anchorage and accessory items.

1. Provide schedule of doors and frames using same reference numbers for details and openings as those on Drawings.

2. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.

1.3 QUALITY ASSURANCE

A. Provide hollow metal frames complying with ANSI A250.8/SDI100-1998 Recommended Specifications for Standard Steel Doors and Frames and as herein specified.

B. Manufacturer - Provide each type of door frame unit by a single firm specializing in production of that type of work.

C. Storm Shelter Openings: Provide complete door systems for hurricane or tornado storm shelters, and other areas of refuge, complying and tested according to ICC 500 (2014/2020), ICC/NSSA Standard for the Design and Construction of Storm Shelters.

1. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work carton or crated to provide protection during transit and job storage.

B. Inspect hollow metal work upon delivery for damage. Minor damages may be repaired, provided finish items are equal in all respects to new work and acceptable to Architect; otherwise, remove and replace damaged items as directed.

C. Store doors and frames at building site under cover. Place units on wood sills at least 4" high, or otherwise store on floors in manner that will prevent rust and damage. Avoid use of non-vented plastic or canvas shelters which could create humidity chamber.

1.5 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Curries Company

B. Ceco Door Products

C. Steelcraft Manufacturing Company

D. Metal Products Incorporated

E. Republic Doors & Frames

F. Or equal

2.2 MATERIALS

A. Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, complying with ASTM A569 and ASTM A568.

B. Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A366 and ASTM A568.

C. Galvanized Steel Sheets: Zinc coated carbon steel sheets of commercial quality complying with ASTM A653, with A60 coating.

D. Inserts, Anchors Bolts and Fasteners: Manufacturer's standard units, except hot-dip galvanize items to be built into exterior walls, complying with ASTM A153 Class C or D as applicable.

2.3 COMPONENTS

A. Steel Doors:

1. Provide flush metal doors indicated on drawings or schedules, complying with requirements for SDI Level 3, Model 2 (16 gauge, extra heavy duty, seamless).

2. **All exterior doors shall be galvanized.** All other metal items in exterior doors shall also be galvanized. Interior doors shall be galvanized where indicated.

3. Close top and bottom edges as integral part of door construction or by addition of inverted steel channels.

4. Exterior doors shall be insulated with fiberglass insulation. Provide doors fabricated as thermal-rated assemblies with a minimum R-value of 3.2 or better.

B. Standard Steel Frames:

1. Provide 16 gauge metal frames (unless otherwise noted on Drawings or as specified herein) for doors, and other openings, of types and styles as shown on drawings and schedules. Conceal fastenings, unless otherwise indicated. Fabricate frames with mitered and full welded corners, unless otherwise indicated.

a. Provide 14 gauge metal frames at all frames supporting hollow metal doors.

b. All exterior frames and other interior frames supporting galvanized doors shall be galvanized.

c. Provide thermally broken hollow metal frames at exterior door openings to Plumbing Chases (120A and 117A) Thermal break shall be a continuous, non-metallic material isolating exterior and interior frame components.

2. Door Silencers: Except on weatherstripped frames, drill stops to receive 3 silencers on strike jambs of single door frames and 2 silencers on heads of pair of door frames.

3. Provide floor anchors at each jamb and mullion in addition to required wall anchors.

2.4 FABRICATION

A. General

1. Fabricate steel door and frame units to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at project site.

2. Fabricate exposed faces of doors and panels, including stiles and rails of non-flush units, from only cold-rolled steel.

3. Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold-rolled or hot-rolled steel (at fabricator's option). <u>All items in exterior doors to be galvanized.</u>

4. Fabricate doors indicated to be galvanized from galvanized sheet steel. Close top and bottom edges as integral part of door construction or by addition of inverted galvanized steel channels.

5. Exposed Fasteners: Where indicated, provide countersunk flat Phillips heads for exposed screws and bolts.

B. Finish Hardware Preparation

1. Prepare doors and frames to receive mortised and concealed finish hardware in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 series specifications for door and frame preparation for hardware.

2. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at project site.

3. Locate finish hardware as shown on final shop drawings or, if not shown, in accordance with "Recommended Locations for Builder's Hardware", published by Door and Hardware Institute.

2.5 FINISHES

A. Shop Paint:

1. Clean, treat and paint exposed surfaces of steel door and frame units.

2. Clean steel surfaces of mill scale, rust, oil, grease, dirt and other foreign materials before application of paint.

3. Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive finish paint.

B. Field Application:

1. Prior to application of **ANY** hardware, frames and doors shall be re-primed, and coated with 2 coats of finish paint by Painting Contractor. Coordinate to ensure all frames/doors are painted prior to application of hardware.

2. Hardware and doors are not to be installed until **ALL** painting has been completed.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Installer must examine substrate and conditions under which steel doors and frames are to be installed and must notify Architect in writing of any conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to installer.

3.2 INSTALLATION

A. General

1. Install standard steel doors, frames, and accessories in accordance with final shop drawings and manufacturer’s data, and as herein specified

B. Placing Frames

1. Comply with provisions of SDI-105 "Recommended Erection Instructions for Steel Frames", unless otherwise indicated.

2. Place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned and braced securely until permanent anchors are set. After wall construction is completed remove temporary braces and spreaders leaving surfaces smooth and undamaged.

3. Locate 3 wall anchors, of type suitable for construction involved, per jamb at hinge and strike levels and floor anchor at each jamb and mullion.

C. Door Installation

1. Fit metal doors accurately in frames, within clearances specified in SDI-100-98.

3.3 ADJUSTING

A. Final Adjustments: Check and readjust operation of finish hardware items, leaving steel doors and frames undamaged and in complete and proper operating condition.

END OF SECTION

SECTION 08 14 13 – PAINTED FLUSH WOOD DOORS

PART 1 – GENERAL

1.1 SUMMARY

A. Extent and location of each type of wood door is shown on Drawings and in schedule.

B. Types of doors required include the following:

1. Factory primed, field finished solid core painted flush wood doors.

C. Related Sections include the following:

1. Division 8 Section “Hollow Metal Doors and Frames”

2. Division 8 Section “Door Hardware”

3. Division 9 Section “Painting and Coating”

1.2 SUBMITTALS

A. Product Data: Submit door manufacturer's product data, specifications and installation instructions for each type of wood door. Include details of core and edge construction and similar components.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicated blocking locations for hardware locations.

2. Indicate dimensions and locations of mortises and holes for hardware.

3. Indicate dimensions and locations of cutouts.

4. Doors to be factory primed, field finished.

C. Product Warranty: Provide manufacturer's standard extended warranty for review.

D. Samples: final field finish on actual primed wood door sample.

1.3 QUALITY ASSURANCE

A. Allowable Tolerances for Fabrication:

1. Size, overall dimensions - 1/16"

2. Maximum warp and diagonal squareness - 1/8"

1.4 DELIVERY, STORAGE AND HANDLING

A. Protect wood doors during transit, storage and handling to prevent damage, soiling and deterioration. Comply with the "On-site Care" recommendations of NWMA pamphlet "Care and Finishing of Wood Doors" and with manufacturer's instructions.

B. Deliver doors to site **ONLY** after building has reached average prevailing humidity of this area. Refer to Project Conditions as specified herein.

C. Store doors in area where no excessive variations of heat, dryness or humidity are to be encountered.

1.5 PROJECT/SITE CONDITIONS

A. Environmental Limitations: **Do not deliver or install doors** until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during remainder of construction period.

1.6 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.

    b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

2. Warranty shall also include installation that may be required due to repair or replacement of defective doors.

3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Masonite Architectural (Graham, Marshfield-Algoma, Mohawk)

B. VT Industries (Eggers Industries)

C. Oshkosh Door Company

2.2 DOOR CONSTRUCTION, GENERAL

A. WDMA I.S.1-A-11 Performance Grade: Heavy duty.
    1. All doors must meet specified WDMA Performance Duty Level, including face screw holding requirement. Surface applied hardware shall be installed with screws; through bolts are not acceptable.

2.3 INTERIOR SOLID CORE DOORS (PAINTED)

A. Provide “Cendura Series – Mohawk” by Masonite Architectural or equal by one of the approved manufacturers.

    1. Faces: Paint grade birch.

    2. Vertical Edges: Hard maple, full height factory bonded to core, compatible with hardware preps, capable of meeting WDMA screw holding requirements for hinge and lock hardware.

    3. Horizontal Edges: Structural Composite Lumber

    4. Core: Extra heavy duty wood-based particleboard

    5. Construction: Five plies. Stiles and rails are bonded to core, and then entire unit is abrasive planed before veneering.

    6. Thickness: 1-3/4 inch

2.4 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.

2.5 FINISHES

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted at edges of cutouts, and mortises.

B. Opaque Finish:

1. Grade: AWI Custom Grade

C. Factory-Primed: Primer suitable for field finish paint specified in Division 9 Section “Painting and Coating”.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs. Any deficiencies must be corrected prior to door installation.

2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Condition doors to average prevailing humidity in installation area prior to hanging. Building shall be fully enclosed and permanent climate control system operating.

B. Do not install any hardware until doors have been field finished per Division 9 Section “Painting and Coating”. Allow for proper paint cure time before installing.

C. Hardware: Coordinate installation with Division 8 Section “Door Hardware”.

D. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

E. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer. Machine doors for hardware. Seal edges of cutouts and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 3/4 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.

3.3 ADJUST AND CLEAN

A. Operation: Correct any deficiency that prohibits the door from swinging or operating freely. Do not remove hinge screws after initial insertion. Shims used for alignment purposes must be inserted between hinge and frame. Do not insert shims between hinge and door.

B. To prevent stile failure, insure that door closers are properly adjusted and do not limit the door opening swing. Limit door opening swing only with a properly located stop.

C. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

3.4 PROTECTION

A. Do not “prop” doors open with any devices during construction at the base of the door. If this occurs, doors will be rejected and replaced at no cost to the Owner.

B. Protection of Completed Work: Advise Architect of proper procedures required for protection of installed wood doors from damage or deterioration until acceptance of work.

C. One month prior to expiration of Trade Contractor’s 1-year warranty, the Contractor shall perform a walk-thru, with the Architect present, of all wood door openings and adjust hardware as necessary for proper operation of doors to fully satisfy door manufacturer’s warranty.

END OF SECTION

SECTION 08 31 00 – ACCESS DOORS AND PANELS

PART 1 – GENERAL

1.1 SUMMARY

A. Provide the following Metal Access Panels as specified herein in locations indicated on Drawings and as follows:

1. Wall or ceiling mounted, non rated, recessed with gypsum infill.

B. Related Sections include the following:

1. Division 8 Section “Door Hardware” for cylinder and interchangeable core

1.2 SUBMITTALS

A. Product Data:

1. Manufacturer’s technical data for each type of access door and panel assembly, including setting drawings, templates, fire-resistive characteristics, finish requirements, and details of anchorage devices.

2. Include complete schedule, types, locations, construction details, finishes, latching or locking provisions, and other pertinent data.

B. Shop drawings:

1. Door and panel units: Show types, elevations, thickness of metals, full size profiles of door members.

2. Hardware: Show materials, finishes, locations of fasteners, types of fasteners, locations and types of operating hardware, and details of installation.

3. General: Show connections of units and hardware to other Work. Include schedules showing location of each type and size of door and panel units.

C. Manufacturer's Installation Instructions: Indicate installation requirements and rough-in dimensions.

1.3 QUALITY ASSURANCE

A. Coordination

1. Furnish inserts and anchoring devices which must be built into other work for installation of access doors. Coordinate delivery with other work to avoid delay.

1.4 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Nystrom Building Products

B. Babcock Davis

C. J.L. Industries

2.2 MANUFACTURED UNITS

A. Recessed Access Doors with gypsum infill (non-rated):
1. Basis-of-Design Product: Provide Nystrom; "Model RGB", wall board surfaces with mortise prep.

2. Size: as indicated on drawings.

3. Description: Door face recessed 5/8 inchfor gypsum board infill, with exposed flange and concealed hinge.

4. Cold-Rolled Steel:

a. Door Material: Nominal 0.075 inch, 14 gauge.

b. Frame Material: Nominal 0.062 inch, 16 gauge. Provide 1/4 inch mounting holes.

c. Finish: White powder coat primed, field finish painted.

5. Latch and Lock: Prepared for mortise cylinder – provide with key operated cam lock.

2.3 FABRICATION

A. Manufacture each access panel assembly as an integral unit ready for installation.

B. Welded construction: Furnish with a sufficient quantity of 1/4 inch mounting holes to secure access panels to types of supports indicated.

C. Recessed panel: Form face of panel to provide specified recess for application of finish material. Reinforce panel as required to prevent buckling.

2.4 FINISHES

A. Phosphate dipped with factory applied prime coat. Finish coat to be applied per Division 9 Section “Painting and Coating”.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine opening to receive the work. Verify that openings are correctly dimensioned to receive doors. Do not proceed until any unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install access door and frame units per manufacturer's written instructions.

B. Install frames plumb and level in opening. Secure rigidly in place.

C. Position units to provide convenient access to concealed Work requiring access whether shown on drawings or not.

3.3 ADJUSTING

A. Adjust latching mechanism to operate smoothly.

B. Remove and replace panels or frames which are bowed, warped or damaged.

3.4 ADJUSTING

A. Leave work area clean and free of debris.

END OF SECTION

SECTION 08 36 00 – SECTIONAL OVERHEAD DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aluminum Sectional Overhead Doors - Unglazed

B. Manual Operators.

C. Operating Hardware, tracks, and support.

1.2 RELATED SECTIONS

A. Section 05500 - Metal Fabrications: Steel frame and supports.

B. Section 13 14 22 – Pre Engineered Structures.

1.3 REFERENCES

A. ANSI/DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

A. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
   1. As shown on Structural Drawings

B. Single-Source Responsibility: Provide doors, tracks, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

1.5 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

B. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.

C. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

D. Operation and Maintenance Data.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

B. Installer Qualifications: Authorized representative of the manufacturer with minimum five years documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened labeled packaging until ready for installation.

B. Protect materials from exposure to moisture until ready for installation.

C. Store materials in a dry, ventilated weathertight location.

1.8 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.8 PROJECT CONDITIONS

A. Pre-Installation Conference: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com. E-mail: sales@overheaddoor.com.

B. Substitutions: Or equal.

2.2 ALUMINUM SECTIONAL OVERHEAD DOORS

A. Sectional Overhead Doors: 521 Series Aluminum Doors by Overhead Door Corporation.

1. Door Assembly: Stile and rail assembly secured with 1/4 inch (6 mm) diameter through rods.

a. Panel Thickness: 1-3/4 inches (44 mm).
b. Center Stile Width: 2-11/16 inches (68 mm)
c. End Stile Width: 3-5/16 inches (84 mm)
d. Intermediate Rail Pair Width: 3-11/16 inches (94 mm).
e. Top Rail Width:
1) Not less than 4 inches, or as required to meet wind loading requirements.
f. Bottom Rail Width:
1) Not less than 6 inches, or as required to meet wind loading requirements.
g. Aluminum Panels: 0.050 inch (1.3 mm) thick, aluminum.
h. Stiles and Rails: 6063 - T6 aluminum.
i. Springs: Galvanized torsion springs.
1) 50,000 cycles – heavy duty.

2. Finish and Color:

a. Anodized Finish: Bronze anodized.

3. Windload Design: Provide to meet the Design/Performance requirements specified.

4. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.

5. Lock: Interior galvanized single unit.

6. Weatherstripping:

a. Flexible bulb-type strip at bottom section.
b. Flexible Jamb seals.
c. Flexible Header seal.

7. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.

8. Manual Operation: Chain hoist.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until openings have been properly prepared.

B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

C. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer’s printed instructions.

B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.

C. Anchor assembly to wall construction and building framing without distortion or stress.

D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

E. Fit and align door assembly including hardware.

3.4 CLEANING AND ADJUSTING

A. Adjust door assembly to smooth operation and in full contact with weatherstripping.

B. Clean doors, frames and glass.

C. Remove temporary labels and visible markings.

3.5 PROTECTION

A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

B. Protect installed products until completion of project.

C. Touch-up, damaged coatings and finishes and repair minor damage before Substantial Completion.

END OF SECTION

SECTION 08 41 13 – ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 – GENERAL

1.1 SUMMARY

A. Extent of entrance and curtainwall work is indicated on the Drawings

B. Work includes, but is not limited to the following:

1. Impact Resistant aluminum curtain wall system

2. Impact Resistant aluminum entrance

3. Door hardware for all aluminum entrances **(Refer to Section 08 71 00 Door Hardware for hardware).**

a. Hardware Preparation Coordination: Provide factory preparation of aluminum doors and frames for all door hardware specified in Section 08 71 00. Coordinate hardware templates, reinforcements, and machining requirements with the hardware supplier prior to fabrication. Field cutting of aluminum doors for hardware is not permitted.

4. Frame, transoms and sidelights where indicated.

5. Breakmetal closures at heads, jambs, and sills as indicated on Drawings.

a. Extruded aluminum slanted curtain wall cover at Security Window – full perimeter.

6. Accessories including perimeter trims, stools, accessories, shims, anchors and perimeter sealing of framing units to create an air and weathertight seal.

C. Related Sections include the following:

1. Division 1 Section “Testing Laboratory Services”

2. Division 7 Section “Sheet Metal Flashing and Trim” for sill flashings

3. Division 7 Section “Joint Sealants”

4. Division 8 Section “Door Hardware”

5. Division 8 Section “Glazing”

6. Division 8 Section “Cantilever Sunshades”

1.2 PERFORMANCE REQUIREMENTS

A. Wind Design Data:

1. Refer to Structural Drawings for additional design data.

2. Design pressure: refer to Structural Drawings.

3. Windborne-Debris-Impact Resistance Performance: Shall be tested in accordance with ASTM E1886, information in ASTM E1996, and TAS 201/203.

    a. Large/Small Missile Impact: For all aluminum-framed systems in this project.

B. Curtainwall Performance Requirements:

1. Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283. Air infiltration rate shall not exceed 0.06 cfm/ft2 (0.3 l/s · m2) at a static air pressure differential of 6.24 psf (300 Pa).

2. Water Resistance, (static): The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a static air pressure differential of 12 psf (575 Pa) as defined in AAMA 501.

3. Water Resistance, (dynamic): The test specimen shall be tested in accordance with AAMA 501.1. There shall be no leakage at an air pressure differential of 12 psf (575 Pa) as defined in AAMA 501.

4. Uniform Load: A static air design load of 40 psf (1915 Pa) shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member at design load. At structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.

5. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than: 0.66 (clear).

6. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than 66frame and 60glass (clear)

C. Sealants: Provide elastomeric joint sealants as specified in Division 7 Section “Joints Sealants” that have been produced and installed to establish and maintain weathertight and airtight continuous seals without causing staining or deterioration of joint substrates.

1. Sealants used for weather seals shall not experience adhesive or cohesive failure.

2. Sealants shall withstand movements up to the limits prescribed by the manufacturer.

3. Exposed sealant surface shall not crack, bubble or stain adjacent materials.

4. Perform adhesion testing on aluminum and substrate members prior to installation.

D. Movable joints: Provide to accommodate the full range of manufacturing tolerance, field tolerance, thermal movement, seismic movement, floor sag, beam sag and column settlement. Joints shall accommodate the worst possible combination of effects so as to prevent internal stress, failure, deterioration, or failure of weather seals.

E. Not permitted: Vibration harmonics, wind whistles, noises caused by thermal movement, thermal movement transmitted to other building elements, loosening, weakening or fracturing of attachments or components of system.

1.3 SUBMITTALS

A. Product Data:

1. Submit manufacturer's descriptive literature and product specifications.

a. Submit component dimensions; describe components within assembly, anchorage and fasteners, glass, internal drainage details and water flow drainage diagrams.

2. Include information for factory finishes, hardware, accessories, and other required components.

3. Calculations: Submit calculations and loads, signed by a Structural Engineer registered in the State of Mississippi, where such impacts the primary or secondary building structural systems.

4. Letter from entrance door manufacturer stating all hardware and components provided meets assembly testing for large and small missile impact.

a. Coordinate with Division 8 Section “Door Hardware” to ensure all components meet the testing assembly requirements.

b. The Contractor shall not propose or submit any manufacturer that cannot provide written documentation verifying full tested assembly compliance, including all specified hardware and components. Manufacturers lacking such documentation shall be deemed non-responsive and shall not be eligible to bid this Project.

B. Shop Drawings:

1. Indicate system dimensions, framed opening requirements and tolerances, anticipated deflection under load, affected related work, weep drainage network, expansion and contraction joint location and details, and field welding required.

2. Provide full elevations at a minimum scale of 1/4 inch to 1 foot.

3. Provide full-size joint details illustrating details, including flashing.

4. Indicate means of adjustment to accommodate field conditions.

5. Indicate locations and details for attachment of components to building structure including primary and secondary steel.

    a. Show locations of all fasteners, including size and spacing of such fasteners.

C. Door Hardware Schedule for Aluminum Doors: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Hardware Templates: Submit manufacturer-certified hardware preparation templates for each opening. Templates shall be coordinated with Section 08 71 00 – Door Hardware and reviewed prior to commencement of fabrication.

2. Coordination Submittals: Submit confirmation letter from aluminum entrance manufacturer stating preparations for electrified and mechanical hardware are compatible with tested assembly requirements and door profiles.

D. Samples for verification:

1. Submit manufactures samples indicating quality of finish in required colors.

2. Where normal texture or color variations are expected, include additional samples illustrating range of variation.

E. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed systems, made from 18" lengths of full-size components and showing details of the following:

1. Joinery.

2. Anchorage.

3. Expansion provisions.

4. Glazing.

5. Flashing and drainage.

6. Joint sealant locations

F. Test reports: Indicate substantiating engineering data, test results of previous tests by independent laboratory which purport to meet performance criteria, and other supportive data.

G. Manufacturer’s field reports

H. Field testing results and report

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An installer which has had successful experience with installation of the same or similar units required for the project and other projects

of similar size and scope.

B. Manufacturer Qualifications: A manufacturer capable of providing aluminum-framed system that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.

C. Engineer Qualifications: Professional Structural Engineer registered in State of Mississippi.

D. Source Limitations: Obtain aluminum-framed system through one source from a single manufacturer.

E. Coordination Responsibility: Coordinate hardware preparation and installation requirements with Section 08 71 00. The Storefront Contractor is responsible for factory preparation of doors, including hardware locations, drilling, cutouts, and required reinforcement for hardware supplied under Section 08 71 00.

F. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum-framed system and are based on the specific system indicated. Do not modify size and dimensional requirements.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

G. Mockups: Refer to Section 01 43 39 Mockup Requirements

H. Structural-Sealant Glazing: Comply with ASTM C 1401, “Guide for Structural Sealant Glazing” for design and installation of structural-sealant-glazed systems.

I. Structural-Sealant Joints: Design reviewed and approved by structural-sealant manufacturer.

J. Pre-installation Conference:

1. Arrange with Architect, and representatives of curtainwall, glazing, and sealant manufacturer to visit Project site before beginning to analyze site conditions, and inspect surfaces and joints to be sealed in order that recommendations may be made should adverse conditions exist.

2. Discuss following items:

a. Detailed review of Contract Documents and approved shop drawings.

b. Weather conditions under which work will be done.

c. Anticipated frequency and extent of joint movement.

d. Joint design.

e. Glazing procedures.

3. Sign off from the manufacturer that site conditions are acceptable is required

in writing prior to start of Work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Handle Work of this Section in accordance with AAMA - Curtain Wall Manual #10. In addition, store in a dry location and protect from exposure to contaminants and temperature extremes.

B. Protect pre-finished aluminum surfaces with wrapping or strippable coating and store in a dry location. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather. Puncture wrappings at ends for ventilation.

C. Immediately replace materials that become damaged or are otherwise unsuitable for installation, and replace with new materials.

1.6 PROJECT CONDITIONS

A. Inspect substrates to which work of this section adjoins. Field check all dimensions and elevations on the connecting work affecting the work of this section to insure a proper fit and weathertight construction.

1.7 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.7 WARRANTY

A. Manufacturer's 10 year finish warranty covering checking, crazing, peeling, chalking, fading, or adhesion of clear anodized finish.

B. General: warranty period 5 years. Longer warranties apply as noted below and in other sections of these specifications where components are specified which are part of the assemblies. Replace components with deficiencies such as:

1. Discoloration, fading, chalking, staining, pitting, corrosion or other deterioration or inconsistency in surface finish.

2. Aging or weathering that does not match extra materials in storage.

3. Penetration of water into the building exceeding specified limits.

4. Air infiltration exceeding specified limits.

5. Structural failure of components resulting from forces within specified limits.

6. Failure of operating parts to function normally.

1.8 MAINTENANCE

A. Storefront Contractor shall furnish maintenance service for a period of **12 months from date of Substantial Completion** during normal working hours at no cost to the Owner. Service shall consist of examination and adjustment of aluminum entrance components only, including hinges, pivots, frames, and door alignment. Adjustment, service, or replacement of finish hardware furnished under Section 08 71 00 – Door Hardware is excluded from this section and shall be provided by the hardware supplier.

B. 1 month prior to expiration of maintenance agreement during warranty “walk-thru”, survey **all** storefront doors and hardware and perform any adjustments if necessary.

1.9 RESPONSIBILITY MATRIX

A. Supply of hardware: Section 08 71 00 Hardware Supplier

B. Hardware templates: Section 08 71 00 Hardware Supplier

C. Door hardware prep (factory)

1. Hollow Metal Doors and Frames: Section 08 11 13 Hollow Metal Supplier

2. Wood Door: Section 08 14 13 Wood Door Supplier

3. Aluminum Entrances and Storefronts: Section 08 41 13 Storefront Contractor

D. Wiring to door: Division 26 – Electrical

E. Low-voltage connections: Division 28 – Security

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Kawneer North America (Basis of Design)

B. The following manufacturers are considered equal systems. If the following are used, any changes to the building design or construction (including hardware changes) shall be at **no cost** to the Owner.

1. Oldcastle Building Envelope
2. EFCO Corporation
3. YKK AP America, Inc.
4. Equal as approved

2.2 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by aluminum manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.

B. Fasteners: aluminum or 304 stainless steel, to be non-corrosive and compatible with aluminum members, trim hardware, anchors, and other components.

C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

E. Expansion Anchor Devices: Lead-shield or toothed-steel, drilled-in, expansion bolt anchors.

F. Shims: Non-staining, non-ferrous, type as recommended by system manufacturer.

G. Protective Coatings: Cold applied asphalt mastic complying with SSPC-Paint 12, compounded for 30 mil thickness for each coat; or alkyd type zinc chromate primer complying with FS TT-P-645.

H. Glass: Provide glazing as specified in Division 8 Section “Glazing”.

I. Gaskets: Glazing gaskets shall comply with ASTM C 864 and be extruded of a silicone compatible EPDM rubber that provides for silicone adhesion.

J. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type for a complete system warranty, and as follows:

1. Structural Sealant: ASTM C 1184, single-component neutral-curing silicone

formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in aluminum-framed systems indicated.

2. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.

3. Refer to Division 7 Section “Joint Sealants” for adhesion testing prior to installation.

2.3 CURTAINWALL COMPONENTS

A. Provide at all exterior framing in sizes in tolerances as indicated on Drawings.

B. Impact Resistant Curtainwall:

Typical: Provide curtainwall – “1600 Wall System 2” as manufactured by Kawneer – Vertical Structural Silicone Glazed (SSG), Hurricane Resistant with no exterior applied glazing stops or pressure plates at vision areas, except where required at perimeter or termination conditions.

C. Pressure Plates: Manufacturer’s standard pressure plates, provided only where required at perimeter, termination, spandrel, or non-vision conditions, and not permitted at vision areas of structural silicone glazed assemblies..

D. Provide all necessary components for complete installation including glazing gaskets for flush glazing and adapters as required to accommodate the following:

1. 1-5/16” impact glazing as specified in Division 8 Section “Glazing”.

E. Extruded Aluminum Curtain Wall Covers: Profile similar to Model # 817-863; Custom size – 2.5” x 11” – sloped down to 0.5” at the leading edge.

1. Miter corners to provide continuous profile.

2. Finish to match adjacent curtain wall framing.

2.4 ENTRANCE COMPONENTS

A. Standard impact entrances (exterior):

1. Provide “350 IR” as manufactured by Kawneer.

B. All door sections shall be of extruded aluminum alloy and temper to meet or exceed finishing and structural criteria as specified.

C. Doors shall be 1-3/4 inches thick. Major portions of the door members to be 0.125” nominal in thickness.

D. Glazing gaskets shall be either EPDM elastomeric extrusions or a thermoplastic elastomer.

E. Fasteners: aluminum alloys or stainless steel. Exposed fasteners, if any, shall be finished to match door and frame sections.

F. Provide all necessary components for complete installation including glazing gaskets for flush glazing and adapters as required to accommodate the following:

1. Exterior: 9/16" impact glazing as specified in division 8 section "Glazing".

G. Hardware:

1. Hardware Sets: Refer to Section 08 71 00 – Door Hardware.

2. Preparation:

a. Provide factory preparation of doors and frames for all hardware listed in Section 08 71 00.
b. Reinforce door stiles, rails, and frames as required for closers, exit devices, hinges, electric strikes, and power transfer devices.
c. Coordinate door and frame profiles with door hardware supplier to ensure compatibility.

3. Electrified Hardware: Factory-prep doors for electrified hardware including concealed vertical rods, power transfer hinges, electric locks, and request-to-exit devices. Coordinate wiring conduit and access with Division 26 – Electrical.

4. Impact Compliance: All hardware shall maintain the tested impact-resistant assembly rating. No substitutions are permitted that compromise compliance with ASTM E1886, ASTM E1996, or TAS 201/203.

H. Weatherstripping: manufacturer's standard in addition to specified in Division 8 Section "Door Hardware".

2.5 FABRICATION

A. Aluminum framing:

1. Provide members of size, shape and profile indicated, designed to provide for glazing from exterior.

2. Fabricate frame assemblies with joints straight and tight fitting.
3. Reinforce internally with structural members as necessary to support design loads.

4. Maintain accurate relation of planes and angles, with hairline fit of contacting members.

5. Seal horizontals and direct moisture accumulation to exterior.

6. Provide flashings and other materials used internally or externally that are

corrosive resistant, non-staining, non-bleeding and compatible with adjoining materials.

7. Provide manufacturer's extrusions and accessories to accommodate expansion and contraction due to temperature changes without detrimental to appearance or performance.

8. Make provisions in framing for minimum edge clearance, nominal edge cover and nominal pocket width for thickness and type of glazing or infill used in accordance with recommendations of manufacturer and FGMA glazing manual.

B. Welding:

1. Comply with recommendations of the American Welding Society.

2. Use recommended electrodes and methods to avoid distortion and discoloration.

3. Grind exposed welds smooth and flush with adjacent surfaces; restore mechanical finish.

C. Flashings: form from sheet aluminum with same finish as extruded sections. Material thickness as required to suit condition without deflection or "oil canning".

D. Entrance System Fabrication:

1. Door corner construction shall consist of mechanical clip fastening, SIGMA deep penetration plug welds and 1-1/8" long fillet welds inside and outside of all four corners. Glazing stops shall be hook-in type with EPDM glazing gaskets reinforced with non-stretchable cord.

2. Accurately fit and secure joints and corners. Make joints hairline in appearance.

3. Prepare components with internal reinforcement for door hardware.

4. Arrange fasteners and attachments to conceal from view.
5. All glazing shall be flush, including the horizontal muntins and sills. Glass shall be held in place by EPDM glazing gaskets on both sides. No applied stops shall be permitted.

6. All door frames shall have door stops at jambs and head with continuous weathering.

2.6 FINISHES

A. All exposed surfaces shall be free of unsightly scratches and blemishes.

B. Provide on all surfaces:

1. AA-M10C21A41, AAMA 611, Architectural Class I Dark Bronze Anodize Coating (.7 mils minimum)

PART 3 – EXECUTION

3.1 PREPARATION

A. Install sill flashings: Turn up ends and edges; seal with joint sealant to adjacent Work to form water tight dam. Provide joints between flashing pieces as required to accommodate the thermal movement of the flashing material while maintaining a weathertight seal.

1. Refer to Division 7 Section “Sheet Metal Flashing and Trim”.

2. NOTE: this is not a “subsill” and is to be provided in addition to the high performance aluminum subsill per the manufacturer.

3.2 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight aluminum-framed installation.

1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.

2. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.

3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing aluminum-framed system, accessories, and other components.

B. Framing Installation:

1. Install aluminum-framed system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
2. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.

3. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

C. Hardware Installation: Install hardware in strict accordance with templates and schedules submitted under Section 08 71 00. Final adjustments of hardware shall be performed by the hardware supplier. Storefront Contractor shall coordinate

mounting locations but shall not install finish hardware unless specifically included in the Contract.

D. Entrance Door Installation:

1. Doors shall be hung plumb, level and square, and properly secured in accordance with manufacturer's approved shop drawings.

2. Hardware shall be properly installed and adjusted. Coordinate with Division 8 Section “Door Hardware”. Final adjustment shall be made for proper and easy operation of the doors after glazing and after air conditioning is in operation.

E. Sealant Installation:

1. Refer to Division 7 Section “Joint Sealants” for adhesion testing requirements prior to start of any sealant work.

2. Sealant installation standard: Comply with recommendations of ASTM C 1193 for use of joint sealant as applicable to materials, applications, and conditions indicated.

3. Installation of sealant backings: Install sealant backings to comply with the following requirements:

a. Install joint backers to provide support of sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

(1) Do not leave gaps between ends of joint backer.

(2) Do not stretch, twist, puncture or tear joint backer.

(3) Remove absorbent joint backer that have become wet prior to sealant application and replace with dry material

(4) Install bond breaker tape between sealants where backer rods are not used between sealants and joint backer or back of joints.

4. Installation of sealants: Install all sealants by proven techniques that result in sealants directly contacting and fully wetting the joint substrates, completely filling recess provided for each joint configuration, and providing uniform cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability:

a. Fill the sealant rabbet to a slightly concave surface. Tool joints as necessary to assure continuous bonding, obtain a uniform appearance free from defects.

b. Install sealants to depths as recommended by sealant manufacturer.

c. Use sealing materials in strict accordance with sealant manufacturer’s printed instructions.

5. Sealant curing and protection:

    a. Cure sealants in compliance with manufacturer's recommendations, to obtain high early bond strength, internal cohesive strength and surface durability.
    b. Ensure procedures required for cure and protection of joint sealants are followed during construction period, so that they will be without deterioration or damage.

    c. Cure and protect sealants in a manner which will minimize increases in modulus of elasticity and other accelerated aging effect. Replace or restore sealants which are damaged or deteriorated during construction period.

F. Glazing: Comply with "Glazing Manual" by Glass Association of North America except as shown and specified otherwise, and except as specifically recommended otherwise by the manufacturer of the glass and the manufacturer of the glazing materials.

1. Comply with Division 8 Section "Glazing".

2. Do not mark on installed glass.

3. Comply with glass manufacturer's instructions and recommendations for possible use of setting blocks.

4. Before installing glass, check the setting to verify that it is plumb with no edge damage and in a perfect plane suitable for installing.

5. Do not proceed unless glazing surfaces are dry and free of frost.

6. Do not attempt to cut, seam, nip, or abrade any fully tempered, heat-strengthened, or coated glass.

7. Unify appearance of each series of lights by setting each glass piece to match others as nearly as possible. Inspect each glass piece and set with the pattern, draw and bow oriented in the same direction as other pieces.

3.4 TOLERANCES

A. Maximum variation from plumb: 0.06 inches every 3 feet non-cumulative or 0.5 inches per 100 feet, whichever is less. Maximum misalignment of two adjoining members abutting in plane: 1/32 inch.
B. Work shall have sharp, clean profiles, be straight and free from defects, dents, marks, waves or flaws.

C. Glazing rabbets shall be aligned between horizontal and vertical mullions to a tolerance of 1/32 inch total misalignment.

D. Removable glass stops shall be centered in openings with no more than 1/32 inch gap on each side.

3.5 FIELD QUALITY CONTROL

A. Testing: Contractor shall engage a qualified independent testing agency. Testing Standard per AAMA 503, including reference to ASTM E 783 for Air Infiltration Test and ASTM E 1105 Water Infiltration Test.

1. Test exterior curtainwall assembly in minimum 2 locations per substrate condition, and storefront in minimum 2 locations; with repeat tests when failures occur.

2. Schedule testing once units have been installed, glazed, perimeter caulked and fully cured. No other work shall be performed until the testing is completed and results sent to the Architect for review. If any other aluminum framing work is completed prior to testing, it will be removed and replaced at no cost to the Owner if failures occur.

3. Test flashings and perimeter sealant joints at interface to adjacent components or systems.

4. Air Infiltration Tests: Conduct tests in accordance with ASTM E 783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft2, whichever is greater.

5. Water Infiltration Tests: Conduct tests in accordance with ASTM E 1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 8 psf.

6. Testing shall be performed **prior to the installation** of the interior finishes. If interior finishes have been installed, they **must be** removed at the area of the test chamber to allow visual access to verify testing performance.

B. Conduct tests for air infiltration and water penetration with manufacturer's representative present. Tests not meeting specified performance requirements and units having deficiencies shall be corrected, and retested until all tests pass.

1. Corrective work shall be approved by Architect and manufacturer’s representative before retesting. Corrective work and re-testing shall be paid by Contractor (including testing fees and additional service fees of Architect and manufacturer’s representative if any).

C. Report to include results of air and water tests, photographs of the test itself, and any other information pertinent to the outcome of the testing (site conditions, etc.).

3.6 MANUFACTURERS FIELD SERVICES

A. Manufacturer to provide field surveillance of the installation of their products. Provide site surveillance at start-up, 20% completion and 60% completion of the Work. Monitor installation procedures and submit written report in writing to the Architect.

1. Payment will not be process without written report.

3.7 ADJUSTING

A. Test door operating functions. Adjust closing and latching speeds and other hardware in accordance with manufacturer's instructions to ensure smooth operation. Adjusting wrenches and small tools furnished with operating hardware shall be turned over the Owner, properly tagged and identified.

3.8 CLEANING

A. Clean aluminum surfaces immediately after installing aluminum-framed system. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

1. Remove protective material from pre-finished aluminum surfaces if present.

B. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

3.9 PROTECTION

A. Protect doors and frames from damage during subsequent construction activities. Replace damaged materials at no additional cost to the Owner.

B. Maintain glass units in a reasonably clean condition during construction to prevent damage by corrosive action.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

3.10 HARDWARE SCHEDULE COORDINATION

A. Refer to Section 08 71 00 – Door Hardware for all hardware sets, hardware schedule, and hardware specifications. No hardware shall be furnished or installed under this Section.

END OF SECTION

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Sliding doors.
3. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Automatic operators.
4. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Hollow Metal Doors and Frames”.
2. Division 08 Section “Flush Wood Doors”.
3. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ANSI/SDI A250.13 - Testing and Rating of Severe Windstorm Resistant Components for Swing Door Assemblies.
3. ASTM E1886 - Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Shutters Impacted by Missiles and Exposed to Cyclic Pressure Differentials.
4. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure difference.
5. ASTM E1996 - Standard specification for performance of exterior windows, curtain walls, doors and storm shutters impacted by Windborne Debris in Hurricanes.
6. ICC/IBC - International Building Code.
7. NFPA 70 - National Electrical Code.
8. NFPA 80 - Fire Doors and Windows.

9. NFPA 101 - Life Safety Code.
10. NFPA 105 - Installation of Smoke Door Assemblies.
11. UL/ULC and CSA C22.2 - Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
12. TAS-201-94 - Impact Test Procedures.
13. TAS-202-94 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components using Uniform Static Air Pressure.
14. TAS-203-94 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
15. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:

1. ANSI/BHMA Certified Product Standards - A156 Series.
2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
3. ANSI/UL 294 - Access Control System Units.
4. UL 305 - Panic Hardware.
5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:

    a. Type, style, function, size, label, hand, and finish of each door hardware item.
    b. Manufacturer of each item.
    c. Fastenings and other pertinent information.
    d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    e. Explanation of abbreviations, symbols, and codes contained in schedule.
    f. Mounting locations for door hardware.
    g. Door and frame sizes and materials.
    h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

    a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
    b. Complete (risers, point-to-point) access control system block wiring diagrams.
    c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Proof of Qualification: Provide copy of manufacturer(s) Factory Trained Installer documentation indicating proof of status as a qualified installer of tornado or hurricane storm shelter assemblies.

E. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

F. Informational Submittals:

1. Hurricane Resistant Openings: Exterior hurricane opening assemblies to be tested according to ASTM E330, ASTM E1886, ASTM E1996, TAS 201, TAS 202, TAS 203 standards, and certified by a qualified independent third party agency acceptable to authority having jurisdiction, with labeling indicating compliance with the design pressure and debris impact resistance level requirements specified for the Project.
2. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

1.4 CLOSEOUT SUBMITTALS

A. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

B. Project Record Documents: Provide record documentation of as-built door hardware sets in digital format (.pdf, .docx, .xlsx, .csv) and as required in Division 01, Project Record Documents.

1.5 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

1. All installers shall be full time employees of the supplier (or subcontractors of the supplier) of the hardware and trained and approved by lock manufacturer. Installer shall have minimum 3 years' experience in installation of similar hardware that is required for this Project.

2. The General Contractor or other subcontractors may not install hardware. If any hardware is installed, it will be considered non-conforming.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

E. Storm Shelter Impact Protective Assembly Installer Qualifications: Installers are to be factory trained for shop and field installation prior to project bid, and are responsible for commissioning, servicing, and warranting the installed equipment specified for the project. A pre-installation site inspection of the frame and floor conditions shall be conducted by the factory trained installer prior to any Storm Shelter Impact Protective assembly hardware applied to the opening.

F. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

G. Hurricane Resistant Exterior Openings: Provide exterior door hardware as complete and tested assemblies, or component assemblies, including approved doors and frames specified under Section 081113 "Hollow Metal Doors and Frames", to meet the design pressures, debris impact resistance, and glass and glazing requirements applicable to the Project.

1. Test units according to ASTM E330, ASTM E1886, ASTM E1996, TAS 201, TAS 202, and TAS 203 standards, certified by a qualified independent third party listing agency acceptable to authority having jurisdiction, and bearing a third party certification agency permanent label indicting windstorm approved product.

H. Storm Shelter Openings: Provide complete door systems for hurricane or tornado resistant storm shelters and other areas of refuge complying and tested according to ICC 500 (2014/2020), ICC/NSSA Standard for the Design and Construction of Storm Shelters.

I. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

J. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

K. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

L. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.6 DELIVERY, STORAGE AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.7 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.8 RESPONSIBILITY MATRIX

A. Supply of hardware: Section 08 71 00 Hardware Supplier

B. Hardware templates: Section 08 71 00 Hardware Supplier

C. Door hardware prep (factory)

1. Hollow Metal Doors and Frames: Section 08 11 13 Hollow Metal Supplier

2. Wood Door: Section 08 14 13 Wood Door Supplier

3. Aluminum Entrances and Storefronts: Section 08 41 13 Storefront Contractor

D. Wiring to door: Division 26 – Electrical (Including conduit, sleeves, and junction boxes to door/frame).

E. Low-voltage connections: Division 28 – Low Voltage Contractor (Including, door position switches, request-to-exit devices, electrified locking hardware terminations, and final connections)

F. Division 26 provides raceways and line-voltage power only. Division 28 provides all low-voltage cabling, terminations, and connections to access control devices at doors.

1.9 BUILD AMERICA, BUY AMERICA (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.10 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

1.11 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Storm Shelter Openings: Furnish a complete set of operational and maintenance instructions as needed for Owner's continued adjustment, maintenance, and repairs of door hardware as required by ICC 500 (2020), ICC/NSSA Standard for the Design and Construction of Storm Shelters.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Hardware shall not have any visible manufacturer names on exposed materials, except cylinders, when the door is in a closed position.

2.2 BUTT HINGES

A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:

a. Two Hinges: For doors with heights up to 60 inches.
b. Three Hinges: For doors with heights 61 to 90 inches.
c. Four Hinges: For doors with heights 91 to 120 inches.
d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:

a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a

groove in hinge pin, prevents removal of pin while door is closed; for all out-swinging lockable doors.

5. Manufacturers:

a. McKinney (MK) - TA/T4A Series, 5-knuckle.

B. Hinges at Storm Shelter Assemblies: At a minimum, provide heavy weight hinges with stainless steel screws used in accordance with and specified as part of a Severe Storm Shelter Opening meeting ICC 500 and FEMA 361.

2.3 CONTINUOUS HINGES

A. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:.

a. Pemko (PE).

B. Pin and Barrel Continuous Hinges: ANSI/BHMA A156.26 Grade 1-600 pin and barrel continuous hinges with minimum 14 gauge Type 304 stainless steel hinge leaves, concealed stainless pin, and twin self-lubricated nylon bearings at each knuckle separation. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:

a. Markar Products; ASSA ABLOY Architectural Door Accessories (MR).
b. Pemko (PE).

2.4 POWER TRANSFER DEVICES

A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Manufacturers:

a. Pemko (PE) - EL-CEPT Series.
b. Securitron (SU) - EL-CEPT Series.

B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic

locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:

    a. McKinney (MK) - Electrical Connecting Kit: QC-R001.
    b. McKinney (MK) - Connector Hand Tool: QC-R003.

2. Manufacturers:

    a. McKinney (MK) - QC-C Series.

2.5 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
5. Manufacturers:

    a. Rockwood (RO).

B. Coordinators: ANSI/BHMA A156.3 door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Model as indicated in hardware sets.

1. Manufacturers:

    a. Rockwood (RO).

2.6 DOOR OPERATING TRIM

A. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.

4. Pulls shall be provided with a 10” clearance from the finished floor on the push side to accommodate wheelchair accessibility.
5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets. When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
6. Manufacturers:

    a. Rockwood (RO).

2.7 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:

1. Threaded mortise cylinders with rings and cams to suit hardware application.
2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
4. Tubular deadlocks and other auxiliary locks.
5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
6. Keyway: Manufacturer’s Standard.

C. Large Format Interchangeable Cores: Provide removable cores (LFIC) as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.

D. Security Cylinders: ANSI/BHMA A156.5, Grade 1 Certified Products Directory (CPD) listed security cylinders and keys able to be used together under the same facility master or grandmaster key system. Cylinders to be factory keyed.

1. New security key systems shall not be established with products that have an expired patent. Expired systems shall only be specified and supplied to support existing systems.
2. Manufacturers:

    a. Corbin Russwin (RU) - Access 3 AS.
    b. Sargent (SA) - Degree DG2.
    c. No Substitution.

E. Patented Cylinders: ANSI/BHMA A156.5, Grade 1 Certified Products Directory (CPD) listed cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer’s United States patents. Cylinders are to be factory keyed with owner having the ability for on-site original key cutting.

1. Patented key systems shall not be established with products that have an expired patent. Expired systems shall only be specified and supplied to support existing systems.
2. Manufacturers:

    a. Corbin Russwin (RU) - Access 3 AP.
    b. Sargent (SA) - Degree DG1.
    c. No Substitution.

F. Keying System: Each type of lock and cylinders to be factory keyed.

1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. New System: Key locks to a new key system as directed by the Owner.

G. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).

H. Construction Keying: Provide construction master keyed cylinders.

I. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.8 KEY CONTROL

A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Manufacturers:

    a. Lund Equipment (LU).
    b. MMF Industries (MM).
    c. Telkee (TK).

2.9 MORTISE LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): Provide ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed mortise locksets. Listed manufacturers shall meet all functions and features as specified herein.

1. Manufacturers:

a. ASSA ABLOY ACCENTRA (YA) - 8800FL Series.
b. Corbin Russwin Hardware (RU) - ML2000 Series.
c. Sargent Manufacturing (SA) - 8200 Series.

2.10 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.11 ELECTRIC STRIKES

A. Standard Electric Strikes: Electric strikes conforming to ANSI/BHMA A156.31, Grade 1, for use on non-rated or fire rated openings. Strikes shall be of stainless steel construction tested to a minimum of 1500 pounds of static strength and 70 foot-pounds of dynamic strength with a minimum endurance of 1 million operating cycles. Provide strikes with 12 or 24 VDC capability, fail-secure unless otherwise specified. Where specified provide latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike.

1. Manufacturers:

a. HES (HS) - 1500/1600 Series.

B. Provide electric strikes with in-line power controller and surge suppressor by the same manufacturer as the strike with the combined products having a five year warranty.

2.12 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. Exit devices shall have a five-year warranty.
2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper

fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.

3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.
4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.
9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
12. Hurricane and Storm Shelter Compliance: Devices to be U.L. listed for windstorm assemblies where applicable. Provide the appropriate hurricane or storm shelter products that have been independently third party tested, certified, and labeled to meet state and local windstorm building codes applicable to project.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide exit devices with functions and features as follows:

    a. Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.
    b. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
    c. No catch points: addition of applied deflectors or other added components are not allowed.
    d. No visible plastic.
    e. Heavy duty end caps with flush and overlapping options made of stainless steel, brass, or bronze with architectural finishes.
    f. Constructed of all stainless steel.
    g. Stainless steel pullman type latch with deadlock feature.

h. Narrow or wide style exterior trim as specified in the hardware sets.
i. Center case adjustability on concealed vertical rod exit devices; single operation with hex key individually adjusts top or bottom latches. No retainer screws or clips required to maintain adjustment.
j. Ten-year limited warranty for mechanical features.

2. Manufacturers:

a. Corbin Russwin Hardware (RU) - PED4000 / PED5000 Series.
b. Sargent Manufacturing (SA) - PE80 Series.

C. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.

1. Electromechanical exit devices shall have the following functions and features:

a. Universal Molex plug-in connectors that have standardized color-coded wiring and are field configurable in fail safe or fail secure and operate from 12vdc to 24vdc regulated.
b. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.
c. Options to be available for request-to-exit or enter signaling, latchbolt and touchbar monitoring.
d. Field configurable electrified trim to fail-safe or fail-secure that operates from 12-24VDC.
e. Five-year limited warranty for electromechanical features.

2. Manufacturers:

a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
b. Sargent Manufacturing (SA) - 80 Series.

D. Steel Removable Mullions: ANSI/BHMA A156.3 steel removable mullions with options for fire rating, locking, through-wire electrification and hurricane compliance as specified.

1. Provide mullions with functions and features as follows:

a. At openings designed for severe wind load conditions due to hurricanes or tornadoes, provide manufacturer’s certified mullion and accessories to meet applicable state and local windstorm codes.
b. Provide keyed removable feature where specified in the Hardware Sets.
c. Provide stabilizers and mounting brackets as required.

2. Manufacturers:

a. Same as exit device manufacturer.

2.13 SURFACE DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.

1. Large body cast iron surface mounted door closers shall have a 30-year warranty.
2. Manufacturers:

    a. Corbin Russwin Hardware (RU) - DC8000 Series.
    b. Norton Rixson (NO) - 9500 Series.
    c. Sargent Manufacturing (SA) - 281 Series.

2.14 ELECTROHYDRAULIC DOOR OPERATORS

A. Electrohydraulic Door Operators (High Traffic): Provide ANSI/BHMA A156.19 Certified Products Directory (CPD) listed low energy operators that meet ANSI/BHMA A156.4 requirements and are UL listed for use on fire rated doors and UL10C certified that comply with requirements for the Americans with Disabilities Act (ADA). Operators shall be verified by GreenCircle to offer energy savings of 19% when compared to similar products to accommodate openings up 250 pounds and 48” wide. Provide accessories such as custom templates, special mounting brackets, spacers and drop plates as needed for proper installation. Operators shall accommodate openings up to 200 pounds and 48” wide. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide operators with features as follows:

    a. Non-handed with push and pull side mounting.
    b. Operates as mechanical surface closer during close cycles, when door is opened manually or if power is off.
    c. Activation by push button, hands-free or radio frequency devices.

d. On board electronics to collect usage and cycle count data to facilitate preventative maintenance/diagnostics.
e. Two-year limited warranty.
f. Wi-Fi interface where the operator is a secure, password protected WiFi hot spot with no connection to building's IT required.
   1) Simple setup with no app required.
   2) View status and make adjustments without removing the cover.
   3) Built-in logic to support single use restroom applications with no external relay boards, logic modules, position switches required.
g. Mounting backplate to simplify and speed up installation.

2. Operators shall have the following functionality:

a. Adjustable Hold Open: Amount of time a door will stay in the full open position after an activation.
b. Blow Open for Smoke Ventilation: Door opens when signal is received from alarm system allowing air or smoke to flow through opening. Door will stay open until signal from alarm system is stopped.
c. Infinite Hold Open: Door will hold open at set position until power is turned off.
d. Obstruction Detection: Door closes if it hits an obstruction while opening; door will reverse to open position if it hits an obstruction while closing. Door will stop once it hits an obstruction and will rest against the obstruction until removed.
e. Open Delay: Delays operator opening for locking hardware.
f. Overload Safety Shut-Off: After two minutes of receiving a door activation signal, inverter times out and door closes to prevent motor/inverter damage.
g. Presence Detector Input: Input for external sensor to detect presence at door open or close position only.
h. Push & Go: As the door is manually opened, the operator "senses" movement and opens door to the full-open position.
i. Selector Mode Switch: Off disables the signal inputs unless Blow Open is activated, on activates the signal inputs, hold open activates the unit (unless Blow Closed is activated) to the hold open position.
j. Vestibule Delay: When the wall switch is pressed, first door in vestibule will open. Second door will open once vestibule door delay has expired. Delay is adjustable.

3. Manufacturers:

a. Norton Rixson (NO) - 6000 Series.

2.15 ARCHITECTURAL TRIM AND ACCESSORIES

A. Door Protective Trim:

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and

provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:

    a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:

    a. Rockwood (RO).

2.16 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:

    a. Rockwood (RO).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Manufacturers:

    a. Norton Rixson (RF).
    b. Rockwood (RO).
    c. Sargent Manufacturing (SA).

2.17 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

1. Pemko (PE).

2.18 ELECTRONIC ACCESSORIES

A. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.

1. Manufacturers:

a. Securitron (SU) - DPS Series.

B. Intelligent Switching Power Supplies: Provide the least number of power supplies at the appropriate amperage level sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.

1. Power supplies shall meet all functions and features as specified herein.

a. UL listed dual voltage 12 or 24 VDC field selectable continuous output.
b. Dedicated fast charger to prolong battery life with low battery cutoff to protect batteries from deep discharge.
c. Enhanced surge immunity for input/output protection
d. Separate, dedicated battery charging circuit to keep locks cooler.
e. Dual-color LED visual notification to prevent applying incorrect voltages to the power supply.
f. Instant auto-switch to battery on AC loss.
g. Expandable up to 16 outputs in the standard enclosure

h. Integrated fire alarm interface to allow main output shutdown or disconnect on a per output basis when using an R8 output module.
i. Network ready and remotely manage locks and connected devices when using an M8 managed output module on network models.
j. Lifetime replacement, no-fault, no questions asked warranty.

2. Manufacturers:

a. Securitron (SU) - AQL Series.

2.19 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.20 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Push Plates and Door Pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.

E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be

adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.

B. Manufacturer’s Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. MR - Markar
4. SA - SARGENT
5. HS - HES
6. RO - Rockwood
7. RF - Rixson
8. NO - Norton
9. OT - Other
10. SU - Securitron

Hardware Sets

Set: 1.0

Doors: 106A, 123A, 123B
Description: EXT ALUMINUM EGRESS - EAC

1	Continuous Hinge	DFM SLF-HD1 EL-CEPTx10B x Length Required		PE
1	Concealed Vert Rod Exit, Nightlatch	16 TB 43 55 56 AD8610 106 x Less Pull	US10BE	SA
2	Core/ Cylinder	as required	US10BE	SA
1	Door Pull	RM3311-48 Mtg-Type 1XHD	US10B	RO
1	Surface Closer	TB 281 POTB	US10BE	SA
1	Gasketing	by door / frame mfg		
1	Threshold	2005DT x Length Required x MSES25SS		PE
1	Door position switch	DPS-W/M-BLK		OT
1	ElectroLynx Harness	QC-C1500 [PS to hinge]		MK
1	ElectroLynx Harness	QC-CXXP [Lock / exit to hinge]		MK
1	Card Reader	Supplied By Owner		OT
1	Power Supply	AQ Series		SU
1	Elevation Diagram			OT
1	Riser Diagram			OT
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Door normally closed and secured.
Authorized credential retracts the latchbolt to allow free entry, door relocks upon closing. REX (request to exit) switch in device rail allow for free exit at all times
Entry by key override at all times
Door is fail secure

-Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified impact resistant rating.

-Balance of hardware by storefront supplier
-Coordinate all hardware with the aluminum storefront manufacturer/supplier.
-Provide necessary drop plates and fillers for proper installation of door closers.
-Provide blocking/spacer rings in thickness as required to fill gap, if any, between cylinder head and face of door.
-Verify finish of hardware.

Set: 2.1

Doors: 116A

Description: EXT ALUMINUM EXIT ONLY EGRESS PR

2	Continuous Hinge	DFM SLF-HD1 x Length Required		PE
2	Concealed Vert Rod Exit, Exit Only	LD TB 43 AD8610 EO	US10BE	SA
2	Surface Closer	TB 281 POTB	US10BE	SA
2	Door Stop	409 / 446 [as required]	US10B	RO
1	Gasketing	by door / frame mfg		
1	Threshold	2005DT x Length Required x MSES25SS		PE

Notes: -Balance of hardware by storefront supplier
-Coordinate all hardware with the aluminum storefront manufacturer/supplier.
-Provide necessary drop plates and fillers for proper installation of door closers.
-Provide blocking/spacer rings in thickness as required to fill gap, if any, between cylinder head and face of door.
-Verify finish of hardware.

-Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified impact resistant rating.

Set: 2.2

Doors: 101B

Description: EXT ALUMINUM EGRESS PR

2	Continuous Hinge	DFM SLF-HD1 x Length Required		PE
1	Concealed Vert Rod Exit, Nightlatch	16 43 TB AD8610 106 x Less Pull	US10BE	SA
1	Concealed Vert Rod Exit, Exit Only	16 TB 43 AD8610 EO	US10BE	SA
3	Core/ Cylinder	as required	US10BE	SA
2	Door Pull	RM3311-48 Mtg-Type 1XHD	US10B	RO
2	Surface Closer	TB 281 POTB	US10BE	SA
2	Door Stop	409 / 446 [as required]	US10B	RO
1	Gasketing	by door / frame mfg		
1	Threshold	2005DT x Length Required x MSES25SS		PE

Notes: -Balance of hardware by storefront supplier
-Coordinate all hardware with the aluminum storefront manufacturer/supplier.
-Provide necessary drop plates and fillers for proper installation of door closers.

-Provide blocking/spacer rings in thickness as required to fill gap, if any, between cylinder head and face of door.
-Verify finish of hardware.

-Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified impact resistant rating.

Set: 3.0

Doors: 101A

Description: EXT ALUMINUM EGRESS PR - ADA

2	Continuous Hinge	DFM SLF-HD1 x Length Required		PE
1	Concealed Vert Rod Exit, Nightlatch	16 43 TB AD8610 106 x Less Pull	US10BE	SA
1	Concealed Vert Rod Exit, Exit Only	16 TB 43 AD8610 EO	US10BE	SA
3	Core/ Cylinder	as required	US10BE	SA
2	Door Pull	RM3311-48 Mtg-Type 1XHD	US10B	RO
1	Automatic Opener	D6000 Series	690	NO
2	Door Stop	409 / 446 [as required]	US10B	RO
1	Gasketing	by door / frame mfg		
1	Threshold	2005DT x Length Required x MSES25SS		PE
2	Door Switch	505		NO

Notes: Doors should be in dogged position for operator to function properly.

-Balance of hardware by storefront supplier
-Coordinate all hardware with the aluminum storefront manufacturer/supplier.
-Provide necessary drop plates and fillers for proper installation of door closers.
-Provide blocking/spacer rings in thickness as required to fill gap, if any, between cylinder head and face of door.
-Verify finish of hardware.

-Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified impact resistant rating.

Set: 4.0

Doors: 101C, 101D, 102B, 102C

Description: EXT ALUMINUM EGRESS

1	Continuous Hinge	DFM SLF-HD1 x Length Required		PE
1	Concealed Vert Rod Exit, Nightlatch	16 43 TB AD8610 106 x Less Pull	US10BE	SA

2 Core/ Cylinder	as required	US10BE	SA
1 Door Pull	RM3311-48 Mtg-Type 1XHD	US10B	RO
1 Surface Closer	TB 281 POTB	US10BE	SA
1 Door Stop	409 / 446 [as required]	US10B	RO
1 Gasketing	by door / frame mfg		
1 Threshold	2005DT x Length Required x MSES25SS		PE

Notes: -Balance of hardware by storefront supplier
-Coordinate all hardware with the aluminum storefront manufacturer/supplier.
-Provide necessary drop plates and fillers for proper installation of door closers.
-Provide blocking/spacer rings in thickness as required to fill gap, if any, between cylinder head and face of door.
-Verify finish of hardware.

-Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified impact resistant rating.

Set: 5.0

Doors: 101E, 102A

Description: EXT ALUMINUM EGRESS - ADA

1	Continuous Hinge	DFM__SLF-HD1 x Length Required		PE
1	Concealed Vert Rod Exit, Nightlatch	16 43 TB AD8610 106 x Less Pull	US10BE	SA
2	Core/ Cylinder	as required	US10BE	SA
1	Door Pull	RM3311-48 Mtg-Type 1XHD	US10B	RO
1	Automatic Opener	6000 Series	690	NO
1	Door Stop	409 / 446 [as required]	US10B	RO
1	Gasketing	by door / frame mfg		
1	Threshold	2005DT x Length Required x MSES25SS		PE
2	Door Switch	505		NO

Notes: Doors should be in dogged position for operator to function properly.

-Balance of hardware by storefront supplier
-Coordinate all hardware with the aluminum storefront manufacturer/supplier.
-Provide necessary drop plates and fillers for proper installation of door closers.
-Provide blocking/spacer rings in thickness as required to fill gap, if any, between cylinder head and face of door.
-Verify finish of hardware.

-Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified impact resistant rating.

Set: 6.0

Doors: 109B
Description: EXT EGRESS PR - KNURLING

2 Continuous Hinge	FM300 x Length Required	PC-1	MR
1 Mullion	HCL980 x Size Required	PC	SA
1 Rim Exit Device	HC LD TB PE8844 WEMW x Knurling	US10BE	SA
1 Rim Exit Device, Exit Only	HC LD TB PE8810 EO	US10BE	SA
2 Core/ Cylinder	as required	US10BE	SA
1 Mullion Cylinder Kit	980C1	US10B	SA
2 Surface Closer	TB 281 POTB	US10BE	SA
2 Kick Plate	K1050 10 x 2" LDW	US10BE	RO
2 Door Stop	409 / 446 [as required]	US10B	RO
1 Gasketing	303DS (Head & Jambs)		PE
1 Mullion Gasketing	5110BL		PE
1 Rain Guard	346D		PE
2 Sweep	315DN		PE
1 Threshold	2005DT x Length Required x MSES25SS		PE

Notes: -Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified impact resistant rating.

Set: 7.0

Doors: 108B, 050A
Description: EXT - STOREROOM EXIT w/ KNURLIING

1 Continuous Hinge	FM300 x Length Required	PC-1	MR
1 Rim Exit Device	HC LD TB PE8844 WEMW x Knurling	US10BE	SA
1 Core/ Cylinder	as required	US10BE	SA
1 Surface Closer	TB 281 POTB	US10BE	SA
1 Kick Plate	K1050 10 x 2" LDW	US10BE	RO
1 Gasketing	303DS (Head & Jambs)		PE
1 Rain Guard	346D		PE
1 Sweep	315DN		PE
1 Threshold	2005DT x Length Required x MSES25SS		PE

Notes: -Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified impact resistant rating.

Set: 8.0

Doors: 107B, 117A, 120A, 122A
Description: EXT - STOREROOM

1 Continuous Hinge	FM300 x Length Required	PC-1	MR
1 Storeroom Deadbolt Lock	LB 8251 LNMW	US10BE	SA
1 Core/ Cylinder	as required	US10BE	SA
1 Surface Closer	TB 281 POTB	US10BE	SA
1 Kick Plate	K1050 10 x 2" LDW	US10BE	RO
1 Door Stop	409 / 446 [as required]	US10B	RO
1 Gasketing	303DS (Head & Jambs)		PE
1 Rain Guard	346D		PE
1 Sweep	3452DNB		PE
1 Threshold	2715D x Length Required x MSES25SS		PE

Notes: -Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified impact resistant rating.

Set: 9.0

Doors: 108A
Description: (RATED) STOREROOM EXIT w/ STOP ARM CLOSER, KNURLING

3 Hinge, Full Mortise	TA2714	US10BE	MK
1 Rim Exit Device, Storeroom	12 PE8804 WEMW x Knurling	US10BE	SA
1 Core/ Cylinder	as required	US10BE	SA
1 Surface Closer	TB 281 POTB	US10BE	SA
1 Mop Plate	K1050 4" x 1" LDW	US10BE	RO
1 Kick Plate	K1050 10 x 2" LDW	US10BE	RO
1 Gasketing	S88BL X LAR		PE

Set: 10.0

Doors: 113A, 114A
Description: EXIT LOCK w/ ELECTRIC STRIKE, AUTOMATIC OPERATOR, SOUND SEALS

4 Hinge, Full Mortise, Hvy Wt	T4A3386	US10BE(SS)	MK
1 Dormitory/Exit Lock	LB 8245 LNMW	US10BE	SA

1	Core/ Cylinder	as required	US10BE	SA
1	Electric Strike w/ Deadbolt Monitor	1600-CS-DLMS	613E	HS
1	SMART Pac Bridge Rectifier	2005M3		HS
1	Automatic Opener	6000 Series	690	NO
1	Mop Plate	K1050 4" x 1" LDW	US10BE	RO
1	Kick Plate	K1050 10 x 2" LDW	US10BE	RO
1	Door Stop	409 / 446 [as required]	US10B	RO
1	Acoustic Seal Set w/ Door Bottom	PEMKOSTCSET-1A x Length Required	BL	PE
1	LED Annunciators	CM-AF500 (OCCUPIED WHEN LIT)		OT
1	ElectroLynx Harness	QC-C1500P		MK
2	Door Switch	505		NO
1	Power Supply	AQ Series		SU
1	Coat Hook	RM828	US10B	RO
1	Elevation Diagram			OT
1	Riser Diagram			OT
1	Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: When deadbolt is thrown electric strike is locked and light is lit. When deadbolt is in retracted position and operator actuators are pressed electric strike is released and operator initiates.

Set: 11.0

Doors: 107A, 109A, 110A
Description: STOREROOM w/ CLOSER

3	Hinge, Full Mortise	TA2714	US10BE	MK
1	Storeroom/Closet Lock	8204 LNMW	US10BE	SA
1	Core/ Cylinder	as required	US10BE	SA
1	Surface Closer	TB 281 OT/ POT	US10BE	SA
1	Mop Plate	K1050 4" x 1" LDW	US10BE	RO
1	Kick Plate	K1050 10 x 2" LDW	US10BE	RO
1	Door Stop	409 / 446 [as required]	US10B	RO
1	Gasketing	S88BL X LAR		PE

Set: 12.0

Doors: 115A, 118A, 118B, 119A, 119B
Description: STOREROOM w/ STOP ARM CLOSER/ HOLDER

4	Hinge, Full Mortise	TA2714	US10BE	MK

1 Storeroom/Closet Lock	8204 LNMW	US10BE	SA
1 Core/ Cylinder	as required	US10BE	SA
1 Surface Closer	TB 281 PHTB	US10BE	SA
1 Mop Plate	K1050 4" x 1" LDW	US10BE	RO
1 Kick Plate	K1050 10 x 2" LDW	US10BE	RO
1 Gasketing	S88BL X LAR		PE

Notes: PROVIDE 3 HINGES AT 7'2" TALL DOORS.

Set: 13.0

Doors: 112A
Description: OFFICE

3 Hinge, Full Mortise	TA2714	US10BE	MK
1 Office/Entry Lock	LB 8205 LNMW	US10BE	SA
1 Core/ Cylinder	as required	US10BE	SA
1 Mop Plate	K1050 4" x 1" LDW	US10BE	RO
1 Kick Plate	K1050 10 x 2" LDW	US10BE	RO
1 Door Stop	409 / 446 [as required]	US10B	RO
3 Silencer	608		RO
1 Coat Hook	RM828	US10B	RO

Set: 14.0

Doors: 103A
Description: CLASSROOM w/ CLOSER

3 Hinge, Full Mortise	TA2714	US10BE	MK
1 Classroom Lock	8237 LNMW	US10BE	SA
1 Core/ Cylinder	as required	US10BE	SA
1 Surface Closer	TB 281 OT/ POT	US10BE	SA
1 Mop Plate	K1050 4" x 1" LDW	US10BE	RO
1 Kick Plate	K1050 10 x 2" LDW	US10BE	RO
1 Door Stop	409 / 446 [as required]	US10B	RO
1 Gasketing	S88BL X LAR		PE

Set: 15.0

Doors: 111A
Description: PRIVACY w/ CLOSER, SOUND SEALS

3 Hinge, Full Mortise	TA2714	US10BE	MK
1 Privacy Lock	LB V11 8265 LNMW	US10BE	SA
1 Surface Closer	TB 281 OT/ POT	US10BE	SA

1 Mop Plate	K1050 4" x 1" LDW	US10BE	RO
1 Kick Plate	K1050 10 x 2" LDW	US10BE	RO
1 Door Stop	409 / 446 [as required]	US10B	RO
1 Acoustic Seal Set w/ Door Bottom	PEMKOSTCSET-1A x Length Required	BL	PE
1 Coat Hook	RM828	US10B	RO

Set: 16.0

Doors: 121A
Description: PRIVACY w/ OHS, SOUND SEALS

3 Hinge, Full Mortise	TA2714	US10BE	MK
1 Privacy Lock	LB V11 8265 LNMW	US10BE	SA
1 Conc Overhead Stop	2-X36	613E	RF
1 Mop Plate	K1050 4" x 1" LDW	US10BE	RO
1 Kick Plate	K1050 10 x 2" LDW	US10BE	RO
1 Acoustic Seal Set w/ Door Bottom	PEMKOSTCSET-1A x Length Required	BL	PE
1 Coat Hook	RM828	US10B	RO

Set: 17.0

Doors: 105A
Description: FEMA | CLASSROOM SECURITY LOCKSET

4 Hinge, Hvy Wt	SP3786	US10B	MK
1 Multi-Point Lock	FM7341 LNMW	US10BE	SA
1 Surface Closer	TB 281 O	US10BE	SA
1 Kick Plate	K1050 WS 10" high BEV LDW	US10B	RO
1 Door Stop	409 / 446 [as required]	US10B	RO
1 Gasketing	S773BL		PE

Notes: Door will have a 3/8" undercut.

Set: 18.0

Doors – Professional Services

Professional Services – Door Hardware Project Punch Inspection

The Contractor shall engage a qualified, independent, certified door hardware specialist to perform a comprehensive door hardware punch inspection at completion of the Work and prior to Substantial Completion.

Services shall include, at a minimum:

a. Field inspection of all door hardware for compliance with the Contract Documents, approved submittals, and applicable codes

b. Verification of proper installation, adjustment, and operation of all hardware sets

c. Identification of deficiencies, omissions, and nonconforming work

d. Preparation of a written Door Hardware Punch Report documenting findings and required corrective actions

The Door Hardware Punch Report shall be submitted to the Architect and Owner as part of project closeout.

Acceptable Specialist:

The Contractor may contact Charlie Treadaway, ASSA ABLOY, as an acceptable certified hardware specialist for pricing and scheduling of the Project Punch Inspection.
205-603-8519
Charlie.treadaway@assaabloy.com

END OF SECTION

SECTION 08 80 00 – GLAZING

PART 1 – GENERAL

1.1 SUMMARY

A. Types of work in this section includes:

1. Glass and glazing for Fixed Glass Units.
2. Large Restroom Mirrors.
3. Display Cabinet Glass Panels – antiglare, low-iron glazing

B. Related Sections include the following:

1. Division 6 Section “Interior Architectural Woodwork” – Cable suspended glass shelving
2. Division 7 Section “Joint Sealants”
3. Division 8 Section “Metal Doors and Frames”
4. Division 8 Section “Painted Flush Wood Doors”
5. Division 8 Section “Aluminum Framed Entrances and Storefronts”
6. Division 8 Section “Door Hardware”
7. Division 10 Section “Toilet and Bathroom Accessories” for Family Restroom mirrors.

1.2 SUBMITTALS

A. Product data for all glass components, including sample warranty. Include performance for all exterior glazing.

B. Product test reports: based on evaluation of comprehensive tests performed by a qualified testing agency, for glazing sealants

1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

C. Samples: Submit 12-inch square samples of each type of glass indicated, and 12-inch long samples of each color required (except black) for each type of sealant or gasket exposed to view.

D. Compatibility and adhesion test reports from sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealants and other glazing materials.

1.3 QUALITY ASSURANCE

A. Exterior Glazing Design Requirements:

1. Refer to Structural Drawings for design data.

2. Small and Large missile impact required

B. Safety glass products are to comply with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for Category II materials.

1. Subject to compliance with requirements, provide safety glass permanently marked with certification label of Safety Glazing Certification Council (SGCC) or other certification agency acceptable to authorities having jurisdiction.

C. Insulating glass products are to be permanently marked either on spacers or at least one component lite of units with appropriate certification label of inspecting and testing agency indicated below:

1. Insulating Glass Certification Council (IGCC).

D. Single Source fabrication responsibility: Fabrication processes, including Low E and reflective coatings, insulating, laminating, silkscreen, and tempering, shall be fabricated by a single Fabricator.

E. Protect glass from edge damage during handling and installation, and subsequent operation of glazing components of the work. During installation, discard units with significant edge damage or other imperfections.

F. Comply with combined recommendations and technical reports by manufacturers of glass and glazing products as used in each glazing channel, and with recommendations of Flat Glass Marketing Association "Glazing Manual", except where more stringent requirements are indicated.

G. Pre-installation Conference: conduct conference at the Project site.

1. Review and finalize construction schedule and verify availability of materials, installers personnel, equipment, and facilities needed to make progress and avoid delays.

2. Review temporary protection requirements for glazing during and after installation.

1.4 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.4 WARRANTY

A. Warranty on Hermetic Seals: Provide insulating glass manufacturer's written warranty, agreeing to, within specified warranty period, furnish FOB project site, replacement units for insulating glass units which have defective hermetic seals (excluding that due to glass breakage); defined to include intrusion of moisture or dirt, internal condensation at temperatures above -20 degrees F (-31 degrees C), deterioration of internal glass coatings, and other visual evidence of seal failure or performance failure.

1. Warranty period is 10 years after seal date permanently imprinted on unit.

B. Any leaks or defective work shall be immediately corrected by the manufacturer and Contractor, at no expense to the Owner.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Guardian Industries

B. Vitro Architectural Glass

C. Pilkington / NSG

D. Or equal.

2.2 PERFORMANCE REQUIREMENTS

A. Glass shall meet requirements of ASTM E2190 for insulating units and ANSI Z97.1 for safety glazing.

B. Coordinate Low-E coatings and glazing make-up to maintain overall visible light

transmission and solar performance consistent with the basis-of-design glass (Guardian SNR43 Gray outboard/clear inboard.

2.3 MATERIALS

A. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 2190, Class CBA.

1. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.

B. Typical Insulating Glass Unit:

1. Equal to Guardian “SNR43 Gray outboard/clear inboard”

2. Performance Values (based on 1” insulated glass):

a. Visible Light Transmission %: 22

b. Solar Heat Gain Coefficient: 0.17

c. U-Value Winter Nighttime: 0.29

d. Reflectance – Visible Light Out / In: 10 / 13

2.2 FABRICATION

A. General:

1. Provide in overall sizes indicated on Drawings and as specified herein.

2. Impact glazing must be glazed with Dow 995 structural silicone (or equal) applied per manufacturer’s instructions. Provide primer if determined by preconstruction testing per Division 7 Section “Joint Sealants”.

a. Cure time of 21 days is required.

3. No exposed fasteners in the glazing stops will be acceptable.

B. GL1 (Clear Safety Glass):

1. Typical: 1/4-inch-thick clear tempered glass

C. GL2 (Tinted Insulated Safety Glass – Impact Resistant @ Curtainwall) 1-5/16”:

1. Typical:

a. 1/4" tempered tinted (low-e) Outboard/Exterior Lite
b. 1/2" Air Space
c. 1/4" tempered Outboard/Interior Lite

d. .100 Solutia Saflex HP (PVB)
e. 1/4" tempered Inboard Lite

2. Provide permanent manufacturer identification and certification label indicating compliance with SGCC and IGCC.

D. GL3 (Tinted Safety Glass – Impact Resistant @ Exterior Doors) 9/16”:

1. 1/4" fully tempered tinted (low-e) tinted Outboard Lite
2. .090 Solutia Saflex (PVB)
3. 1/4" tempered Inboard Lite

E. GL4 (One Way / Reflective Privacy Glass):

1. Provide mirror-coated “one-way” glass for interior applications where visibility is required from one side only).
2. Single lite, 1/4-inch (6 mm) thick fully tempered float glass..090 Solutia Saflex
3. Coating: Vacuum-deposited metallic reflective coating on the No. 2 surface, providing one-way vision when the observation side is maintained at a lower light level.
4. Substrate: Clear glass meeting ASTM C1036, Type I, Quality Q3.
5. Edgework: Flat, seamed edges.
6. Performance:
   a. Visible Light Transmission: 15–20 percent nominal (varies with lighting ratio).
   b. Reflectance: 60–70 percent on coated side.
   c. Color: Neutral silver or light gray; confirm with Architect.
   d. Meet safety requirements of ANSI Z97.1, Category II, and 16 CFR 1201.

7. Acceptable Manufacturers:
   a. Guardian Industries – Mirrorpane® One-Way Glass or SunGuard® Silver 20 on Clear (interior use).
   b. Vitro Architectural Glass – Mirropane® Transparent Mirror Glass.
   c. Or approved equal meeting performance criteria above.

F. GL5 – (Display Cabinet Glazing – Low Iron / Anti-glare / Anti-Reflective)

1. Glass: ASTM C1048, Kind FT (fully tempered), Condition C (coated surfaces), Type I (transparent), tested for surface and edge compression per ASTM C1048 and for impact resistance per 16 CFR 1201, Category II.

   a. Glass Type: Class 1 low-iron clear monolithic glass with ultra-low ferric oxide content (≤ 0.02 percent) to provide maximum clarity and accurate color rendition.

   b. Thickness: 3/8 inch nominal.

   c. Optical Performance:

      1) Visible Light Transmittance (VLT): Minimum 89 percent for uncoated glass; minimum 96 percent total system transmittance with anti-reflective coating applied.

2) Visible Light Reflectance (VLR): Maximum 1.0 percent per surface, measured at 8 degrees from perpendicular.

3) Color Shift: Delta E ≤ 1.0; coating shall not introduce perceptible color distortion.

4) Color Rendering Index (CRI): Minimum 99 percent.

d. Anti-Reflective Coating:

1) Type: Dual-sided, multi-layer dielectric anti-reflective coating.

2) Application Method: Vacuum deposition or sputter coating.

3) Application: Coating shall be applied to both exposed surfaces of the glass.

4) Durability: Coating shall meet hardness and abrasion resistance requirements equivalent to ISO 9211 or MIL-C-14806A.

e. Edge Treatment:

1) Exposed Edges: Machine-ground and flat-polished.

2) Butt Edges: Flat-ground.

3) Corner Conditions: Lap-joint corners with all exposed edges polished.

2. Single Componet Nonsag, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Uses NT, G, and A.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

i. Dow Corning Corporation.
ii. GE Construction Sealants; Momentive Performance Materials Inc.
iii. Tremco Incorporated.
iv. Or equal

b. Sealant shall have a VOC content of 250 g/L or less.

3. Fully temper glass using horizontal (roller-hearth) process, and fabricate so that when glass is installed, roll-wave distortion is parallel with bottom edge of lite.

4. Display Cabinet Glazing Accessories: Aluminum U-Channel Glazing System.

a. Manufacturer: FHC (or approved equal).

b. Type: Two-part, snap-in aluminum U-channel glazing system designed for dry glazing of monolithic glass panels. Provide in lengths as shown on the drawings, with channels breaking on vertical glass joints.

c. Material: Extruded aluminum.

d. Finish: Black anodized finish.

e. Glass Compatibility: Sized and gasketed to receive 3/8-inch nominal thickness low-iron, anti-reflective display cabinet glass specified under GL5.

f. Configuration: Base channel with concealed mechanical attachment to substrate. Snap-in or pressure-fit retaining cap providing concealed glass retention. Provide manufacturer's standard gaskets or setting materials compatible with coated low-iron glass. Exposed gaskets to be transparent or clear. Tan or gray is not permitted.

g. Installation Requirements: Dry-glazed system only; wet glazing, exposed silicone joints, or wood glazing stops are not permitted. Provide uniform edge clearances and setting tolerances in accordance with manufacturer's recommendations. Allow for glass removal and replacement without damage to adjacent finishes or cabinetry.

h. Performance: Provide rigid, rattle-free glass support. Prevent glass-to-metal contact. Maintain clean, minimal sightlines appropriate for museum-quality display conditions.

i. Substitutions: Substitutions shall demonstrate equivalent profile dimensions, glass retention method, finish quality, removability, and compatibility with anti-reflective coated glass.

G. GL6 – Large Restroom Mirrors (G1 and G2)

3. Provide factory-fabricated, silver-backed float glass mirrors for interior restroom applications, including necessary backing, edges, and mounting provisions.

4. Construction:

a. Glass Type: 1/4-inch-thick (6 mm) clear float glass, ASTM C1036, Type I, Quality Q2. Size as indicated on the drawings.

b. Reflective Coating: Electrolytic silvering process with copper backing and two coats of protective paint, complying with ASTM C1503.

c. Edges: Flat-polished mirror edges set within a continuous, slim-profile perimeter frame. Frame shall be Type 304 stainless steel with factory-applied matte black finish. Provide welded mitered corners, heliarc welded, ground, and polished smooth. Frame profile shall be minimal, intended as a narrow reveal around mirror perimeter.

d. Backing:

i. Provide full-coverage polyethylene safety film backing (Category II) meeting ANSI Z97.1 and 16 CFR 1201 for safety glazing.
ii. Alternatively, provide factory-applied vinyl film safety backing meeting the same standards.

e. Mounting: Provide concealed metal clips, channels, or adhesive system per manufacturer’s recommendations.

5. Performance Requirements:

a. Comply with ANSI Z97.1 and CPSC 16 CFR Part 1201 for Category II safety glazing in public restrooms.
b. Edges shall be sealed and protected from moisture infiltration.
c. Mounting and adhesives shall be moisture-resistant and compatible with mirror backing materials.

6. Acceptable Manufacturers:

a. Guardian Industries – MirroView® or SilverGuard® Mirror Glass with Safety Backing.
b. Vitro Architectural Glass – Mirropane® or Silver Mirror with Safety Backing.
c. Pilkington North America – MirroPane™.
d. Approved equal meeting ASTM C1503 and safety glazing standards.

2.3 COMPONENTS

F. General: Provide color of exposed sealant/compound indicated or if not otherwise indicated, as selected by Architect from manufacturer's standard colors, or black if no color is so selected. Comply with manufacturer's recommendations for selection of hardness, depending upon the location of each application, conditions at time of installation, and performance requirements as indicated. Select materials and variations or modifications carefully for compatibility with surfaces contacted in the installation. Sealants shall contain no asbestos.

G. 2-part Polysulfide Glazing Sealant: Elastomeric polysulfide sealant complying with FS TT-S-227, Class A, Type 2; specially compounded and tested to show a minimum of 20 years resistance to deterioration in normal glazing applications. Use for all exterior locations. Verify compatibility with insulating glass and substitute if necessary.

H. Oleo-resinous Glazing Compound: Oil-based glazing compound; non-staining and non-bleeding; provide proper type as required for channel. Use for interior locations.

2.4 ACCESSORIES

A. Miscellaneous Materials:

1. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.

2. Setting Blocks: Neoprene or EPDM, 79-90 durometer hardness, with proven compatibility with sealants used.

3. Spacers: Neoprene or EPDM, 40-50 durometer hardness with proven compatibility with sealants used.

4. Compressible Filler (Rod): Closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, proven to be compatible with sealants used; flexible and resilient, with 5-10 psi compressive strength for 25% deflection.

B. Structural Sealant:

1. Structural Sealant: ASTM C 1184, chemically curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant.

a. Provide sealants for use inside that have a VOC content of 100 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

b. Color: Black.

PART 3 – EXECUTION

3.1 PREPARATION

A. Clean glazing channel and other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to substrate. Remove lacquer from metal surfaces where elastomeric sealants are used.

B. Apply primer or sealant to joint surfaces where recommended by sealant manufacturer.

3.2 INSTALLATION

A. General:

1. Watertight and airtight installation of each glass product is required, except as otherwise shown. Each installation must withstand normal temperature changes, wind loading, and impact loading (for doors), without failure, including loss or breakage of glass, failure of sealants to remain watertight and airtight, deterioration of glazing materials and other defects in the work.

2. Install insulating glass units to comply with recommendations by Sealed Insulating Glass Manufacturers' Association, except as otherwise specifically indicated or recommended by glass and sealant manufacturers.

B. Glazing

1. Install setting blocks of proper size in sill rabbet located in 1/4 of glass width from each corner. Set blocks in thin course of heel-bead compound, if any.

2. Provide spacers inside and out, of proper size and spacing, for glass sizes larger than 50 united inches, except where preshimmed tapes are used for glazing. Provide 1/8" minimum bite of spacers on glass and use thickness equal to sealant width.

3. Set units of glass in each series with uniformity of pattern, draw, bow and similar characteristics.

4. Voids and Filler Rods: Prevent exudation of sealant or compound by forming voids or installing filler rods in channel at heel of jambs and head (do not leave voids in sill channels), except as otherwise indicated and depending on light size, thickness and type of glass and complying with manufacturer's recommendations.
5. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing per Division 7 Section “Joint Sealants”.

6. Force sealants into channel to eliminate voids and to ensure complete "wetting" or bond of sealant to glass and channel surfaces.

7. Tool exposed surfaces of glazing liquids and compounds to provide a substantial "wash" away from glass.

8. Clean and trim excess glazing materials from glass and stops or frames promptly after installation, and eliminate stains and discolorations.

9. Factory glazing may deviate from these specifications as necessary to accommodate manufacturer's standard glazing procedures which will result in a watertight, rattle free installation.

3.3 MIRRORS

A. Install mirrors in accordance with manufacturer’s instructions, plumb, level, and without distortion.

B. Provide continuous extruded aluminum glassless mirror wall brackets at top and bottom of each mirror panel. Brackets shall be secured directly to the tile backer board substrate prior to installation of tile and shall be completely concealed from view after mirror installation. Bracket fasteners are to be concealed.

1. Secure channels to tile backer board with corrosion-resistant fasteners at 16 inches o.c. maximum.
2. Set lower channel in continuous bead of clear silicone sealant; provide vinyl or neoprene setting blocks.
3. Provide 1/8-inch clearance at top channel to allow mirror insertion.

C. Apply mirror mastic compatible with mirror backing in vertical beads on back of mirror; maintain 1/8-inch air space between mirror and tile backer board.

D. Install tile to terminate flush with mirror frame edges, creating a recessed installation with mirror face and frame aligned with finished tile plane.

E. After installation, apply continuous bead of clear silicone sealant at mirror-to-tile interface to prevent moisture intrusion.

F. Protect installed mirrors from abrasion and contamination until Substantial Completion.

3.4 CLEANING

A. Wash and polish glass on both faces not more than 4 days prior to date scheduled for inspections intended to establish date of Substantial Completion of project. Comply with glass product manufacturer's recommendations for final cleaning.

3.5 PROTECTION

A. Protect exterior glass from breakage. Do not apply markers to surfaces of glass. Remove non-permanent labels and clean surfaces. Cure sealant for high early strength and durability.

B. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.

END OF SECTION

SECTION 08 90 00 – CANTILEVERED SUNSHADES

PART 1 – GENERAL

1.1 SUMMARY

A. Provide fixed custom sunshades as shown on the drawings, as specified and as needed for a complete and proper installation.

1. The drawings show the extent of the work, the dimensioned profile and depth of the sunshade to be provided.

B. Related sections include the following:

1. Division 5 Section “Structural Steel Framing”

2. Division 5 Section “Metal Fabrications”

3. Division 8 Section “Aluminum Framed Entrances and Storefronts”

1.2 SUBMITTALS

A. Product Data: Submit specifications, data, and installation instructions from the manufacturer of the sunshades.

B. Shop Drawings

1. Include elevations, sections, and specific details for each sunshade.

2. Show anchorage details and connections for all component parts.

3. Include signed and sealed structural calculations.

C. Samples: Submit one sample minimum 24’’ long of each material to be utilized at each sunshade with appropriate finish.

D. Submit color chips for approval.

E. Warranty: Provide written warranty to the owner that all products will be free of defective materials or workmanship for a period of one year from date of installation.

1.3 QUALITY ASSURANCE

A. Manufacturer and Installer shall have no less than ten years experience in the design and manufacturing of work similar to that shown and required. For quality and delivery control, sunshade system must be purchased from a single source manufacturer. Sub-contracting of sunshade assembly is not acceptable.

B. Performance:

1. Design sunshades to accommodate local requirements for snow and wind loading. Provide engineering calculations to support design. Calculations to be by a registered engineer licensed in the State of Mississippi. Analysis to include all components of sunshade including but not limited to deflection of blades, outriggers and fascia.

2. Deflection to be limited to L/120, ¾'', or as required by code.

C. Professional Engineer Requirements: Drawings and structural calculations to be signed and sealed by a professional engineer licensed to practice in the project state.

1.4 DELIVERY, STORAGE AND HANDLING

A. Delivery: At the time of delivery all materials shall be visually inspected for damage. Any damaged boxes, crates, louver sections, etc. shall be noted on the receiving ticket and immediately reported to the shipping company and the material manufacturer.

B. Storage:

1. Material may be stored flat on end or on its side.

2. Material may be stored either indoors or outdoors.

3. If stored outdoors the material must be raised sufficiently off the ground to prevent it being flooded.

4. If stored outdoors the material must be covered with a weatherproof flame-resistant sheeting or tarpaulin.

C. Handling: Material shall be handled in accordance with sound material handling practices and in such a way as to minimize racking

1.5 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.5 WARRANTY

A. Provide manufacturer's standard 1-year warranty from date of Substantial Completion that all products will be free of defective materials or workmanship.

1. Manufacturer to furnish an extended 20 limited warranty for the Kynar/Hylar coating.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Construction Specialties (Basis of Design)

B. Equal as approved

2.2 Materials

A. Aluminum Extrusions: ASTM B211, Alloy 6063-T5, 6063-T6 or 6061-T6.

B. Fasteners: Fasteners to be minimum 304 stainless steel. Provide types, gauges and lengths engineered to suit installation conditions by manufacturer or supplier. All fasteners to the structure are to be designed by a Professional Engineer licensed to practice in the project state and supplied by the manufacturer.

C. Anchors and Inserts: Use non-ferrous metal or hot dip galvanized anchors and inserts for installation and elsewhere as required for corrosion resistance. Use stainless steel or lead expansion bolt devices for drill in place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.3 MANUFACTURED UNITS

A. Sunshade Model: provide "Custom Designed Cantilevered Sunshade System" as manufactured by Construction Specialties or approved equal.

1. Outriggers: 1/4'' custom tapered flat aluminum plate members.

2. Blades: 6" and 8'' high, extruded aluminum airfoil design as shown in the drawings. Blades shall be factory assembled to outriggers using stainless steel, type F, thread cutting screws through internal screw slots in blades.

Welding is not acceptable. Blades to be mechanically secured to allow for replacement in case of damage. Fasteners to be hex head.

3. Mounting Bracket:

   a. Stainless steel mounting bracket to be designed and provided as part of the pipe beam.

   b. All fasteners mounting to structure to be designed and supplied by sunshade manufacturer.

   c. Fasteners to be 304 stainless steel.

2.4 FABRICATION

A. Provide CS fixed sunshades and accessories materials, sizes, depths, arrangements, and material thickness to be as indicated or as required for optimal performance with respect to strength; durability; and uniform appearance.

B. Include all supports, anchorage, and accessories required for complete assembly.

2.5 FINISHES

A. General: Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations, except as otherwise indicated. Apply finishes in factory. Protect finishes on exposed surfaces prior to shipment. Remove scratches and blemishes from exposed surfaces that will be visible after completing finishing process. Provide color as indicated or, if not otherwise indicated, as selected by architect.

B. Three Coat Fluorocarbon Coating:

   1. Sunshades to be finished with a minimum 1.4 mil (0.035mm) thick full strength 70% resin, 3 coat Fluoropolymer system.

   2. All aluminum shall be thoroughly cleaned, etched and given a chromated conversion pre-treatment before application of the Kynar/Hylar coating. The coating shall consist of a primer, a high Metallic color coat and a clear PVF2 topcoat. It shall receive a bake cycle of 17 minutes at 450°F. All finishing procedures shall be one continuous operation in the plant of the manufacturer.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine openings and support structure to receive the work. Do not proceed until any unsatisfactory conditions have been corrected.

B. Ensure all steel plates are welded in-place ready for installation of sunshades.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of the work.

B. Verify dimensions of supporting structure at the site by accurate field measurements so that the work will be accurately designed, fabricated, and fitted to the structure.

C. Anchor sunshades to the building substructure as indicated on architectural drawings.

D. Erection Tolerances:

1. Maximum variation from plane or location shown on the approved shop drawings: 1/8" per 12 feet of length, but not exceeding 1/2" in any total building length or portion thereof (non-cumulative).

2. Maximum offset from true alignment between two members abutting end to end, edge-to-edge in line or separated by less than 3": 1/16" (shop or field joints). This limiting condition shall prevail under both load and no-load conditions.

E. Cut and trim component parts during erection only with the approval of the manufacturer or fabricator, and in accordance with his recommendations. Restore finish completely. Remove and replace members where cutting and trimming has impaired the strength or appearance of the assembly.

F. Do not erect warped, bowed, deformed, or otherwise damaged or defaced members. Remove and replace any members damaged in the erection process as directed.

G. Set units level, plumb and true to line, with uniform joints.

3.3 PROTECTION

A. Protect installed materials to prevent damage by other trades. Use materials that may be easily removed without leaving residue or permanent stains.

3.4 CLEANING

A. Immediately clean exposed surfaces of the louvers to remove fingerprints and dirt accumulation during the installation process. Do not let soiling remain until the final cleaning.

B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to the material finishes. Thoroughly rinse surfaces and dry.

C. Restore louvers and accessory components damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by the Architect, remove damaged materials, and replace with new materials.

1. Touch up minor abrasions in finishes with a compatible air-dried coating that matches the color and gloss of the factory applied coating.

END OF SECTION

SECTION 08 91 00 - LOUVERS

PART 1 – GENERAL

1.1 SUMMARY

A. Furnish and install louvers, structural supports and attachment brackets as shown on the drawings, as specified, and as needed for a complete and proper installation.

B. The louvers to be furnished include the following:

1. Fixed extruded hurricane resistant louvers.

C. The Drawings show the extent of the work and the dimensioned profile of the louvers to be provided.

1.2 SUBMITTALS

A. Product Data indicating materials types and thicknesses, finishes, size and configuration. Include air flow and water entrainment performance test results.

B. Shop drawings:

1. Include elevations, sections and specific details for each louver.

2. Show anchorage details and connections for all component parts.

3. Include signed and sealed structural calculations.

C. Samples: Submit one sample minimum 24" long of each material to be utilized at the louver with appropriate finish.

1.3 QUALITY ASSURANCE

A. Single subcontract responsibility: Subcontract the work to a single firm that has had not less than six years experience in the design and manufacturing of work similar to that shown and required.

B. Performance Requirements: Provide AMCA and BSRIA test data as required to confirm that the louvers have the specified air and water performance characteristics.

C. Structural Requirements: Design all materials to withstand wind and snow loads as required by the current edition of the (IBC) International Building Code. Maximum allowable deflection for the louver structural members to be l/180 or 0.75 inches, whichever is less. Maximum allowable deflection for the louver blades to be l/120 or 0.50 inch across the weak axis, whichever is less.

D. Dade County Protocols:

1. PA 100(A)-95 Test Procedure For Wind and Wind Driven Rain Resistance and/or Increased Wind Speed Resistance of Soffit Ventilation Strip and

Continuous or Intermittent Ventilation System Installed at Ridge Area.

2. PA-201-95 Impact Test Procedure.

3. PA-202-95 Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components Using Uniform Static Air Pressure.

4. PA-203-95 Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.

1.4 DELIVERY, STORAGE AND HANDLING

A. Delivery: At the time of delivery all materials shall be visually inspected for damage. Any damaged boxes, crates, louver sections, etc. shall be noted on the receiving ticket and immediately reported to the shipping company and the material manufacturer.

B. Storage:

1. Material may be stored flat, on end or on its side.

2. Material may be stored either indoors or outdoors.

3. If stored outdoors the material must be raised sufficiently off the ground to prevent it being flooded.

4. If stored outdoors the material must be covered with a weather proof flame resistant sheeting or tarpaulin.

C. Handling:

1. Material shall be handled in accordance with sound material handling practices and in such a way as to minimize racking.

2. Louver sections may be hoisted by attaching straps to the jambs and lifting the section while it is in a vertical position.

3. Louver sections should only be lifted and carried by the jambs. Heads, sills and blades are not to be used for lifting or hoisting louver sections.

1.5 WARRANTY

A. Warranty: Provide written warranty to the owner that all products will be free of defective materials or workmanship for a period of one year from date of completion.

B. Finish shall have a twenty (20) year warranty against failure of finish.

1.6 BUILD AMERICA, BUY AMERICA (BABA) REQUIREMENTS

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.
B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Construction Specialties, Inc. (The C/S Group)

B. Equal as approved

2.2 MATERIALS

A. Aluminum Extrusions: ASTM B211, Alloy 6063-T5, 6063-T6 or 6061-T6.

B. Aluminum Sheet: ASTM B3209, Alloy 1100, 3003 or 5005.

2.3 MANUFACTURED UNITS

A. Provide C/S Group 5" Deep Dade County Approved Fixed Horizontal Louver Model DC-5304 or approved equal.

1. Material: Heads, sills, jambs and mullions to be one-piece structural aluminum members with integral caulking slot and retaining beads. Blades to be one-piece aluminum extrusions with front lip gutter and multiple secondary gutters designed to catch and direct water to sill. Louvers to be supplied with 4" high by full depth sill flashings formed from minimum 0.050" thick aluminum. Sill flashings to have welded side panels. Louvers and sill flashings to be installed in accordance with the manufacturer's recommended procedures to ensure complete water integrity performance of the louver system.

a. Material thickness to be as follows: Heads, sills, jambs and mullions: 0.081". Fixed blades: 0.060".

2. Structural Performance: Louvers shall have been tested in accordance with Dade County Protocols PA201, PA202 and PA 203; and shall be Dade County Approved for open structure building envelope protection (including missile)

for single unit sizes up to 12 feet wide by 7 feet high; and for allowable design wind loading up to 120 psf.

3. AMCA Performance: A 4’ x 4’ unit shall conform to the following:

   a. Free Area: 7.24 SF

   b. Intake pressure drop at 700 fpm free area velocity: 0.20 H_2O

4. Wind Driven Rain Performance: AMCA certified and licensed to bear the AMCA seal. The louver test was based on a 39.370 x 39.370" core area. Unit tested at a rainfall rate of 3.0 inches per hour and with a wind directed to the face of the louver at a velocity 29.1-mph. The test data shall show the water penetration effectiveness rating at each corresponding ventilation rate.

Core Ventilation Rate (m/s):	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5
Core Ventilation Rate (ft/min):	0	98	197	295	394	492	591	689
Free Area Ventilation Rate (ft/min):	0	181	364	545	727	908	1091	1272
Rating effectiveness:	A	A	A	B	B	B	C	C
Effectiveness Rating:	A = 1 to 0.99		B = 0.989 to 0.95		C = 0.949 to 0.80		D = 0.80 to 0	

2.4 FABRICATION

A. Provide C/S louver models, structural supports and accessories as specified and/or shown on the drawings. Materials, sizes, depths, arrangements and material thickness to be as indicated or as required for optimal performance with respect to strength; durability; and uniform appearance.

   1. Louvers to be mechanically assembled using stainless steel or aluminum fasteners.

   2. Include supports, anchorage, and accessories required for complete assembly.

2.5 FINISHES

A. General: Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations, except as otherwise indicated. Apply finishes in factory. Protect finishes on exposed surfaces prior to shipment. Remove scratches and blemishes from exposed surfaces that will be visible after completing finishing process.

B. Three Coat Fluorocarbon Coating:

   1. Louvers to be finished with a minimum 1.4 mil thick full strength 70% resin, 3 coat Fluoropolymer system.

   2. All aluminum shall be thoroughly cleaned, etched and given a chromated conversion pre-treatment before application of the Kynar/Hylar coating. The coating shall consist of a primer, a high metallic color coat and a clear PVF_2 topcoat. It shall receive a bake cycle of 17 minutes at 450^0F. All finishing

procedures shall be one continuous operation in the plant of the manufacturer.

3. Color to match wall panels or masonry depending on location.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine opening to receive the work. Do not proceed until any unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of the work.

B. Verify dimensions of supporting structure at the site by accurate field measurements so that the work will be accurately designed, fabricated and fitted to the structure.

C. Anchor louvers to the building substructure as indicated on Drawings.

D. Erection Tolerances:

1. Maximum variation from plane or location shown on the approved shop drawings: 1/8" per 12 feet of length, but not exceeding 1/2" in any total building length or portion thereof (non-cumulative).

2. Maximum offset from true alignment between two members abutting end to end, edge-to-edge in line or separated by less than 3": 1/16" (shop or field joints). This limiting condition shall prevail under both load and no load conditions.

E. Cut and trim component parts during erection only with the approval of the manufacturer or fabricator, and in accordance with his recommendations. Restore finish completely. Remove and replace members where cutting and trimming has impaired the strength or appearance of the assembly.

F. Do not erect warped, bowed, deformed or otherwise damaged or defaced members. Remove and replace any members damaged in the erection process as directed.

G. Set units level, plumb and true to line, with uniform joints.

3.3 PROTECTION

A. Protect installed materials to prevent damage by other trades. Use materials that may be easily removed without leaving residue or permanent stains.

3.4 ADJUSTING AND CLEANING

A. Immediately clean exposed surfaces of the louvers to remove fingerprints and dirt accumulation during the installation process. Do not let soiling remain until the final cleaning.

B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to the material finishes. Thoroughly rinse surfaces and dry.

C. Restore louvers and accessory components damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by the Architect, remove damaged materials and replace with new materials.

1. Touch up minor abrasions in finishes with a compatible air-dried coating that matches the color and gloss of the factory applied coating.

END OF SECTION

SECTION 09 22 16 – NON-STRUCTURAL METAL FRAMING

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Interior framing systems (includes but is not limited to supports for partition walls, framed soffits, furring).

2. Interior suspension systems (includes but is not limited to supports for ceilings, suspended soffits).

B. Related Sections include the following:

1. Division 6 Section “Rough Carpentry”

2. Division 9 Section “Gypsum Board”

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

A. Direct Suspension Systems: ASTM C635

B. Metal Support System Installation: ASTM C754

C. Allowable Tolerances: 1/8" in 8' - 0" variation in finish surface

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover and in a manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes.

1.5 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 NON-LOAD-BEARING STEEL FRAMING, GENERAL

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.

2. Protective Coating: ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating, unless otherwise indicated.

2.2 SUSPENSION SYSTEM COMPONENTS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch diameter wire, or double strand of 0.0475-inch diameter wire.

B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch diameter.

C. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch wide flanges.

1. Depth: 2 inches unless otherwise noted on Drawings.

D. Furring Channels (Furring Members):

1. Steel Studs: ASTM C 645.

a. Minimum Base-Metal Thickness: 20 gauge, unless otherwise indicated on Drawings.

b. Depth: 3-5/8 inches minimum, unless otherwise indicated on Drawings to be larger.

E. Grid Suspension System for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Armstrong World Industries, Inc.; Drywall Grid Systems.
2. Chicago Metallic Corporation; 650-C Drywall Furring System.
3. USG Corporation; Drywall Suspension System.
4. Or equal

2.3 STEEL FRAMING FOR FRAMED ASSEMBLIES

A. Steel Studs and Runners: ASTM C 645.

1. Double 20 gage stud framing at all openings including door and view panels.
2. **20 gauge** at 16" o.c. for all locations.
3. Use 20 gauge for all runners.

B. Slip-Type Head Joints: Where indicated or at a minimum where required by the Steel Stud Manufacturers Association (SSMA), provide the following:

1. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
2. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

C. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base Metal Thickness: 25 gauge
2. Depth: 1-1/2 inches unless otherwise noted.

2.4 STEEL FRAMING ACCESSORIES

A. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Provide stud manufacturer's standard clips, shoes, ties, reinforcement, and other accessories as needed for a complete partition framing system.

2.5 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. For fire rated construction use same fasteners as used in applicable fire test.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Metal Support Systems:

1. Direct-hung Suspension System: Attach perimeter support member to adjacent vertical surfaces. Mechanically join support members to each other and butt-cut to fit into wall support. Cut, bend and secure joints at bulkhead at ceiling level change as indicated and in accordance with manufacturer's recommendations.

a. Space runners 48 inches on center, and suspend from structure with specified hangers spaced no more than 48 inches on center along the runners.

(1) For interior ceilings suspend from structure with 12 gage or heavier galvanized steel wire. Wrap ties tightly at least 3 full turns.

b. Place furring tees 16 inches on center between furring runners. Provide a furring tee at, and 8 inches each side of, gypsum board end joints.

c. Provide auxiliary framing at openings for light fixtures and similar work, as required for support of both the gypsum board and other work indicated for support thereon.

d. Install supplementary framing, runners, blocking and bracing at openings and terminations in the work, and at locations required to support fixtures, equipment, services, heavy trim, grab bars, toilet accessories, furnishings, and similar work which cannot be adequately supported on gypsum board alone.

2. Wall/Partition Support System: Support systems shall extend from floor to heights indicated on partition types/schedule.

a. Install runner tracks at floors and bottom of roof or floor framing members and where stud system abuts other construction. Where partitions parallel, but are not directly beneath framing members, where there is no floor above, provide runner, or stud, headers between beams, spaced 4 feet on center, attached at each end, and secure top runner of partition thereto.

b. Space studs 16 inches on center, unless otherwise indicated.

c. Frame door openings with 20 gage vertical studs. Provide runner track header of same gage as jamb studs, and jack studs same as partition

studs across head of opening.

d. Frame other openings same as door openings and frame above and below openings same as above door head.

e. Install supplementary framing, runners, blocking and bracing at openings and terminations in the work, and at locations required to support fixtures, equipment, services, heavy trim and similar work which cannot be adequately supported on gypsum board alone.

f. Secure perimeter framing to structural elements with suitable fasteners located 2 inches from each end and 24 inches apart between, except top runner parallel to, but not directly under, framing members will be attached with 2 screws to headers provided at 48 inches on center. Anchor studs adjacent to door and fixed light openings, partition intersections, and corners to top and bottom runner flanges. Make web-flange bend at each end of runner over openings and screw to jamb studs with 2 screws each end.

3. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.

END OF SECTION

SECTION 09 29 00 – GYPSUM BOARD

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Mold and Mildew Resistant Gypsum Board
2. Tile backer board
3. Cementitious backerboard for Plumbing Chases.
4. Wallboard finishing (joint tape-and-compound treatment)
5. Gypsum wallboard trims, reveals and accessories
6. Gypsum wallboard reveals used as base.
7. Levels of Gypsum Board Finish

B. Related Sections include the following:

1. Division 6 Section “Rough Carpentry”
2. Division 7 Section “Joint Sealants”
3. Division 9 Section “Non-Structural Metal Framing”
4. Division 9 Section “Digitally Printed Wall Cladding”
5. Division 9 Section “Tiling”
6. Division 9 Section “Painting and Coating”
7. Division 10 Section "Passive Wall Ventilation Accessories”

1.2 SUBMITTALS

A. Product Data:

1. Submit manufacturer’s product specifications and installation instructions for each gypsum board component, including other data as may be required to show compliance with these specifications.
2. Product Data: Provide Safety Data Sheets for fire resistant (Type X) gypsum board.

B. Samples: 12 inch long sample of reveals, in finish specified.

1.3 QUALITY ASSURANCE

A. Manufacturer: Obtain gypsum board products from a single manufacturer.

1. Provide products manufactured in North America only.

B. Gypsum Board:

1. “GA-216, Application and Finishing of Gypsum Panel Products” by Gypsum Association

2. “GA-214, Recommended Levels of Gypsum Board Finish” by Gypsum Association.

C. Allowable Tolerances: 1/8" in 8' - 0" variation in finish surface

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store gypsum in accordance with GA-238 and manufacturer recommendations.

B. Deliver materials in original packaged, containers or bundles bearing brand name and identification of manufacturer or supplier

C. Store materials inside under cover and in a manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes. Neatly stack gypsum boards flat to prevent sagging.

D. Handle gypsum boards to prevent damage to edges, ends or surfaces. Protect metal corner beads and trim from being bent or damaged.

1.5 PROJECT CONDITIONS

A. Cold Weather Protection: When ambient outdoor temperatures are below 55° F., maintain continuous, uniform, comfortable building working temperatures of not less than 55° F. for a minimum period of 48 hours prior to, during and following application of gypsum board and joint reinforcement materials or bonding of adhesives.

B. Ventilation: Ventilate building spaces as required to remove water in excess of that required for drying of joint treatment material immediately after its application. Avoid drafts during dry, hot weather to prevent too rapid drying.

1.6 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA) requirements under the Infrastructure Investment and Jobs Act (IIJA), 41 U.S.C. §§ 8301–8305.

B. All iron, steel, manufactured products, and construction materials permanently installed in the Work shall be produced in the United States.

C. Manufactured Materials: For manufactured products, the cost of components mined, produced, or manufactured in the United States shall be greater than 55 percent of the total cost of components.

D. Construction Materials: For the purpose of this Section, construction materials include non-ferrous metals, plastic and polymer-based products (such as the translucent resin panel system specified herein), glass, fiber-optic cable, optical fiber, engineered wood, and other items defined by 2 CFR § 184.3. All manufacturing processes for such materials—from initial melting or polymerization through coating or finishing—shall occur in the United States. Foreign-sourced raw materials or resins shall not be used unless a BABA waiver has been approved in writing by the Owner.

E. Products shall be manufactured in the United States. Foreign-sourced products or components are not permitted unless a BABA waiver has been approved in writing by the Owner prior to procurement.

F. Contractor shall provide manufacturer's certification letters and/or signed statements verifying compliance with the Build America, Buy America Act for all applicable products prior to submittal approval.

G. Where Basis-of-Design manufacturers are listed, such products are identified for design intent only; all substitutions must demonstrate full compliance with BABA prior to approval.

H. In the event a listed manufacturer cannot provide compliant documentation, Contractor shall notify Architect and propose a U.S.- manufactured equivalent meeting aesthetic and performance requirements.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Gypsum Board:

1. Georgia-Pacific

2. US Gypsum Company (USG)

3. CertainTeed Gypsum

4. Or equal (Products must be manufactured in North America)

2.2 MATERIALS

A. General:

1. All interior components shall have a mold resistance rating minimum board score of 10 when tested per ASTM D 3273.

B. Mold and Mildew Resistant Gypsum Board: ASTM C 1396, of thickness indicated below to resist mold and mildew; in maximum lengths available to minimize end-to-

end butt joints.

1. Type X, 5/8 inch thick, for fire-resistant rated assemblies and where indicated.

2. Provide at all interior areas unless noted otherwise for different type of material (tile backer).

C. Tile Backer Board (provide at all locations where wall tile occurs and other areas indicated). Board shall score minimum 10 when tested per ASTM D 3273.

1. 5/8" DensShield Tile Backer Board as manufactured by Georgia Pacific Corporation.

2. 5/8" Fiberock Tile Backer as manufactured by USG Corporation.

3. 5/8" GlasRoc Tile Backer as manufactured by CertainTeed Corporation

4. Or equal

D. Cementitious Backer Board: Plumbing Chase ceilings and end-wall.

1. Provide cementitious backer board at ceilings within plumbing chases where indicated.

2. Thickness: 5/8 inch nominal.

3. Performance Requirements:

a. Noncombustible when tested in accordance with ASTM E136.
b. Moisture- and mold-resistant; suitable for ceiling installation.
c. Suitable for use in non-conditioned and service-access ceiling spaces.

4. Acceptable Manufacturers:
a. USG – Durock® Cement Board
b. National Gypsum – PermaBase® Cement Board
c. James Hardie – HardieBacker® Cement Board
d. Or equal

2.3 ACCESSORIES

A. General: Except as otherwise specifically indicated, provide trim and accessories by manufacturer of gypsum board materials, made of galvanized steel (required at exterior) or zinc alloy and configured for concealment in mold resistant joint compound.

1. Include corner beads, edge trim, control joints and other units necessary for project conditions. Provide accessories as required in order to achieve details indicated, whether or not specific accessories are shown on the drawings.

a. All edge trim, including J-mold, shall be metal drywall edge trim with perforated or textured flanges suitable for embedding in joint compound, designed to be finished flush with adjacent gypsum board surfaces. Exposed reveal faces are not permitted unless specifically indicated.

2. Comply with ASTM C1047-19 Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base, current version.

B. Reveals/trim:

1. Provide where indicated on Drawings equal to Fry Reglet Corporation (Basis of Design).

a. Drywall Reveal Base: DRMP-625-600, 5/8" depth x 6" high. Refer to drawings for location.

i. clear anodized finish - aluminum
ii. buffed brite black anodized finish - aluminum

b. Drywall Reveal: DRMP-625-50, ½" reveal. Refer to drawings for location.

i. buffed brite black anodized finish - aluminum

c. **Provide manufacturers factory fabricated intersections, end caps and other accessories for a complete installation**

2. Provide "Control Joint" at all gypsum control joint locations as manufactured equal to Fry Reglet Corporation in locations indicated on Drawings.

C. Wall Covering Trim for "Digitally Printed Wall Cladding"

1. Wall Covering Trim: WCTBT125-217.
a. Aluminum shall be extruded 6063 T5, with chemical conversion coating.
b. Color: As selected by Architect from all available custom colors and finishes.

D. Joint Treatment Materials:

1. General: Comply with ASTM C475 Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board, current version.

2. Manufacturer's standard paper tape is acceptable for interior areas (non-tile backer) **only if all** environmental conditions are met.

a. Provide glass fiber mesh tape at all tile backer areas:

(1) Glass-Fiber Mesh Tape: Self-adhering glass-fiber tape, alkali resistant, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch. Mold resistance rating score of 10 when tested in accordance with ASTM D 3273.

3. Exterior sealant: Silicone Emulsion Sealant meeting ASTM C 920, Type S, Grade NS, compatible with glass fiber mesh tape and for covering exposed fasteners.

4. Setting Type Joint Compound: Factory prepackaged, job mixed chemical-hardening powder products for bedding and filling.

    a. Provide equal to USG "Sheetrock Brand Easy Sand Lightweight Setting-Type Joint Compound".

    b. Use for all areas requiring setting or topping compound (ie: taping, filling, and treating fasteners).

E. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

F. Fasteners: Steel drill screws, in lengths recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating.

1. For steel framing less than 0.0329 inch thick, attach sheathing with steel drill screws complying with ASTM C1002, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products to Steel Studs.

2. For steel framing from 0.033 to 0.112 inch thick, attach sheathing with drill screws complying with "ASTM C954 Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. to 0.112 in. in Thickness".

3. Provide Type S or Type S-12 screws only.

PART 3 – EXECUTION

3.1 PREPARATION

A. **Do not deliver or install** gypsum board until building is fully enclosed and wet work is complete.

B. **Prior to finishing**, permanent HVAC system shall be operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period. If permanent HVAC system is not available, then temporary air and humidity control must be established prior to any finish work.

3.2 EXAMINATION

A. Examine substrates to which gypsum board construction attaches or abuts, installed hollow metal frames, cast-in anchors and structural framing with Installer present for compliance with requirements for installation tolerances and other conditions affecting performance of gypsum board assemblies specified in this Section.

1. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. General:

1. Install and finish in accordance with "GA-216, Application and Finishing of Gypsum Panel Products", with manufacturer's printed directions and recommendations, and to comply with applicable fire tests where fire rated construction is required.

2. Install boards with correct side out (typically logo side out). Use maximum lengths possible to minimize number of joints.

3. Apply fasteners so screw heads bear tightly against face of boards but do not cut into facing (no countersinking).

4. Horizontal Installation: Install sheathing with long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of stud flanges, and stagger end joints of adjacent boards not less than one stud spacing. Screw-attach boards at perimeter and within field of board to each steel stud.

5. Caulk/seal cut edges and penetrations around pipes, fixtures, etc., and where sheathing butts against dissimilar materials with applicable sealant.

6. Do not install imperfect, damaged or damp boards.

7. Finishing, General: Apply joint treatment at gypsum board joints (both directions); flanges of corner bead, edge trim and control joints; penetrations; fastener heads, surface defects and elsewhere as required to prepare work for decoration.

B. Mold and Mildew:

1. Cut boards at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.
   a. Install boards with a minimum ¼ inch setback at wall-to-floor intersections.

   b. Allow no joints greater than 1/8 inch.

2. Fastener Spacing:

   a. Space fasteners approximately 8 inches o.c. along supported edges and 12 inches o.c. along intermediate supports (or tighter spacing if recommended by manufacturer for specific application) and set back a minimum of 3/8 inch from edges and ends of boards.

3. Joints and corners shall be treated with 2" fiberglass tape embedded in a skim coat of setting material as specified herein.

a. Skim coat all fasteners with setting material.

C. Tile Backer Board:

1. Comply with Division 9 Section “Tiling” and TCA Handbook for Ceramic Tile Installation.

2. Cut boards at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.

a. Install boards with a ¼ inch setback where they abut shower receptors to prevent wicking.

b. Allow no joints greater than 1/8 inch.

3. Do not install an additional vapor barrier in conjunction with tile backer boards.

4. Horizontal Installation: Install sheathing with long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of stud flanges, and stagger end joints of adjacent boards not less than one stud spacing. Screw-attach boards at perimeter and within field of board to each steel stud.

5. Fastener Spacing:

a. Space fasteners approximately 6 inches o.c. (or tighter spacing if recommended by manufacturer for specific application) and set back a minimum of 3/8 inch from edges and ends of boards.

6. Joints and corners shall be treated with 2” fiberglass tape embedded in a skim coat of the tile setting material as specified in Division 9 Section “Tiling”.

a. Skim coat all fasteners with tile setting material.

7. Where tile backer board is indicated to be painted, finish per “Mold and Mildew Resistant Gypsum Board”, Level 5 finish, as specified herein.

D. Cementitious Backer Board:

1. Install cementitious backer board only at plumbing chase ceilings and end-wall where indicated.

2. Install perpendicular to framing members.

3. Provide cold formed framing at 12 inches o.c. maximum unless manufacturer requires closer spacing.

4. Fasten using manufacturer-recommended corrosion-resistant screws suitable for cementitious boards.

5. Set fasteners flush; do not countersink or fracture board surface.

6. Treat joints in accordance with manufacturer's recommendations; provide joint taping and painted finish.

E. Accessories:

1. Trim:

a. Use same fasteners to anchor trim accessory flanges as required to fasten gypsum board to supports, unless otherwise recommended by trim manufacturer.

b. Install metal corner beads at external corners in locations as indicated on the Drawings or as specified herein.

(1) Install muddable metal casing bead trim whenever edge of gypsum board would otherwise be exposed or semi-exposed.

2. Wall Covering Trim for "Digitally Printed Wall Cladding".

a. Install wall covering trim WCTBT125-217 at full perimeter of digital wall cladding in strict accordance with manufacturer's written instructions and approved shop drawings.

b. Install trim true to line, plumb, level, and square, with tight, uniform joints and consistent alignment with adjacent wall surfaces and wall covering edges.

c. Provide concealed fastening; locate fasteners to maintain clean, uninterrupted finished appearance.

d. Cut, miter, and fit trim accurately at corners, terminations, and transitions to other materials.

e. Maintain required expansion clearances for aluminum trim in accordance with manufacturer's recommendations.

f. Coordinate installation sequencing to avoid damage to digitally printed wall cladding.

3. Control Joints:

a. Install control joints at locations indicated, or if not indicated, at spacing and locations required by "GA-216, Application and Finishing of Gypsum Panel Products", and as specified herein. Locations shall be approved by Architect prior to installation for visual effect.

(1) Install control joints at junction of gypsum board partitions with walls or partitions of other finish material.
(2) A control joint shall be installed where a partition, wall, or ceiling traverses a construction joint (expansion, seismic, or building control element) in the base building structure.
(3) Control joints shall be installed where a wall or partition runs in an uninterrupted straight plane exceeding 30 linear feet.

(4) Control joints in interior ceilings shall be installed so that linear dimensions between control joints do not exceed 30 linear feet.
(5) Where gypsum board is vertically continuous, as at stairwells, provide horizontal control joints at each floor level.

(6) A control joint or intermediate blocking shall be installed where ceiling framing members change direction.

(7) Where a control joint occurs in an acoustical or firerated system, blocking shall be provided behind the control joint by using a backing material of 5/8 in. type X Mold and Mildew resistant gypsum board as specified herein, mineral fiber, or other tested equivalent.

3.4 LEVELS OF GYPSUM BOARD FINISH

A. Levels of Finish: Provide in accordance with Gypsum Association "GA 214, Recommended Levels of Gypsum Board Finish". Refer to Interior Sheets for additional finish level requirements.

1. Level 1: Ceiling plenum areas, exterior, and concealed areas, except provide higher level of finish as required to comply with fire resistance ratings and acoustical ratings.

a. All joints and interior angles shall have tape set in joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.

2. Level 2: all Tile Backer gypsum surfaces to receive tile.

a. All joints and interior angles shall have tape embedded in joint compound and wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles. Fastener heads and accessories shall be covered with a coat of joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable. Joint compound applied over the body of the tape at the time of tape embedment shall be considered a separate coat of joint compound and shall satisfy the conditions of this level.

3. Level 3: Gypsum board substrate at areas of textured finishes.

a. All joints and interior angles shall have tape embedded in joint compound and one additional coat of joint compound applied over all joints and interior angles. Fastener heads and accessories shall be covered with two separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges.

4. Level 4: All exposed gypsum board surfaces to receive paint, except where a higher level of finish is indicated.

a. All joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles.

Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges.

5. Level 5: all exposed Gypsum board surfaces, except where another finish level is indicated.

   a. All joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. A thin skim coat of joint compound shall be applied to the entire surface. The surface shall be smooth and free of tool marks and ridges.

   b. At locations where “Digitally Printed Wall Cladding” is to be installed, provide a Level 5 finish at all gypsum board surfaces. Paint per Division 9 prior to installation of wall cladding.

   c. At Restroom Lobby 116, provide Level 5 finish on east wall adjacent to Exterior Vending

3.5 FIELD QUALITY CONTROL

A. Tolerances:

   1. Do not exceed 1/8 inch in 8'-0" variation from plumb or level in exposed lines of surface, except at joints between gypsum board units.

   2. Do not exceed 1/16 inch variation between planes of abutting edges or ends.

   3. Shim as required to comply with specified tolerances.

3.6 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 09 30 00 – TILING

PART 1 – GENERAL

1.1 SUMMARY

A. Definitions - Tile includes ceramic surfacing units for wall and base made from clay or other ceramic materials. The types of work of this section include:

1. Porcelain Tile
2. Ceramic Tile
3. Ceramic Mosaic Tile
4. Tile Trim and Accessories to achieve a complete installation.
5. Epoxy Grout

B. Related Sections include the following:

1. Division 9 Section “Gypsum Board” for gypsum based tile backer board

1.2 REFERENCES

A. ANSI A108 Series/A118 Series - American National Standards for Installation of Ceramic Tile.

B. ANSI A136.1 - American National Standard for Organic Adhesives for Installation of Ceramic Tile.

C. TCNA Handbook for Ceramic, Glass and Stone Tile Installation.

1.3 SUBMITTALS

A. Manufacturer's product data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

B. Samples - Submit manufacturer's color charts consisting of actual tiles or sections of tiles showing full range of colors available for each type of tile specified.

1. Physical samples of grout for product selection – paper copies will not be accepted.

C. Shop Drawings: Submit shop drawings including tile and their specific locations as indicated on the drawings. Show control joints to be moved, expansion joint locations, and other specialty areas for approval.

1. Expansion joint locations of all oversized porcelain tile areas is required.

1.4 QUALITY ASSURANCE

A. Tile Manufacturing Standard: ANSI A137.1. Furnish tile complying with standard grade requirements unless indicated otherwise.

B. Obtain all installation products from a single source manufacturer to assure compatibility and to be in compliance with manufacturers Full System Warranty.

C. Tile Council of North America, Inc. (TCNA):

1. Handbook No. W245-18 for wall tile installed over backerboard.

a. Refer to Division 9 Section “Gypsum Board” for preparation of gypsum board.

2. Expansion joints, control joints, etc., must be located in compliance with TCNA EJ171 and filled with appropriate materials.

D. Mock-ups:

1. General: Each mock up of grout will be with the actual surrounding tile, minimum 6 tile x 6 tile unless shown otherwise on the Finish Schedule adhered to a solid backer (plywood, gypsum board, cement board, etc.)

2. Wall Tile WT-1A:

a. Size: Mockup size as indicated on Finish Schedule.

b. Provide 2 mockups using two grout colors as indicated.

3. Wall Tile WT-1B

a. Size: Mockup size to include two full sheets of tile in each direction.

b. Provide 2 mockups using two grout colors as indicated.

4. Wall Tile WT-2

a. Size: Mockup size to include 6 tile wide x 4 tile tall.

b. Provide 2 mockups using grout colors as indicated.

5. Wall Tile WT-3

a. Size: As indicated on the Finish Schedule.

b. Provide 1 mockup using grout color as indicated.

6. Wall Tile WT-4A

a. Size: As indicated on the Finish Schedule.

b. Provide 3 mockups using three grout colors as indicated.

7. Wall Tile WT-4B

a. Size: Similar to 4A.

b. Provide 3 mockups using three grout colors as indicated.

8. Wall Tile WT-4C

a. Size: Similar to 4A.

b. Provide 3 mockups using three grout colors as indicated.

9. Wall Tile WT-5

a. Size: Mockup size as indicated on the Finish Schedule.

b. Provide 1 mockup using grout color as indicated.

10. Wall Tile WT-6

a. Size: Mockup size as indicated on the Finish Schedule.

b. Provide 1 mockup using grout color as indicated.

11. Wall Tile WT-7

a. Size: Mockup size as indicated on the Finish Schedule.

b. Provide 2 mockups using two grout colors as indicated.

12. Wall Tile WT-8

a. Size: Mockup size as indicated on the Finish Schedule.

b. Provide 2 mockups using two grout colors as indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver packaged materials and store in original containers with seals unbroken and labels intact until time of use, in accordance with manufacturer's instruction. All cartons must be from same Lot.

1.6 PROJECT CONDITIONS

A. Maintain environmental conditions and protect work during and after installation in accordance with referenced standards and manufacturer's printed recommendations. All cartons must be from the same lot.

1.7 BUILD AMERICA, BUY AMERICA (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 TILE MATERIALS

A. General:

1. Colors, patterns, and locations of all tile types are as indicated on the Drawings. Other manufacturers’ must submit samples after contract award matching color and finish in order to be considered “equal”.

a. Design Intent Only: Where tile materials are indicated on the Drawings or Interior Finish Schedules by reference to specific manufacturers, such references are for DESIGN INTENT ONLY regarding size, color, texture, and finish. Tile products furnished shall comply with all Project requirements, including Build America, Buy America Act (BABA) domestic sourcing requirements, and shall match the intended aesthetic and performance characteristics of the Basis of Design. Determination of whether a proposed substitution or “equal” product is acceptable and truly

equivalent shall be made solely by the Architect, whose decision shall be final.

2.2 SETTING MATERIALS

A. Manufacturers:

1. Schluter Systems
2. Bostik USA
3. Laticrete International
4. Custom Building Products
5. Litokol
6. Mapei

B. Cementitious Tile Adhesives:

1. Use polymer-modified thin-set mortar meeting ANSI A118.4T (non-sag) for wall tile. For tiles with any side ≥ 15 in. or where required by manufacturer, use ANSI A118.15T (large & heavy tile, non-sag).

   a. Basis of Design: Schluter "ALL-SET" (no admixtures required)

   b. Approved Equals:

      i. ATICRETE 257 Titanium (A118.15T)

      ii. MAPEI Ultraflex LFT / Large-Tile & Stone (A118.4HT)

      iii. CUSTOM ProLite (A118.15HT)

C. Tile Grout:

1. Color to be selected from mockups in "Quality Assurance" section.
2. Color Intent Only: Where grout colors are indicated on the Drawings or Interior Finish Schedules by reference to specific manufacturers (including but not limited to Litokol "Starlike EVO" and Custom Building Products "CEG-Lite"), such references are for COLOR INTENT ONLY. Grout products provided shall comply with project requirements, including Build America, Buy America Act (BABA) domestic sourcing requirements. Provide grout meeting the specified performance, color intent, and compliance criteria. Final grout color selection shall be as approved by the Architect based on field mockups.
3. 100% Solids Epoxy Grout: Comply with ANSI A118.3.

   a. Basis of Design: LATICRETE "SPECTRALOCK® PRO Premium Grout" (Parts A, B, and C).

b. Approved Equals:

(1) MAPEI “Kerapoxy® CQ” Epoxy Grout (2-part).

(2) Custom Building Products “CEG-Lite™ 100% Solids Commercial Epoxy Grout” (2-part).

(3) Others meeting BABA requirements and complying with the performance of the basis of design.

4. Color Control: Provide all grout units for each contiguous area from the same color lot; mix full units. If partial units are used, weigh components to maintain color consistency.

5. Mosaic/Tight Joints: For joints ≤ 1/8 inch and mosaic tile, provide fine-aggregate epoxy (e.g., “CQ”-type) suitable for narrow joints.

2.3 ACCESSORIES

A. Provide accessories in locations as indicated on Drawings and as specified herein

B. Termination Strip:

1. Provide transitions at all tile edges and outside corners using Schlüter Systems profiles. Basis of Design: Schlüter Quadec.

a. References to specific profiles establish design intent for a continuous and coordinated trim system throughout the Project.

b. Finish: Provide Type 304 stainless steel, color as selected by Architect.

c. Size/Height: Provide profile sizes appropriate for each tile thickness and installation condition.

d. Provide other transition profiles where indicated on the Drawings, all by Schlüter Systems, unless otherwise approved by the Architect.

e. Include all inside and outside corners, end caps, connectors, and accessories required for a complete and uniform installation.

f. Substitutions: Alternative manufacturers or profiles will be considered only if submitted as substitutions and approved by the Architect. Determination of equivalency shall be made solely by the Architect and shall be final.

B. Grout Sealer: not required due to type of grout specified.

PART 3 – EXECUTION

3.1 PREPARATION

A. General:

1. All supporting surfaces shall be structurally sound, solid, stable, level, plumb, and true to a tolerance in plane of 1/4 inch in 10 feet for walls, when specified for thin-set method. When installing large format tile (one side greater than 15 inches) the tolerance is reduced to 1/8 inch in 10 feet. ANSI A108.01 Section 2.6.2

2. They shall be clean and free of dust, oil, grease paint, tar, wax, curing compound, primer, sealer, form release agent, laitance, loosely bonded topping, loose particles or any deleterious substance and debris which may prevent or reduce adhesion.

3. Turn off all forced ventilation and any radiant heating systems and protect work against drafts during installation and for a period of at least 72 hours after completion. Use indirect auxiliary heaters to maintain the temperatures in the area at the recommended workable level. Vent temporary heater to exterior to prevent damage to tile work from carbon dioxide build-up.

4. Before work commences examine the areas to be covered and report any flaw or adverse condition in writing to the architect and to the general contractor. Do not proceed with work until surfaces and conditions comply with the requirements indicated in ANSI A108 standard.

B. Tile Backer surfaces:

1. Tile Backer Board shall be installed per the guidelines of ANSI A108.01 Section 3.5 and per Division 9 Section “Gypsum Board”.

3.2 PRE-INSTALLATION MOCKUPS (GROUT)

A. Build a minimum mockup with sizes as indicated for each tile type and joint width scheduled to receive epoxy grout, on actual substrate and under final lighting.

B. Demonstrate mixing, placement, initial wash, second wash, and final haze removal using the actual cleaning additives proposed.

C. Acceptance Criteria:

1. Full joints, free of pinholes, voids, and shrinkage.

2. Uniform color and sheen across the panel; no splotching from irregular cleanup.

3. Approved mockup becomes standard of quality; leave in place where directed or photograph for record.

3.3 ENVIRONMENTAL CONDITIONS

A. Maintain ambient and substrate temperatures within the epoxy manufacturer’s limits before, during, and after installation; control ventilation per SDS.

B. Protect work from drafts, direct sun, and rapid temperature swings that shorten pot life or alter cleanup windows.

3.4 SURFACE PREPARATION

A. Protect adjacent finishes from epoxy and cleaners; mask metals, porous stone, and fixtures as required.

B. Stain-Sensitivity Check: Where tile is porous or textured, perform a small field test; pre-seal tile faces only if required by grout manufacturer to prevent staining or resin lodging.

3.5 MIXING OF EPOXY GROUT

A. Mix full factory units only. If partial units are unavoidable, weigh Parts A/B/C to manufacturer ratios; do not estimate by volume.

B. Use a low-speed mixer (≤ 300 rpm); avoid entraining air. Do not add water or solvents.

C. Observe induction/rest time if required by the product; respect pot life at the measured site temperature.

D. Size batches so placement and initial wash are completed within the stated working time; discard material beyond pot life—no re-tempering.

3.6 PLACEMENT

A. Pack grout fully into joints with an epoxy-rated hard rubber float; work diagonally across joints to avoid pull-out.

B. Strike joints flush and even with tile edges for sanitary cleaning; rake or “dished” joints are not acceptable in public restrooms.

C. Mosaics / Tight Joints ≤ 1/8 in.: Use manufacturer’s fine-aggregate (CQ-type) epoxy to minimize pinholes and surface texture.

D. Clean tile faces as you go; do not allow epoxy to skin or harden on surfaces.

3.7 CLEANING AND HAZE REMOVAL

A. Initial Wash: Within the manufacturer’s stated window for the recorded site temperature, perform the first wash using the approved epoxy cleaning additive and clean water; two-bucket method; white pads only; light, circular motion.

B. Second Wash: Perform the secondary wash within the specified window to remove residual film; change water frequently; microfiber final wipe.

C. Post-Cure Haze: If residual film remains after cure, use the manufacturer’s epoxy haze remover; acid cleaners are prohibited.

D. Protect freshly washed areas from dust, water, and traffic until cured.

3.9 FIELD QUALITY CONTROL

A. Contractor to maintain a Grout Timing Plan on site listing: batch size, pot life, initial/secondary wash windows at the actual ambient temperature, and crew responsibilities.

B. Inspect completed work under final lighting:

1. Joints full and uniformly tooled; no pinholes, ridges, or float burns.

2. Color uniform within each contiguous area (same lot numbers).

3. Tile faces free of haze and smears viewed at normal incidence from 5 feet.

3.10 PROTECTION AND CURING

A. Prevent traffic, water exposure, and cleaning until grout has cured per manufacturer’s schedule for the recorded temperature.

B. After initial cure, cover with breathable protection (e.g., uncoated kraft or board) and maintain safe access routes; do not use plastic sheeting in contact with tile.

3.11 CLOSEOUT AND MAINTENANCE

A. Submit O&M for approved epoxy grout, including approved cleaners, stain-removal procedures, and re-sealing requirements for sealant joints.

B. Permanent signage to Owner: Neutral-pH cleaners only; no abrasives or acids; follow grout manufacturer’s maintenance instructions.

END OF SECTION

SECTION 09 51 13 – ACOUSTICAL PANEL CEILINGS

PART 1 – GENERAL

1.1 SUMMARY

A. Extent of each type of acoustical ceiling is shown herein and scheduled on drawings.

B. Types of acoustical ceilings specified in this section include the following:

1. Acoustical panel ceilings, exposed suspension.

C. Indirect Light Coves Perimeter System – Ceiling to Wall

D. Related Sections include the following:

1. Division 9 Section “Gypsum Board” for joint compound finish and gypsum board ceilings

2. Division 26 Section “Interior Lighting and Lamps”

1.2 SUBMITTALS

A. Product Data: Manufacturer’s product specifications and installation instructions for materials and suspension system, including certified laboratory test reports and other data as required showing compliance with these specifications.

B. Samples: Set of samples for acoustical unit, showing full range of exposed color and texture, and set of 8” long samples of suspension system.

C. Installation Instructions: Submit manufacturer's installation instructions.

1.3 QUALITY ASSURANCE

A. Installer: Firm with not less than three years of successful experience in installation of acoustical ceilings similar to requirements for this project and which is acceptable to manufacturer of acoustical units.

B. Single-Source Responsibility: Provide all ceiling panel units and grid components by a single manufacturer.

C. Coordination of Work: Coordinate ceiling work with installers of related work including, but not limited to building insulation, wet work i.e. gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical ceiling units to project site in original unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination or other causes.

B. Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way. Minor damages may be repaired, provide finish items are equal in all respects to new work and acceptable to Architect; otherwise, remove and replace damaged items as directed.

1.5 PROJECT CONDITIONS

A. Space enclosure - Do not install interior acoustical ceilings until space is **enclosed and weather-proof**, until wet work in space is completed and nominally dry, until work above ceilings is completed, and until ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy (between 50 degrees F and 86 degrees F; relative humidity should not fall below 25 percent or exceed 55 percent.)

1. Gridwork is acceptable to be installed, however, no tile is to be installed until the above conditions are met.

B. Before installing acoustical ceiling units, permit them to reach room temperature and stabilized moisture content.

1.6 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered.**

1.7 WARRANTY

A. Acoustical Panel: Submit a written warranty executed by the manufacturer,

agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:

1. Acoustical Panels: Sagging and warping

2. Grid System: Rusting and manufacturer's defects

B. Warranty Period:

1. Acoustical panels: minimum ten (30) years from date of substantial completion.

2. Grid: minimum ten (10) years from date of substantial completion.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full size tiles in sealed boxes – furnish in the following quantities:

a. All types: 5% or 1 full carton, which ever is more

2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component system equal to 1.0 percent of quantity installed.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Armstrong World Industries (basis of design)

B. USG Corporation

C. CertainTeed Ceilings

2.2 ACOUSTICAL CEILING UNITS – EXPOSED SUSPENSION

A. General: Where units less than 6 inches wide would occur at edges of room with 24 X 24 inch pattern, provide 24 X 48 inch panels cut to extend to wall, eliminating the tee near the wall.

B. ACT – Type 1: Acoustical Ceiling Tile, 9/16”, beveled tegular edge:

1. NRC – 0.85; CAC – 35

a. 2’ x 2’ x 1” Ultima 2082 by Armstrong. White
b. Or equal by the approved manufacturers

C. ACT – Type 2: Acoustical Ceiling Tile, 9/16”, tegular edge:

1. NRC – 0.85; CAC – 35

a. 2’ x 2’ x 1” Calla 2824 by Armstrong. Custom color as selected by Architect.

b. Or equal by the approved manufacturers

2.3 INDIRECT LIGHT COVES PERIMETER SYSTEM – CEILING TO WALL

A. Axiom model number AXIDLCW4610 by Armstrong World Industries or equal.

1. Face Profile: 9/16”
2. Profile Type: Perimeter Trim
3. Component Type: 2-sided Perimeter Pocket with preformed inside corners.
4. Description: 10" Indirect Light Cove w/slots – Ceiling to Wall
5. Compatible with Division 26 specified light fixtures.

B. System: An extruded aluminum light cove system fully concealed integrated design to create a light cove profile with integrated Axis Lighting Cove Perfekt, Vode Lighting ZipWAVE or Litecontrol 17L light fixture, installs with Armstrong® Ceiling Solutions acoustical and drywall suspension systems. Commercial quality extruded aluminum alloy 6063 trim channel, factory finished in baked polyester paint (white) color to match intersecting grid system. Commercial quality aluminum unfinished t-bar connection clips; galvanized steel splice plates.

2.4 CEILING SUSPENSION MATERIALS – EXPOSED

A. General: Comply with ASTM C635, as applicable to type of suspension system required for type of ceiling units indicated. Coordinate with other work supported by or penetrating through ceilings, including light fixtures and HVAC equipment.

1. Structural Class: Intermediate-duty.

B. Attachment Devices: Size for 5 times design load indicated in ASTM C635, Table 1 Direct Hung. Hanger Wires-galvanized carbon steel, ASTM A641, soft temper, prestretched, yield-stress load of at least 3 times design load, but not less than 12 gage (0.106").

C. Edge Molding: provide manufacturer’s standard wall angle (7/8” hemmed angle molding – depending on grid) for edges of ceiling of material and finish to match exposed tee flanges in same space.

D. Exposed Suspension System: Manufacturer's standard exposed tees, cross tees and accessories of types indicated, with exposed cross tees coped to lay flush with main runners.

1. Hot dipped galvanized steel on all surfaces of ceiling suspension system, including mouldings, trim and accessories unless noted otherwise.

E. Suspension System:

1. For Acoustical Ceilings (9/16" grid:

a. Suprafine XL 9/16" Exposed Tee Grid System by Armstrong.

b. Or equal by the approved manufacturers

c. Provide white at ACT – Type 1 Ultima Ceiling Tile.

d. Provide custom color to match ACT – Type 2 Calla Ceiling Tile.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Installer must examine conditions under which acoustical ceiling work is to be performed and must notify Contractor in writing of unsatisfactory conditions. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to installer.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling – in accordance with approved coordination layout drawing.

3.3 INSTALLATION

A. General: Install materials in accordance with manufacturer's printed instructions and to comply with governing regulations, fire resistance rating requirements as indicated, and industry standard applicable to work.

B. Exposed suspension:

1. Install suspension system and panels in compliance with ASTM C636; CISCA Seismic Guidelines; approved construction drawings; with the authorities having jurisdiction; and in accordance with the manufacturer's installation instructions.

2. Locate hangers near each end and spaced maximum 4' - 0" along each main tee and as required by UL assembly unless otherwise indicated, leveling to tolerance of 1/8" in 12' - 0". Provide extra hangers and carrying channels as required to support weight at lighting fixtures, duct outlets, and other ceiling mounted items. Install hanger wires plumb and straight.

3. Install edge mouldings of type indicated at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units. Attach mouldings to substrate at intervals not over 16" o.c. and not more than 3" from ends, leveling with ceiling suspension system to tolerance of 1/8" in 12' -0". Miter corners accurately and connect securely.

4. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

3.4 CLEANING

A. Clean exposed surfaces of acoustical ceilings, including trim, edge mouldings and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage.

1. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage at no cost to the Owner.

END OF SECTION

SECTION 09 65 10 – RESILIENT TILE FLOORING

PART 1 – GENERAL

1.1 SUMMARY

A. Extent of resilient base and accessories is shown on Drawings and in schedules. Work includes the following:

1. Cove Base
2. Millwork Wall Finishing System
3. Finish accessories for a complete installation.
4. Resilient Tile Flooring is not included in this project.
5. Locations of all base materials are as indicated on the Drawings. Colors shall be as shown on the drawings.

1.2 SUMBITTALS

A. Product Data: Provide Safety Data Sheets for each base and adhesives.

B. Samples: Submit sample of each type, color and finish of rubber base and accessory required, indicating full range of color and pattern variation. Provide 6" long sample of accessories.

C. Maintenance Instructions: Submit 2 copies of manufacturer's recommended maintenance practices for each type of base required.

1.3 QUALITY ASSURANCE

A. Manufacturer: Provide each type of rubber base and accessories as produced by a single manufacturer, including recommended primers, adhesives and sealants.

1.4 PROJECT CONDITIONS

A. Maintain minimum temperature of 65 degrees (18 Celsius) in spaces to receive rubber base for at least 40 hours prior to installation, and during installation. Subsequently, maintain minimum temperature 55 degrees (13 Celsius) in areas where work is completed.

B. Install rubber base and accessories after other finishing operations, including painting, have been completed.

1.5 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered.**

1.5 WARRANTY

A. Provide manufacturer's standard finish and wear warranties for all products.

1.6 MAINTENANCE

A. Extra Stock:

1. After completion of work, deliver to project site replacement materials from manufactured lot as materials installed.

2. Provide not less than one box of tile flooring for each 50 boxes or fraction thereof, for each type, size, and color installed.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Rubber Base:
1. Johnsonite, Inc. (Tarkett)

2. Or equal

2.2 RUBBER BASE AND ACCESSORIES

A. Resilient Base (RB-1):
1. References: The base shall conform to the requirements of ASTM F 1861, Type TS, Group I (solid).

2. Provide the following:

   a. “Traditional Cove Base” wall base as manufactured by Johnsonite, Inc.

   b. Or equal

3. Description: 1/8 inch thick standard top-set cove.

4. Base over VCT/SDT/concrete: coved bottom

5. Base over carpet: straight bottom

6. Height:

   a. RB-1: 6”.

7. Lengths: **In coils / rolls to limit joints. Provide pre-formed inside and outside corners.**

B. Resilient Base (Mill Base - MRB-1, 2 and 3):

1. References: The base shall conform to the requirements of ASTM F 1861, Type TP, Group I (solid).

2. Provide the following:

   a. “Millwork Wall Finishing System – Ledge 6” Profile” MWB-1, MWB-2 and MWB-3 - decorative wall base (thermoplastic rubber) as manufactured by Johnsonite, Inc. or equal.

      (1) Description: 0.35″ thick by 6″ height.

      (2) Lengths: 8 foot sticks
      (3) Colors: As indicated on the drawings.

C. Adhesives (Cements):

1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

   a. Base Adhesives: provide equal to Johnsonite 960 Cove Base Adhesive (equal to Johnsonite 946 Premium contact adhesive on non-porous surfaces) or as recommended by manufacturer to fully satisfy warranty.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Installer must examine surfaces to determine that they are satisfactory. A satisfactory surface is defined as one that is smooth and free from cracks, holes, ridges, and coatings preventing adhesive bond, and other defects impairing

performance or appearance.

3.2 PREPARATION

A. Prepare wall surfaces as follows: Provide smooth surface and remove foreign materials which could interfere with adhesion.

3.3 INSTALLATION

A. Accessories:

1. Apply resilient base to walls in rooms or areas where base is required. Install base in lengths as long as practicable, with pre-formed outside corner units, and with mitered or coped inside corners. Tightly bond base to backing throughout length of each piece, with continuous contact at horizontal and vertical surfaces.

a. On irregular surfaces, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.

2. Apply edge strips where shown on drawings and at all exposed edges of resilient flooring. Secure units to substrate in compliance with manufacturer's recommendations.

3.4 CLEANING

A. Perform following operations immediately upon completion of resilient flooring:

1. Remove any excess adhesive or other surface blemishes, using appropriate cleaner recommended by resilient flooring manufacturers.

END OF SECTION

SECTION 09 66 23 – EPOXY TERRAZZO

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes:

1. Epoxy terrazzo with divider and accessory strips including preparation of substrates.

2. Cast metal floor lettering installed integrally with terrazzo flooring is included in this Section.

B. Related Sections include the following:

1. Division 3 Section “Cast in Place Concrete”.
2. Division 7 Section “Joint Sealants”.
3. Division 9 Section “Tiling”.
4. Division 9 Section “Carpeting”.

1.2 SUBMITTALS

A. Product Data: Terrazzo Contractor shall submit Product Data for each type of product required for installation including:

1. Strip materials.

2. Sealer.

B. Shop Drawings: Terrazzo Contractor shall prepare and submit Shop Drawings that include plans, elevations, sections, component details and attachments to other work. Include terrazzo installation requirements. Show layout of the following:

1. Divider strips.

2. Expansion joint strips.

3. Accessory strips.

4. Terrazzo patterns.

C. Samples for Initial Selection: Terrazzo Contractor shall submit NTMA “Color Palette Brochure” showing full range of colors and patterns available for each terrazzo type.

D. Samples:

1. Terrazzo Contractor shall prepare and submit a maximum of three samples, sizes 12 by 12 inches for each color and type of terrazzo specified.

E. Qualification Data: Terrazzo Contractor shall submit two copies of qualification data.

1. Include list of projects indicating name and location of project, name of Owner, name and contact information for General Contractor, and name and contact information for Architect.

2. Include letter from NTMA with the name of the Project and name of member, stating current member status.

F. Material Certificates:

1. Epoxy Resin: For each type of resin required indicating that materials meet specification requirements, by manufacturer.

2. Aggregate: For each type of aggregate required indicating compatibility with terrazzo mix, signed by aggregate supplier.

G. Maintenance Literature: Terrazzo Contractor shall submit two copies of maintenance recommendations from NTMA.

1.3 QUALITY ASSURANCE

A. Acceptable Suppliers: A firm experienced in manufacturing products in accordance with NTMA standards and with a record of successful in-service performance, as well as sufficient production capacity to produce required materials.

B. Acceptable Terrazzo Contractor: Terrazzo Contractor shall be a Contractor Member of NTMA and shall perform all work in accordance with NTMA standards. If Terrazzo Contractor is not a Member of NTMA, they shall submit a list of competed projects within the past 5 years of similar magnitude, scope, and complexity.

C. Terrazzo Standards: Terrazzo Contractor shall furnish materials to comply with the applicable provisions and recommendations of the National Terrazzo and Mosaic Association, Inc. (NTMA) for all terrazzo types as specified.

D. Source Limitations for Aggregates: Materials for each color, grade, type and variety of granular materials shall be obtained from sources capable of providing materials consistent quality in appearance and physical properties. Materials furnished shall meet NTMA Specifications.

E. Material Manufacturers' Instructions: In addition to specified requirements, Terrazzo Contractor shall comply with manufacturers' instructions and recommendations, including preparation of substrate, storing, mixing and applying materials, finishing and curing of monolithic terrazzo work.

F. Mockups: Terrazzo Contractor shall construct a minimum 5'x5' mockup to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

G. Pre installation Conference: The General Contractor shall conduct a conference at project site before Terrazzo Contractor begins installation.

1. The General Contractor shall invite Terrazzo Contractor, the Architect and representatives of the Owner.

2. Review methods and procedures related to terrazzo including, but not limited to, the following:

a. Inspect and discuss condition of substrate and other preparatory work performed by other trades.

b. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.

c. Review terrazzo mixes and patterns.

d. Review custom terrazzo mixes, designs and patterns.

e. Coordination with the work of other installers.

1.4 PERFORMANCE REQUIREMENTS

A. Epoxy Resin:

1. Test Specimens: Mix resin materials according to manufacturer's recommendation without aggregate added and cure for 7 days at 75 degrees plus or minus 2 deg. F and 50 percent plus / minus 2 percent relative humidity.

2. Cured test specimens shall meet or exceed the following requirements:

a. Hardness: 60 to 85 per ASTM D 2240, Shore D.

b. Minimum Tensile Strength: 3000 psi per ASTM D 638 for a 2-inch specimen made using a “C” die per ASTM D 412.

c. Minimum Compressive Strength: 10,000 psi per ASTM D 695, Specimen B cylinder.

d. Chemical Resistance: No deleterious effects by contaminants listed below after seven-day immersion at room temperature per ASTM D 1308.

(1) Distilled Water.

(2) Mineral Oil.

(3) Isopropanol.

(4) Ethanol.

(5) Soap solution at 1 percent.

(6) Sodium hydroxide at 10 percent solution.

(7) Hydrochloric acid at 10 percent solution.

(8) Hydrochloric acid at 30 percent solution.

(9) Detergent Solution at 0.025.

(10) Acetic Acid at 5 percent solution.

B. Epoxy Resin with Aggregate:

1. Test Specimens:

a. Mix epoxy resin according to manufacturer's recommendations and blend one volume of epoxy resin with 3 volumes of marble aggregate, consisting of:

(1) 60 percent No. 1 chip.

(2) 40 percent No. 0 chip.

b. Grind and grout with epoxy resin finished to a nominal 1/4-inch thickness.

c. Cure specimens 7 days at 75 deg. F plus / minus 2 deg. and 50 percent plus / minus 2 percent relative humidity.

2. Cured epoxy terrazzo specimens shall nominally meet the following requirements:

a. Flammability: Self- extinguishing, extent of burning 1/4 inch maximum according to ASTM D 635.

b. Coefficient of Linear Thermal Expansion: 0.000025 inch/inch per deg F for temperature range of minus 12 to plus 140 deg F per ASTM D 696.

c. Bond Strength of Epoxy Terrazzo: 300 psi in concrete according to ASTM D7234 (modified to cut slightly into concrete).

1.5 DELIVERY, STORAGE AND HANDLING

A. Materials shall be delivered to Project site in supplier's original wrappings and containers, labeled with source or manufacturer's name, material or product brand name, and lot number if any.

B. Materials shall be stored in their original, undamaged packages and containers, in a location where they will not be exposed to direct sunlight.

1. Epoxy components shall be stored in a space where the ambient temperature can be maintained 60 and 90 deg. F before use.

1.6 PROJECT CONDITIONS

A. Protect adjacent spaces from damage during installation.

B. Maintain ambient temperatures in the area to receive terrazzo at not less than 60 deg. F.

C. Maintain adequate ventilation in the area to receive terrazzo.

D. Protect other adjacent work from water and dust generated by grinding operations.

1.7 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.7 WARRANTY

A. One year from date of substantial completion of terrazzo installation.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Epoxy Resin Matrix: Two-component, high solids product complying with specified performance requirements.

B. Color: As required for mix indicated.

C. Primer: Terroxy Primer or Terroxy Moisture Vapor Primer (for slabs on-grade or light weight and green concrete).

D. Aggregates: Marble, glass, and synthetic.

1. Comply with NTMA gradation standards.

2. Abrasion and Impact Resistance: Loss of 40 percent or less when tested according to ASTM C 131 (LA Abrasion).

3. Aggregates shall contain no deleterious or foreign matter.

E. Divider Strips: ZINC

1. Material: White Zinc or brass as selected by Architect during the shop drawing submittal phase.

a. Type: “L” Strips, 3/8” width x 1/2” depth

b. Gauge: 16 gauge

c. Top Thickness: 1/8” thick

2.2 ACCESSORIES

A. Sealer: Terrazzo Contractor shall provide a non-ambering, clear sealer that is chemically neutral; does not impair terrazzo aesthetics or physical properties; is recommended by terrazzo matrix manufacturer.

1. Solvent Based Sealer Properties: Flashpoint at 80 deg. F or above according to ASTM D 56.

B. Crack Suppression/Isolation Membrane: As recommended, produced and supplied by approved terrazzo resin formulator, having minimum 120 percent elongation potential per ASTM D 412.

2.3 METAL INLAID FLOOR LETTERS

A. General: Provide cast metal letters designed for integral installation within epoxy terrazzo flooring and grinding flush as part of the terrazzo finish system.

B. Material:

1. Cast bronze or cast brass suitable for terrazzo applications.

2. Stainless steel is not permitted unless specifically approved by Architect.

C. Thickness: Minimum 3/8 inch; 1/2 inch preferred to accommodate grinding and polishing.

D. Edges: Vertical or slightly drafted sides; free of sharp edges, fins, voids, or casting defects.

E. Finish: As-cast or light satin polish suitable for terrazzo grinding; mirror-polished finishes are not permitted.

F. Fabrication: Provide letters sized and proportioned to maintain minimum 3/8-inch stroke width after grinding.

G. Submittals: Include shop drawings indicating letter layout, font, size, thickness, and setting depth coordinated with terrazzo patterns and divider strips.

2.4 MIXES

.

A. Color No. 1 (TZ1): Lighter Value

1. Epoxy Color Pigment: Match Sherwin-Williams SW 0037 Morris Room Grey

a. Chips: No. 0 size; Heritage Glass Terrazzo Chips: Mirror, 20%
b. Chips: No. 0 size; T & M Turkish Chips: Pure White, 30%
c. Chips: No. 0 size: T & M Turkish Chips: Boston Cream, 30%
d. Chips: No. 0 size: T & M Turkish Chips: Jersey Cream, 20$

B. Color No. 2 (TZ2): Darker Value

1. Epoxy Color Pigment: Match Sherwin-Williams SW7525 Tree Branch

a. Chips: No. 0 size; Heritage Glass Terrazzo Chips: Mirror, 20%
b. Chips: No. 0 size; Heritage Glass Terrazzo Chips: Plum 7, 7%
c. Chips: No. 0 size: T & M Turkish Chips: Botticino Beige, 20%
d. Chips: No. 0 size: T & M Turkish Chips; Boston Cream, 20%
e. Chips: No. 0 Size: T & M Turkish Chips: Jersey Cream, 30%

C. To comply with BABA – Build American / Buy American, furnish Gass Chips and Turkish Chips, provide U.S. quarried aggregates of similar color/size distribution.

D. All aggregates, pigments and divider strips shall be U.S. manufactured.

PART 3 – EXECUTION

3.1 EXAMINATION

A. The General Contractor, Architect, and Construction Manager shall examine substrates and areas, with Terrazzo Contractor present, for compliance with requirements for installation tolerances and other conditions affecting performance of the work.

1. Slab Flatness Tolerance: Subfloor is not to vary more than 1/4 inch from true plane in a 10 foot span.

2. Cracks: Locate cracks and joints in concrete substrates. Verify location of control joints and expansion joints in epoxy terrazzo flooring.

    a. If required to prevent cracks in concrete substrates transmitting through epoxy terrazzo flooring, the Terrazzo Contractor shall make a written recommendation to install a crack suppression membrane and include specific recommendations on type and location.

B. Retain the services of an independent testing laboratory to verify that concrete substrates are dry by one of the methods below and moisture-vapor emissions are within acceptable levels according to epoxy resin manufacturer's written instructions.

    1. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

    2. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application of resinous flooring only after substrates have maximum moisture-vapor-emission rate of 3 lbs. of water/1000 sq. ft. of slab area in 24 hours.

    3. If required to prevent moisture vapor transmission in concrete substrates, the Terrazzo Contractor shall make a written recommendation to install moisture mitigation materials and include specific recommendations on type and location.

C. Correct non-conforming concrete substrates using materials compatible with epoxy terrazzo flooring system and as approved by the Terrazzo Contractor.

    1. Materials used to correct nonconforming conditions must be compatible with the selected epoxy system and be approved by the manufacturer of epoxy resin materials and Terrazzo Contractor.

D. Terrazzo Contractor shall proceed with installation only after unsatisfactory conditions, including flatness tolerances, cracking, and excessive moisture vapor transmission have been corrected. Start of installation is acceptance of all conditions.

3.2 PREPARATION

A. Broom clean area to receive terrazzo to remove loose chips and all foreign matter.

B. Mechanically abrade concrete surface.

C. Provide/install flexible epoxy crack isolation/suppression membrane:

3.3 POURED-IN-PLACE TERRAZZO INSTALLATION

A. Strip Materials: Terrazzo Contractor shall install strip materials as follows:

    1. Divider and Control-Joint Strips:

        a. Locate divider strips in locations indicated.

b. Install control joint strips back to back in locations indicated.

c. Install strips in epoxy adhesive without voids below strips.

2. Accessory Strips: Install as required to provide a complete installation.

B. Metal Inlaid Letter Installation:

1. Install cast metal letters during terrazzo placement in locations indicated on Drawings and approved Shop Drawings.

2. Set letters securely and rigidly, slightly proud of finished floor elevation to allow grinding flush.

3. Place terrazzo tightly around letters to eliminate voids and ensure full bond.

4. Grind and polish letters flush with adjacent terrazzo surfaces as part of the normal terrazzo finishing sequence.

5. Finished installation shall be smooth, level, and free of lippage, cracking, edge separation, or visual telegraphing.

C. Placing Terrazzo:

1. Prime subfloor in accordance with manufacturer's recommendations.

2. Proportion and thoroughly blend the materials.

3. Place mixture to achieve specified thickness.

D. Poured in Place Terrazzo Base: Terrazzo Contractor shall provide mix color for terrazzo base to match approved sample.

1. Terrazzo Contractor shall place and finish terrazzo base at the same time the terrazzo floor is being installed.

E. Finishing: Terrazzo Contractor shall finish the terrazzo topping as follows:

1. Rough Grinding:

a. Grind with 24 or finer grit stones or with comparable diamond abrasives.

b. Follow initial grind with 60/80 grit stones or with comparable diamond abrasives.

2. Grouting:

a. Clean terrazzo with clean water and rinse. Allow to dry.

b. Apply epoxy grout per manufacturer's instructions.

c. Allow grout to cure.

3. Fine Grinding/Polishing: Grind with 120 grit or with comparable diamond abrasives until all grout is removed from surface.

F. Terrazzo Cleaning: Terrazzo Contractor shall clean finished terrazzo as follows:

1. Remove grinding residue from terrazzo surface.

2. Wash terrazzo surfaces immediately after final grinding of terrazzo flooring with water and allow surfaces to dry thoroughly.

G. Sealing: Terrazzo Contractor shall seal terrazzo according to sealer manufacturer's written instructions.

3.4 REPAIR

A. Terrazzo Contractor shall repair terrazzo areas that evidence lack of bond between topping and underbed according to NTMA's written recommendations.

3.5 PROTECTION

A. After application of the sealer, the Work shall be ready for final inspection and acceptance by the Owner or his agent.

B. Protect the finished floor after the Terrazzo Contractor has completed final grinding and applied sealer to terrazzo surfaces.

END OF SECTION

SECTION 09 68 13 – CARPETING

PART 1 – GENERAL

1.1 SUMMARY

A. The extent of carpeting is indicated on the Drawings and the Specifications, and is defined to include carpet and accessories.

1. Modular carpet – direct glue-down installation

B. Related Sections include the following:

1. Division 9 Section “Tiling”
2. Division 9 Section “Epoxy Terrazo”
3. Division 9 Section “Resilient Tile Flooring”

1.2 SUBMITTALS

A. Shop drawings showing layout of carpet, accessory type and location.

B. Written warranty as specified herein.

C. Manufacturer's descriptive data.

D. Flame Spread Test Reports or Radiant Panel Test to verify the meeting of the various requirements specified herein.

E. Samples: Submit 18 inch x 36 inch samples of each carpet required, and 6" lengths of exposed edge stripping.

F. Product Data: Provide Safety Data Sheets for carpet adhesives.

G. Manufacturer's certificate stating that carpet furnished, identified by register numbers was manufactured according to these specifications.

1.3 QUALITY ASSURANCE

A. Installer: Firm with not less than 5 years of carpeting experience, similar to work of this section.

B. Manufacturer: Major Firm (carpet mill) which has not less than 5 years of production experience with carpet similar to types specified in this section; and whose published product literature clearly indicates compliance of products with requirements of this section.

C. General Standard: "Carpet Specifier's Handbook" by the Carpet and Rug Institute; comply with recommendations which can be reasonably applied to types of carpeting work required.

D. Flammability: Flooring Radiant Panel ASTM E 648 (Glue Down) – NFPA Class I and DOC-FF-1-70.

E. Flame Spread Rating: Carpeting shall have flame spread rating of 75 or less in accordance with ASTM Spec. E84-68, Standard Method of Test for Surface Burning Characteristics of Building Materials or pass the National Bureau of Standards Radiant Panel Test.

F. Smoke Density: ASTM E662, Less than 450

G. Static Propensity: AATC-134 Under 3.5 KV

H. Carpet Identification: Provide hang tag, or other suitable method, to identify carpet delivered as to manufacturer (or supplier), and style.

I. Maintenance Materials: Deliver 1 carton of each modular carpet

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver carpeting material in protective wrapping, and store inside, protected from weather, moisture and soiling.

1.5 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.5 WARRANTY

A. Provide manufacturer’s standard lifetime commercial warranty.

B. Carpeting (all):

1. Lifetime Limited Warranty, Including Face Wear, Colorfastness, Moisture Barrier, Delamination, Tuft Bind, Unraveling, and Static Protection

PART 2 – PRODUCTS

2.1 MATERIALS

A. Carpet - General:

1. Color and Pattern: as indicated on Drawings.

2. Substitutions: Substitutions are not permitted during bidding and will be considered only after award in accordance with Section 01 25 00.

B. CPT-1:

1. "Terra 00845" Product Style: Introspective 10677, Forage Collection, Non-woven synthetic backing as manufactured by Patchcraft.

a. Construction: Multi-Level pattern cut/loop

b. Yarn: EcoSolution Q100 Nylon

c. Dye Method: 100% solution dyed

d. Product Size: 18 inch x 36 inch

e. Tufted Yarn Weight: 27 oz/yd^2

f. Machine Gauge: 1/10 inch

g. Stitches per inch: 9.67

h. Pile Density: 10921 oz/yd^3

2.2 ACCESSORIES

A. General: Provide accessories as indicated on Drawings and specified herein.

B. Installation Adhesive:

1. General: Ensure compatibility with manufacturer for complete warranty.

2. Use adhesive as recommended by the manufacturer.

C. Miscellaneous Materials: As recommended by manufacturers of carpet, and other carpeting products; and selected by installer to meet project circumstance and requirements.

PART 3 – EXECUTION

3.1 PREPARATION

A. Flooring Contractor must examine substrates for moisture content and other conditions under which carpeting is to be installed, and notify Architect in writing of conditions detrimental to proper completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

B. Verify that substrates are dry and free of curing compounds, sealers, and hardeners. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacture. Clear away debris and remove any cementitious deposits, and other foreign matter which could interfere with adhesive bond, from surfaces to receive carpeting; vacuum clean immediately before installation. Do not use solvents.

C. Moisture testing:

1. Proceed with installation only after substrates pass testing. ASTM F2170 (relative humidity) test must be completed on both carpet areas.

a. Provide 1 test (RH) for each space to receive carpet. If space is over 1,000 sq. ft., provide an additional test of each type in the space.

b. Perform relative humidity test using in-situ probes, ASTM F 2170. Moisture Vapor Emission Rate (MVER) results must not exceed the following:

1) 90%

c. A pH test for alkalinity must be conducted. If the test results are not within the acceptable range, the installation must not proceed until the problem has been corrected. Results should be the following:

1) Maximum of 9

d. Do not proceed with flooring installation until substrates pass testing and results of moisture tests are acceptable. All test results shall be documented and retained.

D. Sequence carpeting with other work so as to minimize possibility of damage and soiling of carpet during remainder of construction period.

3.2 INSTALLATION

A. General:

1. Pre-ventilate carpet. Unroll and air out carpet in a well-ventilated, uninhabited space for a minimum of 5 hours prior to installation.

2. Provide maximum ventilation during installation.
3. Isolate area of installation from rest of building.

4. Comply with manufacturer's instructions and recommendations; maintain uniformity of direction and lay of pile.

5. Extend carpet under open-bottomed obstructions and under removable flanges and furnishings, and into adjoining alcoves and closets of each space.

6. Provide cut-outs where required, and bind cut edges properly where not protected by edge guards or overlapping flanges.

7. Install carpet metal trim where edge of carpet is exposed; anchor guards to substrate.

B. Glue-down Installation:

1. Fit sections of carpet into each space prior to application of adhesive.

2. Apply adhesive uniformly to substrate in accordance with manufacturer's instructions. Butt carpet edges tightly together to form cemented seams without gaps. Roll lightly to eliminate air pockets and ensure uniform bond. Remove adhesive promptly from face of carpet.

3.3 CLEANING

A. Remove debris, sorting pieces to be saved from scraps to discarded.

B. Clean new carpet thoroughly with a high-efficiency particulate air (HEPA) filtration vacuum.

C. Remove spots and replace carpet where spots cannot be removed.

3.4 PROTECTION

A. Contractor to use protection methods and materials needed to ensure that carpeting will be without deterioration or damage at time of completion.

END OF SECTION

SECTION 09 72 00 - DIGITALLY PRINTED WALL CLADDING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section includes labor, materials and other services necessary to provide digital wall cladding as indicated as WPS on the Finish Key and Schedule.

B. Includes digitally printed rigid wall panels produced in the United States with permanent image protection suitable for commercial interior wall protection applications.

C. Conform with requirements of all Sections of Division 1, General Requirements, as it applies to the work of this Section.

1.2 RELATED SECTIONS

A. Division 9 – “Gypsum Board”.

1. Trims and accessories

2. Level 5 finish

1.3 REFERENCES

A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.

B. American Society for Testing & Materials (ASTM) & Various:
1. AST ASTM E 84-05 Standard Test Method for Surface Burning Characteristics of Building Materials. CLASS A
2. ASTM D5420 Gardner Impact Exceeds 198 inch pounds
3. ISO 14644 9:12 Standard Laboratory Practice for Quantifying Air Cleanliness by Particle Concentrations
4. CA 01350 Measures VOC Emissions
5. DIN IEC 60 167 Surface Resistance
6. ASTM G21 Fungi Resistance
7. ASTM D3273 Mold Resistance
8. ISO 62 Water Absorption
9. ASTM G154 UV Exposure
10. FDA Compliant
11. USDA Compliant
12. EN 684 Seam Strength Test (result 897 N/50 mm)

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's current printed product literature, specifications, installation instructions, and field reports in accordance with Submittal Procedures.

B. Shop Drawings: Submit shop drawings to indicate materials, details, and accessories in accordance with Submittal Procedures including but limited to the following:

1. Submit a layout diagram indicating the location of each panel and joining method.

C. Samples: Submit duplicate sample pieces of wall cladding material, as well as accessory pieces in accordance with Submittal Procedures.

D. Quality Assurance Submittals: Submit the following:

1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

2. Manufacturer's Instructions: Current published manufacturer's installation and maintenance instructions.

3. Manufacturer's Field Reports: Specified herein.

E. Closeout Submittals: Submit the following:

1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.

2. Warranty: 10 years from date of substantial completion.

1.6 QUALITY ASSURANCE

A. Installers shall be trained and certified by the manufacturer of the specified product or an approved equal, and shall have successfully completed at least three (3) similar installations of comparable size and complexity within the past five years.

B. Mock-ups: Install at project site a job mock-up using acceptable products and manufacturer approved installation methods. Obtain Owner's and Consultant's acceptance of finish color, texture and pattern, and workmanship standards.

1. Mock-Up Size: 4' x 4'.

2. Maintenance: Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.

3. Incorporation: Mock-up shall NOT be incorporated into final construction.

C. Source Qualification: Manufacturer shall have minimum 5 years' experience producing digitally printed rigid wall panels in the United States.

D. Pre-installation Meeting: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements.

1.7 DELIVERY, STORAGE & HANDLING

A. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

B. Deliver, store and handle digitally printed wall cladding panels in accordance with manufacturer's recommendations.

C. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

D. Store materials protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer. Panels should be stored flat and be pre-conditioned a minimum of 72 hours in ambient temperatures similar to the prevailing operational conditions.

E. Store panels in temperature controlled environments. Leave protective blue film on panel until ready to use.

F. Digitally printed wall cladding panels, adhesives and accessories must be stored in enclosed, dry conditions not subjected to freezing or excessive heat. Heat above 60C (140F) will distort and damage the material. Cold temperatures will make the material brittle and temperatures below -5C (23F) should be avoided during storage.

G. Do not stack items or pallets on top of the wall panels as this can damage the custom printed panels. Pallets should sit flat and level, and safety precautions be in place to protect the panels.

H. Panels and all materials are to be acclimated on site 72 hours prior to installation. HVAC is to be up and running with ambient temperatures between 20C (68F) and 27C (80F) through to 24 hours after installation.

I. Maintain air temperature and structural base temperature at between 20C (68F) and 27C (80F) for 72 hours before, during and 24 hours after installation.

J. Verify permanent HVAC is operational. If temporary heat is required, use electric or indirect heat sources. Do not use kerosene or propane in direct contact with the ambient air.

K. Verify other finishing operations, including painting, have been completed.

1.8 PROJECT CONDITIONS

A. Temperature Requirements: If storage temperature is below 20C (68F) the wall panel(s)

must be moved to a warmer place and allowed to reach this temperature before installation. For further information, refer to current Installation Guide.

B. Maintain air temperature and structural base temperature at flooring installation area between 20C (68F) and 27C (80F) for 72 hours before, during and 24 hours after installation.

C. Allow sufficient time for proper preparation, installation and curing.

D. Close spaces to traffic during installation until the installer is satisfied that the adhesive has set.

E. It is best practice to install the panels at the same time the artwork is scheduled to go in, not while there are still trades in the building. Verify other finishing operations, including painting, have been completed.

F. Verify permanent HVAC is operational. If temporary heat is required, use electric or indirect heat sources. Do not use kerosene or propane in direct contact with the ambient air.

G. Install panels in sequence.

H. Panels and all other materials must be checked for defects before installation. Do not install materials with visible defects.

I. Do not install near open heat sources (ovens, etc.). Stainless steel panels should be used in such areas.

1.9 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.10 WARRANTY

A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

B. Manufacturer’s Warranty: Submit, for Owner’s acceptance, manufacturer’s standard warranty document executed by authorized company official. Manufacturer’s warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

C. Warranty Period for wall panels shall be 10 years commencing on Date of Substantial Completion.

1.11 EXTRA MATERIALS

A. Provide extra materials of product and adhesives in accordance with Section 017800 - Closeout Submittals.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design – Altro – Whiterock® Digiclad Multi-Panel Mural System, matte finish, bespoke artwork, as indicated on Drawings and Finish Schedules.

B. BABA Compliance Requirement: The Basis-of-Design product is identified for design intent. Products furnished under this Section shall comply with the Build America, Buy America Act (BABA). Where the Basis-of-Design product cannot provide required documentation of compliance, Contractor shall notify the Architect and propose a U.S.-manufactured equivalent wall protection system meeting aesthetic, performance, durability, and installation requirements, subject to Architect approval.

2.2 DIGITALLY PRINTED PANELS

A. Product: Digitally printed rigid wall protection panels suitable for high-traffic commercial interiors, provided as multi-panel mural systems with factory-applied image and protective surface, installed as shown on Drawings

B. Substrate: Rigid polymer-based wall protection panels suitable for interior wall protection applications, minimum thickness as recommended by manufacturer for specified use, capable of resisting impact, moisture, and routine cleaning.

C. Image Protection: Digitally printed image shall be factory-applied and protected by an integral, non-porous, non-delaminating wear surface resistant to impact, abrasion, cleaning agents, and moisture.

D. Fire Rating: Class A per ASTM E84.

E. Artwork: Custom image as shown in Interior Elevations and Finish Schedule.

E. Manufacturer shall provide artwork proofing, panel layout, panel numbering, and seam coordination to ensure alignment of mural imagery across adjacent panels.

1. Manufacturer shall provide digital proofs and layout drawings for Architect's review and approval prior to fabrication.

2.3 ACCESSORIES – Including, but not limited to:

A. Joint Conditions: Provide concealed joints using factory-formed half-lapped panel edges or manufacturer-proprietary concealed joint profiles. Exposed joint strips shall be used only where concealed joints are not feasible or where specifically indicated on Drawings.

B. Refer to Division 9 "Gypsum Board" for wall covering trim accessories to be provided at full perimeter locations.

C. Adhesive: Manufacturer-recommended panel adhesive compatible with panel substrate and substrate conditions. Where permitted by manufacturer, adhesives may include FRP-grade or hybrid polymer adhesives such as Loctite PL Premium, Titebond Advanced Polymer, or manufacturer-approved equal.

D. Sealant: 100% silicone sanitary-grade sealant for panel perimeters and penetrations

2.4 SOURCE QUALITY

A. Obtain wall panels from a single manufacturer.

B. Product shall be fully manufactured in the United States, including substrate production, printing, coating, and finishing processes, and shall be eligible for Build America, Buy America Act (BABA) compliance.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog, installation instructions and product label instructions for installation.

3.2 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

3.3 SUBSTRATE PREPARATION

A. Walls should be smooth and level. Provide painted Level 5 gypsum finish at all areas to receive wall cladding.

B. Wall tiles must be fixed firmly to the wall. As long as the tile edges do not protrude you do not have to skim grout joints.

B. Surfaces must be permanently dry and free from all substances that may contribute to adhesive bond failure.

C. Remove loose paint and conduct an adhesive bond test with paint.

D. Exterior walls must be adequately damp-proofed and insulated.

3.4 PREPARATION

A. All surfaces must be free from dust and cleaned prior to panel installation. The working environment must also be dust free. Failure to comply with these conditions will reduce the bond strength between the adhesive and substrate and may cause the panels to de-bond.

B. Very absorbent / porous substrates (particularly plaster finishes and unprimed sheetrock) must have a manufacturer’s recommended sealer e.g. PVA primer or similar, applied to the surface a minimum of 12 hours prior to the installation.

C. All electrical switches, power points etc., should be in a first fix / installation state. All electrical equipment should only be moved or altered by a qualified electrician.

D. Do not drill holes through the panels unless required for equipment installation, drilled holes cannot be repaired.

F. All pipes, fixing bolts, etc. extending through the wall panels panels should have a minimum 1/8” (3mm) expansion gap and be sealed using manufacturer’s recommended sealant.

G. If fitting to door frames, these must be in place prior to installation of wall panels.

H. Prior to installation, it is advisable to complete any painting which comes in contact with wall panels, as sealant used at junctions is non-paintable.

I. Panels should be stored flat and be pre-conditioned a minimum of 72 hours in ambient temperatures similar to the prevailing operational conditions.

J. The panels must be stored on a level, flat surface off the ground (risk of condensation on the panels if stored on damp surfaces). Storage on uneven surfaces could cause the panels to distort prior to installation.

K. First, check the room using a 6’ (2 m) level to ensure all walls are flat, paying particular attention to the corners, window reveals, and door entrances. These need to be inspected to ensure they are free of any debris or irregularities, which could prevent the panels laying flat to the substrate after the adhesive has been applied and the panel installed.

3.5 INSTALLATION

A. Install wall panels in accordance with the manufacturer's recommended standards. All joints should be joined by approved methods as detailed in the approved shop drawings.

B. Dry fit all panels and joint-strips prior to installation to confirm image lines up. Care should be taken to protect the joint-strips and panels throughout the entire installation process.

C. Do not bevel, profile or chamfer the edges at seam locations, as this can damage the hard coat and printed image.

D. Do not heat weld images. This requirement must be requested during design phase of layout production to allow for proper production documents, and at time of ordering, as the surface hard coat will be offset.

E. Do not thermoform wall panels.

F. Do not drill holes through the panels unless required for equipment installation, drilled holes cannot be repaired.

3.6 FIELD QUALITY REQUIREMENTS

A. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

1. Site Visits: Manufacturer's representative shall be required to visit the site during the time of installation.

3.7 CLEANING

A. Wall panels can be cleaned using a soft cloth with minimal amount of mild diluted soap/detergent solution per manufacturer's recommendation.

B. When cleaning the panel surface, the temperature of water shall not exceed 60° C (140° F).

C. Do not use solvents such as acetone, MEK or toluene or strongly acidic or alkaline cleaning agents or abrasive agents that can scratch or stain the surface.

D. A clean water wipe-down using a soft damp cloth is recommended after cleaning. Wipe surface dry.

END OF SECTION

SECTION 09 80 13 – ACOUSTICAL TREATMENT

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes the following in locations where indicated on Drawings:

1. Fabric Wrapped Acoustical Wall Panels - AWP (Sound Absorbing Panels)
2. Direct Glue Felt Panels - AWP (Sound Absorbing Panels) – Direct glue acoustical wall panels for interior wall applications.
3. Cementitious Wood Fiber Acoustical Panels - Rigid Acoustical Panels.

B. Related Sections include the following:

1. Division 9 Section “Acoustical Panel Ceilings”
2. Division 9 Section “Gypsum Board”.
3. Division 9 Section “Non-Load Bearing Metal Framing”.

1.2 REFERENCES

A. ASTM C 423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2000.

B. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2000a.

1.3 PERFORMANCE REQUIREMENTS

A. Acoustical Absorption: Perform testing in accordance with ASTM C 423, Type A mounting method unless otherwise specified.

1. Flame Spread Rating: Provide all components with Class A flame spread rating when tested in accordance with ASTM E 84, unless otherwise specified.

1.4 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.
4. Independent testing agency test reports.

B. Selection Samples: For each product specified, two complete sets of color samples representing manufacturer's full range of available colors and patterns.

C. Verification Samples: For each product specified, two samples, minimum size 12 inches square, representing actual product, color, and patterns.

1. Certificates shall list manufacturing location and percentage of U.S. component cost.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 10 years of experience in producing acoustical products of the types specified herein.

B. Installer Qualifications: Acceptable to the manufacturer of the acoustical products being installed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect acoustical products from moisture during shipment, storage, and handling.

B. Store products in manufacturer's unopened packaging until ready for installation.

1. Store materials flat, in dry, well-ventilated space.
2. Do not stand panels on end.
3. Protect edges from damage.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 PROJECT CONDITIONS

A. Do not begin installation of acoustical products until building has been enclosed and environmental conditions approximate those that will prevail when building is occupied.

B. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

2. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 MANUFACTURERS FOR FABRIC WRAPPED ACOUSTIC WALL PANELS

A. Panel Fabric Facing – Basis of Design:

1. Duvaltex – Guilford of Maine FR701, Style 2100 Series.

2. Color: As selected by Architect from manufacturer's full color line and as indicated on the drawings.

3. Acceptable Substitutions: Other acoustically transparent woven fabrics may be submitted for review provided they meet or exceed all of the following:

   a. ASTM E84 Class A flame spread and smoke development.
   b. Acoustically transparent and suitable for wrapping fiberglass core panels.
   c. Match color, texture and weave of fabric (FR701 2100 Series) selected by Architect.
   d. Manufactured in compliance with Buy America, Build America (BABA) requirements.
   e. No vinyl-coated fabric or PVC-based materials allowed.

4. Where fabric colors shown on Drawings reference products not meeting BABA compliance, provide Duvaltex Guilford of Maine FR701 or approved equal fabric that provides a visually equivalent color match in hue, saturation, and lightness.

5. Submit 12" x 12" fabric samples for Architect review for color approval prior to fabrication.

6. Final fabric color match shall be verified in field mockup prior to production.

7. Color substitutions that do not achieve a visually equivalent match will be rejected. Digital or printed color charts are not acceptable for color evaluation.

B. Panel Fabricators:

1. Golterman & Sabo

2. Wenger Corporation

3. Armstrong World Industries

4. Acoustical Resources, Inc.

5. Other qualified manufacturers meeting requirements of this Section.

2.2 FABRIC WRAPPED ACOUSTIC WALL PANELS

A. Wrapped Fiberglass Acoustic Panels:

1. Core: 6 to 7 pcf fiberglass, resin-hardened edges.

2. NRC: Minimum 1.05 at 2-inch thickness per ASTM C423.

3. Fabric Finish: As specified in 2.1.A.

4. Panel Edges: Square.

5. Mounting: Impaling clips.

2.3 ACCESSORIES

A. Mounting

1. Adhesive: Water-based, heavy-bodied adhesive (low or no VOC) as recommended by manufacturer of acoustical panels.

2. Impaling Clips:. Manufacturer's standard 1.5 by 5 inches (38 by 127 mm) mounting clips designed for impaling back side of fiberglass units.

2.4 MANUFACTURERS FOR DIRECT GLUE FELT PANELS

A. Basis of Design:
MDC – Zintra® Textile Acoustic Wall Panels
Zintra Design Series – Design Loom
Color: Meadow, single sided
Website: www.mdcwall.com

B. Acceptable Manufacturers:

1. MDC – Zintra Textile Acoustic Wall Panels

2. Other U.S.-based manufacturers only if submitted as a substitution and approved by the Architect, and capable of matching appearance, texture, acoustic performance, and installation method of the Basis of Design product, and providing documentation of compliance with the Build America, Buy America Act (BABA).

2.5 DIRECT GLUE ACOUSTICAL PANELS

A. Product: Textile-faced acoustical wall panels consisting of a sound-absorptive core with factory-applied textile surface, designed for direct adhesive attachment to substrate.

B. Basis of Design: Zintra® Textile Acoustic Wall Panels by MDC, Design Loom pattern, Meadow color, as indicated on Interior Finish Schedules and Drawings.

C. Performance Requirements: Provide panels with NRC ratings as published by manufacturer for specified product configuration.

D. Installation: Direct glue application in accordance with manufacturer’s written instructions and approved shop drawings.

E. Accessories: Provide trims, edge conditions, and accessories as required for a complete installation.

F. Panel Size: As shown on Drawings.

G. Thickness: 1/2 inch (12 mm) minimum.

H Color/Pattern: As selected by Architect from full manufacturer line; match location and layout shown on Drawings.

1. Color shall match Architect’s selections indicated on Drawings and Finish Schedule.

2. Where substitutions are proposed under Paragraph 2.4.B.2, submitted products shall provide a visually equivalent match in hue, saturation, texture, pattern scale, and lightness, as determined by the Architect.

3. Submit minimum 12” x 12” samples for Architect’s review for color approval prior to fabrication.

4. Final color and pattern match shall be verified in field mockup prior to production.

5. Color or pattern that do not achieve a visually equivalent match will be rejected. Digital or printed color charts are not acceptable for color evaluation.

I. Surface: Smooth or digitally printed textile surfaces as offered by manufacturer.

J. Edges: Clean, square, factory-cut edges.

K. Mounting: Direct adhesive attachment in accordance with manufacturer’s written instructions. Mechanical attachment only where specifically indicated or approved by the Architect.

2.6 CEMENTITIOUS WOOD FIBER ACOUSTICAL PANELS

A. Manufacturers: Tectum - Armstrong as basis of design.

B. Panel description: Cementitious bonded wood fiber acoustical panels,1” thickness; size as indicated on the drawings; square edge profile, custom color to be selected by the Architect from manufacturers available colors.

C. Performance: NRC 0.85, fire (ASTM E84 Class A), sag and humidity resistant (Humigard Plus).

D. Accessories: Direct glue

2.7 ACCESSORIES FOR ACOUSTICAL WALL PANELS

A. Mounting

1. Adhesive: Water-based, heavy-bodied adhesive (low or no VOC) as recommended by manufacturer of acoustical panels.

2.8 PERFORMANCE REQUIREMENTS

A. Acoustic Performance: Noise Reduction Coefficient (NRC) per ASTM C423:

1. Direct mounted: NRC = 0.45 minimum.

B. Fire Performance:

1. ASTM E84 – Class A flame spread and smoke developed.

2. Material shall be thermally bonded polyester fiber; no added fire retardant coatings permitted.

C. Lightfastness: AATCC 16.3 Option 3; Color change ≤ 4.5 at 40 AFU.

D. VOC Emissions: Comply with CDPH Standard Method v1.2; ≤ 0.5 mg/m³ total VOC.

E. Moisture Resistance: < 0.03% weight gain after 96 hours at 120°F and 90% RH.

F. BABA Compliance: Product must be manufactured in the United States. Manufacturer shall provide a certification letter verifying compliance with Build America, Buy America Act (BABA) requirements for manufactured products (2 CFR 184).

PART3 – EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install acoustical wall panels only after verification of substrate conditions and field dimensions.

B. Layout:

1. Install panels true to lines and elevations indicated on Drawings.

2. Maintain consistent reveals and alignment at edges, corners, and joints.

3. Scribe panels neatly to fit around adjacent construction.

C. Adhesive Installation – Direct Glue PET Panels:

1. Use adhesive recommended by panel manufacturer; verify compatibility with gypsum board or substrate.

2. Apply adhesive per manufacturer’s spread rate and open time requirements.

3. Do not use construction adhesives that cause bleed-through, warping, or staining.

4. Apply firm, uniform pressure to ensure full adhesion without telegraphing.

5. Temporary bracing or supports shall be used as required until adhesive cures.

D. Fabric-Wrapped Panels:

1. Install using impaling clips, Z-clips, or mechanical systems as specified.

2. Panels shall be removable for maintenance without damage to adjacent finishes.

E. Field Quality Control:

1. Panels with visible gaps, bowed edges, glue bleed, or surface damage shall be rejected.

2. Replace damaged or non-conforming panels at no additional cost.

F. Color Control:

1. Do not mix dye lots on the same wall or adjacent walls visible as a group.

2. Install only panels from approved samples and mockups.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 09 90 00 – PAINTING AND COATING

PART 1 – GENERAL

1.1 SUMMARY

A. Extent of painting work is shown on drawings and schedules, and as herein specified.

B. Coordination:

1. This Section is intended to clearly define painting and coating requirements under the Architectural scope of work and to avoid duplication with civil and site-related specifications.

C. Related Sections include the following:

1. Division 9 Section “Gypsum Board”
2. Division 9 Section “Painting”
3. Division 9 Section “High Performance Coatings”
4. Division 9 Section “Elastomeric Coatings”
5. Division 9 Section “Concrete Sealer”
6. Division 13 Section “Pre-Engineered Structures”

D. Coating System Designations:

1. Coating systems identified as 1.1.C.3 through 1.1.C.5 apply exclusively to the Welcome Center Building and Pre-Engineered Structure as indicated on Architectural Drawing Sheets 8000 through 8905. These coating systems are not applicable to work shown on civil or site drawings.

2. Where conflicts occur between Sections 09 91 00 - Painting and 09 90 00 - Painting and Coating, the requirements of Section 09 90 00 – Painting and Coating shall govern for painting and coating work shown on Architectural Drawing Sheets 8000 through 8905, regardless of whether those drawings explicitly reference the applicable specification section.

E. The work includes painting and finishing of new interior and exterior exposed items and surfaces throughout project and backpriming of finish woodwork and cabinets, except as otherwise indicated.

1. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.

2. Field painting of exposed bare and covered pipes (including color coding) and ducts, steel and iron work and primed metal surfaces of equipment installed under mechanical and electrical work, except as otherwise indicated, is included.

F. "Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, varnishes, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

G. Following categories of work are not included as part of field-applied finish work, or are included in other sections of these specifications.

1. Shop Priming:

a. Unless otherwise specified, shop priming of ferrous metal items is included under various sections for structural steel, steel joists, metal fabrications, hollow metal work, and similar items. Also, for factory built mechanical and electrical equipment or accessories.

2. Pre-finished Items:

a. Unless otherwise indicated, do not include painting when factory-finishing or installer finishing is specified for such items as (but not limited to) windows, plastic laminate, acoustical materials and finished mechanical and electrical equipment, including light fixtures.

3. Concealed Surfaces:

a. Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, furred areas, pipe spaces, and duct shafts.

4. Finished Metal Surfaces:

a. Metal surfaces of anodized aluminum, stainless steel, chromium plate, bronze and similar finished materials will not require finish painting, unless otherwise indicated.

5. Operating Parts and Labels:

a. Moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts will not require finish painting, unless otherwise indicated. Do not paint over any code-required labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name or nomenclature plates.

6. Do not paint concrete or floors, unless specifically indicated.

7. Gypsum wallboard joint preparation is included in Gypsum Wallboard Section.

1.2 SUBMITTALS

A. Product Data:

1. Provide manufacturer's printed product data on all coatings specified, including preparation and application instructions.

B. Selection Samples:

1. Provide two sets of samples not less than one by two inches in size illustrating range of colors and textures available for each finishing product specified.

C. Verification Samples:

1. Provide two samples of not less than six inches square illustrating selected color and texture for each finishing product specified.

1.3 QUALITY ASSURANCE

A. Job Sample:

1. Prior to start of painting, paint full size field sample of each individual color scheduled on each respective substrate. Paint sample at site, where directed, of workmanship to be expected in the completed work. Obtain Architect’s acceptance of the sample before start of work. If sample is accepted, the sample may become part of the finished project.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label and following minimum information:

1. Name or title of materials

2. Manufacturer's name

3. Thinning instructions

4. Application instructions

5. Color name and number

B. Store paint products in covered, ventilated area at minimum ambient temperature of 45 degrees F and maximum ambient temperature of 90 degrees F.

1.5 PROJECT CONDITIONS

A. Apply water-base paints only when temperature of surfaces to be painted and surrounding air temperatures are between 50 degrees F. (10 Celsius) and 90 degrees F. (32 Celsius), unless otherwise permitted by paint manufacturer's printed instructions.

B. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45 degrees F. (7 Celsius) and 95 degrees F. (35 Celsius), unless otherwise permitted by paint manufacturer's printed instructions.

C. Do not apply paint in snow, rain, fog or mist; or when relative humidity exceeds 85%; or to damp or wet surfaces, unless otherwise permitted by paint manufacturer's printed instructions.

D. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.

1.6 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Paint Acceptable Manufacturers:

1. Sherwin-Williams Company (Basis of Design at specific locations)

2. Dunn Edwards (Basis of Design at specific locations)

a. Where Dunn Edwards is listed as the manufacturer on the drawings, Contractor to substitute equivalent Sherwin Williams paint products as referenced in the schedules below.

3. Benjamin Moore

4. PPG Paints

B. Unless otherwise specified for an individual product or material, supply all products specified in this section from the same manufacturer.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

2.3 MATERIALS

A. General: tint intermediate coat lighter than finish coat.

1. Note: some Series numbers are for extra white base, provide correct base for color selected.

B. Interior Gypsum Board Surfaces:

1. Coverage:

a. 1st Coat: Sherwin Williams ProMar 200 Zero-VOC Interior Latex Primer, B28W12600 Series (4.0 mils wet – 1.0 mil dry)

b. 2nd Coat: Sherwin Williams ProMar 200 Zero VOC Interior Latex Eg-Shel B20-Series (4 mils wet, 1.6 mils dry)

c. 3rd Coat:

(1) Flat: Sherwin Williams ProMar 200 Zero VOC Interior Latex Flat B30-Series (4 mils wet, 1.6 mils dry)

(2) Eg-Shel: Sherwin Williams ProMar 200 Zero VOC Interior Latex Eg-Shel B20-Series (4 mils wet, 1.6 mils dry)

(3) Semi-gloss: Sherwin Williams ProMar 200 Zero VOC Interior Latex Semi-Gloss B31-Series (4 mils wet, 1.6 mils dry)

2. 1 coat primer, 1 coat intermediate, and 1 topcoat finish required for all surfaces.

C. Interior Concrete Masonry Unit (CMU) Surfaces:

1. Coverage:

a. 1st Coat (Block Filler): Sherwin-Williams Pro Industrial Heavy Duty Block Filler, B42W150 (16.0 mils wet – 8.0 mils dry)

b. 2nd Coat: Sherwin-Williams ProMar 200 Zero VOC Eg-Shel, B20-Series; Apply at 4 mils WFT / 1.7 mils DFT.

c. Third Coat: Sherwin-Williams ProMar 200 Zero VOC Eg-Shel (or Semi-Gloss where scheduled), B20-Series; Apply at 4 mils WFT / 1.7 mils DFT

.2. Provide full 3-coat system (block filler + 2 finish coats). Semi-Gloss.

D. Interior Exposed HVAC Ductwork (Uncoated or Factory-Primed Metal):

1. Surface Prep: Clean with SSPC-SP 1 solvent wipe, remove oils from galvanized steel.

2. Pretreatment (Required for Galvanized Steel):
Sherwin-Williams Pro Industrial Pro-Cryl® Universal Primer, B66-310 Series
OR Sherwin-Williams Galvite HS (preferred for bare galvanized).

3. Intermediate Coat:
Sherwin-Williams Pro Industrial Acrylic, Semi-Gloss, B66-650Series.

4. Finish Coat:
Sherwin-Williams Pro Industrial Acrylic, Semi-Gloss, B66-650Series.

5. Color: As selected by Architect.

E. Interior Exposed Sprinkler Piping (Primed Steel):

1. Reference Standards: Painting of sprinkler piping shall comply with NFPA 13 and pipe manufacturer’s requirements.

2. Touch-Up Primer: Sherwin-Williams Pro Industrial Pro-Cryl® Universal Primer, B66-1300 Series.

3. Finish Coats (2-Coat System): Sherwin-Williams Pro Industrial Acrylic Enamel, B66 Series, Semi-Gloss.

4. Color: As selected by Architect; apply only to exposed piping where visible in finished areas.

5. Application Requirements:

a. Protect sprinkler heads from paint; remove any overspray immediately.

b. Do not paint hangers, escutcheons, valves, or identification labels.

c. Do not paint flexible sprinkler hose assemblies.

d. Do not use alkyd/oil-based coatings on sprinkler piping.

6. Color: Match Architect’s color sample. Apply only where exposed to view..

F. Interior Wood Doors (Painted Finish):

1. Semi-Gloss Finish:

a. Primer Coat: Sherwin-Williams Extreme Bond Primer, B51-1150 Series. Apply at 3.1 mils WFT / 1.0 mils DFT.

b. Intermediate Coat: Sherwin-Williams Pro Industrial Waterbased Alkyd Urethane, B53-Series (Semi-Gloss unless noted otherwise); Apply at 4.0 mils WFT / 1.4 mils DFT.

c. Finish Coat: Sherwin-Williams Pro Industrial Waterbased Alkyd Urethane, B53-Series (Semi-Gloss unless noted otherwise); Apply at 4.0 mils WFT / 1.4 mils DFT.

2. Color: Match Architect's color sample.

G. Pre-Engineered Metal Building – Galvanized Steel Components (Interior Exposed):

1. Surface Preparation:

a. Clean galvanized surfaces to remove oils and passivation per SSPC-SP1 Solvent Cleaning.

b. Prepare surfaces by sweep blasting or SP7 brush-off blast where possible.

2. Primer/Intermediate Coat: Sherwin-Williams Pro Industrial Waterbased Alkyd Urethane, B53-Series (Semi-Gloss unless noted otherwise); Apply at 4.0 mils WFT / 1.4 mils DFT.

3. Finish Coat: Sherwin-Williams: Sherwin-Williams Pro Industrial Waterbased Alkyd Urethane, B53-Series (Semi-Gloss unless noted otherwise); Apply at 4.0 mils WFT / 1.4 mils DFT.

4. System: Three-coat galvanized interior system (pretreatment + 2 finish coats).

5. Finish: Semi-Gloss.

6. Apply full DTM system approved for galvanized substrates.

H. Interior Stained Wood Veneer Panels (Clear Finish System):

1. Stain: Sherwin-Williams Minwax Performance Series Interior Oil Stain – color per Architect's schedule.

2. Sealer: Sherwin-Williams Minwax Performance Series Sanding Sealer.

3. Topcoats (2): Sherwin-Williams Minwax Performance Series Polyurethane Varnish.

4. Sheen: Match Architect's finish sample.

5. Sand lightly between coats.

I. Interior Stained Glu-Lam Beams (Treated Wood - Clear Finish System): Provide a complete **waterborne wood finishing system** compatible with preservative-treated glulam members. Do not mix oil-based and waterborne products.

1. Stain: Sherwin-Williams Wood Classics® Waterborne Interior Wood Stain, A23T00150 Series – color per Architect's schedule.

Note: Waterborne stains recommended for treated lumber; oil-based stains may not cure properly or may exhibit uneven absorption.

2. Sealer: Sherwin-Williams Wood Classics® Waterborne Sanding Sealer, A27T00110 Series (3.0 mils wet – 1.2 mils dry).

3. Topcoats (2): Sherwin-Williams Wood Classics® Waterborne Polyurethane Varnish, B73 Series (3.0 mils wet – 1.2 mils dry each).

4. Sheen: Satin, unless otherwise indicated.

5. Application:
   a. Ensure treated wood has equilibrated to interior humidity and moisture content ≤ 15%.

   b. Lightly sand to remove raised grain and surface residue.

   c. Apply stain evenly following wood grain; wipe off excess.

   d. Sand lightly between coats of sealer and topcoat.

6. Notes:

   a. Do not use oil-based stains or sealers over treated substrates.

   b. Provide field mockup on representative glulam substrate for Architect's approval prior to full application.

J. Interior CLT Wood Deck (Untreated Wood - Clear Finish System): Provide a complete **waterborne wood finishing system** compatible with untreated CLT decking. Do not mix oil-based and waterborne products.

1. Stain: Sherwin-Williams Wood Classics® Waterborne Interior Wood Stain, A23T00150 Series – color per Architect's schedule. Waterborne stains provide predictable curing and uniform absorption on mass timber substrates.

2. Sealer: Sherwin-Williams Wood Classics® Waterborne Sanding Sealer, A27T00110 Series (3.0 mils wet – 1.2 mils dry).

3. Topcoats (2): Sherwin-Williams Wood Classics® Waterborne Polyurethane Varnish, B73 Series (3.0 mils wet – 1.2 mils dry each).

4. Sheen: Satin, unless otherwise indicated.

5. Application:

   a. Ensure wood has equilibrated to interior temperature and humidity and has a moisture content not exceeding 12 percent.

   b. Lightly sand to remove raised grain and surface residue.

   c. Apply stain evenly following wood grain; wipe off excess.

d. Sand lightly between coats of sealer and topcoat.

6. Notes:

a. Do not use oil-based stains or sealers within this system.

b. Provide field mockup on representative CLT substrate for Architect's approval prior to full application.

K. Interior Metal paint system:

1. Semi-Gloss Finish (All Alkyd/Oil-Based):

a. 1st Coat: Sherwin-Williams Kem Kromik Universal Alkyd Primer, B50AZ6 (Gray) or B50WZ1 (White); Apply at 3.2-4.2 mils DFT

b. 2nd Coat: Sherwin Williams Sherwin-Williams ProMar 200 Alkyd Semi-Gloss, B34 Series; Apply at 4.0 mils WFT / 2.1 mils DFT.

c. 3rd Coat: Sherwin Williams ProMar 200 Interior Alkyd Semi-Gloss, B34W02251 Series (4 mils wet, 2.1 mils dry)

L. Exterior Metal paint system:

1. Gloss Finish:

a. Primer Coat: Sherwin-Williams Macropoxy® 646 Fast Cure Epoxy, B58 Series; Minimum 5.0-10.0 mils DFT.

b. Intermediate Coat: Sherwin-Williams Macropoxy 646 Fast Cure Epoxy, B58 Series; Minimum 5.0-10.0 mils DFT.

c. Finish Coat: Sherwin-Williams Pro Industrial Acrolon 100 Waterbased Polyurethane, B65 Series; Minimum 1.8-3.6 mils DFT.

2. Provide this paint system for all brick lintels and hollow metal frames and doors.

M. Exterior Stained Glu-Lam Beams (Treated Wood - Clear Finish System):

1. Stain: Sherwin-Williams SuperDeck® Exterior Waterborne Semi-Transparent Stain, A15T00354 Series – color per Architect's schedule.
Note: Waterborne formulation recommended for treated lumber; oil-based stains may fail to cure or may remain tacky.

2. Second Coat: Sherwin-Williams SuperDeck® Exterior Waterborne Semi-Transparent Stain, A15T00354 Series (apply one additional coat to end grain, checks, notches, and cut surfaces for full protection).

3. Clear Topcoat (Limited Use): Sherwin-Williams WoodScapes® Advanced Waterborne Polyurethane Varnish, Clear Satin, A27T00251 Series, applied in two coats at manufacturer's recommended film thickness (3.0 mils wet – 1.2 mils dry each).

a. Application permitted only where wood members are partially covered

and not subject to continuous wetting or direct rainfall exposure.

b. Application shall be only as recommended in writing by Sherwin-Williams for use over SuperDeck® Exterior Waterborne Semi-Transparent Stain on treated glulam substrates.

c. Provide written confirmation from Sherwin-Williams Technical Services that the complete stain + clear system is compatible with the specified substrates and exposure conditions.

d. Provide a field-applied mockup demonstrating adhesion and appearance; do not proceed without Architect's acceptance.

2. Application:

a. Allow pressure-treated lumber to air dry until moisture content is within coating manufacturer's published limits (typically ≤ 15 percent), prior to coating.

b. Clean surfaces of all treatment residue, dirt, and debris.

c. Sand lightly to remove mill glaze and promote adhesion.

d. Apply stain uniformly following wood grain in accordance with manufacturer's written instructions to achieve even penetration and appearance.

e. Sand lightly between clear topcoat coats, if applied, in accordance with manufacturer's instructions.

N. Exterior Stained CLT Wood Deck (Untreated Wood - Clear Finish System):

1. Stain: Sherwin-Williams SuperDeck® Exterior Waterborne Semi-Transparent Stain, A15T00354 Series – color per Architect's schedule.

2. Second Coat: Sherwin-Williams SuperDeck® Exterior Waterborne Semi-Transparent Stain, A15T00354 Series (apply one additional coat to end grain, checks, and cut surfaces for full protection).

3. Topcoats (2): Sherwin-Williams WoodScapes® Advanced Waterborne Polyurethane Varnish, Clear Satin, A27T00251 Series (3.0 mils wet – 1.2 mils dry each).

4. Sheen: Satin, unless otherwise indicated.

5. Application:

a. Allow CLT panels to acclimate and dry until moisture content is within coating manufacturer's published limits (typically ≤ 15 percent) prior to coating.

b. Clean surfaces of all dirt, debris, and surface contaminants.

c. Lightly sand surfaces to remove mill glaze and promote adhesion.

d. Apply stain uniformly following wood grain in accordance with manufacturer's written instructions to achieve even penetration and appearance.

d. Lightly sand between clear topcoat coats in accordance with manufacturer's instructions.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that site environmental conditions are appropriate for application of coatings specified.

B. Immediately prior to coating application, ensure that surfaces to receive coatings are dry.

C. Ensure that moisture-retaining substrates to receive coatings have moisture content within tolerances allowed by coating manufacturer, using moisture measurement techniques recommended by coating manufacturer.

D. Immediately prior to coating application, examine surfaces to receive coatings for surface imperfections and for contaminants which could impair performance or appearance of coatings, including but not limited to, loose primer, rust, scale, oil grease, mildew, algae, or fungus, stains or marks, cracks, indentations, or abrasions.

E. Correct the above conditions and any other conditions which could impair performance or appearance of coatings in accordance with specified surface preparation procedures before proceeding with coating application.

3.2 PREPARATION

A. Do not start work until surfaces to be finished are in proper condition to produce finished surfaces of uniform, satisfactory appearance.
B. Stains and Marks: Remove completely, if possible, using materials and methods recommended by coating manufacturer; seal with shellac or other coating acceptable to paint manufacturer stains and marks that might bleed through paint finishes which cannot be completely removed.

C. Remove or protect hardware, electrical plates, mechanical grilles and louvers, lighting fixture trim, and other items not indicated to receive coatings which are adjacent to surfaces to receive coatings.

D. Remove mildew from impervious surfaces by scrubbing with solution of trisodium phosphate and bleach. Rinse with clean water and allow substrate to thoroughly dry.

E. For specific substrate preparation, see "Surface Preparation" at end of Section.

F. Maximize ventilation during application and drying.

G. Isolate area of application from rest of building.

3.3 APPLICATION

A. General:

1. Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited to substrate and type of material being applied. Do not use roller or spray for wood and plywood, or roller for metal, unless specifically approved by the Architect.

2. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance. Give special attention to insure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

3. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces.

4. Paint back sides of access panels, and removable or hinged covers to match exposed surfaces.

5. Finish exterior doors on tops, bottoms and side edges same as exterior faces, unless otherwise indicated.

6. Sand lightly between each succeeding enamel or varnish coat.

7. Omit first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise indicated. Spot prime any damaged areas.

B. Scheduling Painting:

1. Apply first coat material to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

2. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform, or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

C. Minimum Coating Thickness:

1. Apply materials at not less than manufacturer's recommended spreading rate, to provide a dry film thickness per coat as indicated, or if not indicated, as recommended by coating manufacturer.

D. Mechanical and Electrical Work:

1. Painting of mechanical and electrical work is limited to those items exposed on the exterior or interior of the buildings, including the roof, and in occupied

spaces.

2. Mechanical items to be painted include, but are not limited to, the following (where present):

   a. Exposed ductwork, piping and supports, fire sprinkler piping, roof vents, louvers, grilles, registers, fans and curbs.

3. Electrical items to be painted include, but are not limited to, the following (where present):

   a. Conduit, boxes and fittings, exposed panelboard surfaces, including covers.

E. Prime Coats:

1. Apply prime coat to material which is required to be painted or finished, and which has not been prime coated by others.

2. Recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

F. Pigmented (Opaque) Finishes:

1. Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable. Cut in sharp lines and color breaks.

3.4 CLEANING

A. During progress of work, remove from site discarded paint materials, rubbish cans and rags at end of each work day.
B. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper method of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

C. At the completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

D. Vacate space for as long as possible after application. Wait a minimum of 48 hours before occupying freshly painted rooms.

3.5 PROTECTION

A. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

B. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

3.6 SURFACE PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

C. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

3.7 SCHEDULE

A. If paint on walls is to be applied using spray technique, the final coat shall be backrolled to ensure even distribution.

B. Paint all exposed interior ductwork and electrical conduit where exposed ceilings occur.

C. At all gypsum board ceilings, use a flat finish in lieu of scheduled paint.

D. Paint all exterior metal – primed and/or galvanized (doors/frames, lintels, etc) unless otherwise noted on Drawings.

E. Paint / stain all millwork not to receive surfacing as indicated on Drawings. Coordinate with Division 6 Section “Finish Carpentry” and “Interior Architectural Woodwork”.

F. Paint all hollow metal frames and doors prior to application of any hardware. Coordinate to ensure that doors arrive on-site prior to hardware being installed to ensure painting is done prior to hanging.

END OF SECTION

SECTION 09 91 00
PAINTING

PART 1 — GENERAL

1.01 Description

A. Scope:

1. This Section includes all painting and coating work associated with the Plant Building and all other civil and site-related work, exclusive of the Welcome Center Building and Pre-Engineered Structure.
2. Painting and coating work associated with the Welcome Center Building and Pre-Engineered Structure, as indicated on Architectural Drawing Sheets 8000 through 8905, is specified in Section 09 90 00 – Painting and Coating and is not included in this Section.
3. Where conflicts occur between Sections 09 91 00 and 09 90 00, the requirements of Section 09 90 00 shall govern for painting and coating work shown on Architectural Drawing Sheets 8000 through 8905, regardless of whether those drawings explicitly reference the applicable specification section.
4. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install all painting work.
5. The extent of painting is specified.
6. The types of painting Work includes the painting and finishing of all items and surfaces throughout the project included in this Contract. Surface preparation, priming and coats of paint specified are in addition to shop priming and surface treatment specified under other sections of the Work.
7. The term "paint" as used herein means all coating systems materials, which includes pretreatments, primers, emulsions, enamels, stain, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.
8. Paint all exposed surfaces whether or not colors are designated in any schedule, except where the natural finish of the material is specifically noted as a surface not to be painted. The term "exposed" as used herein means all items not covered with concrete. Ducts, conduits and other materials with corrosion resistant surfaces which are in chases, above finished ceilings, or other inaccessible areas shall not require field painting. Where items or surfaces are not specifically mentioned, paint these the same as adjacent similar materials or areas.
9. Structural and miscellaneous metals covered with concrete, shall only receive a primer compatible with the covering material.
10. Pipe markers as specified.

B. Coordination:

1. Review installation procedures under other Sections and Coordinate the installation of items that must be field painted in this Section.
2. Notify other contractors in advance of the field painting to provide the other contractors with sufficient time for installation of items included in their work

that must be field painted in this Section. Coordinate the painting of areas which would become inaccessible once equipment has been installed.

3. Coordinate the painting of areas that are inaccessible once equipment has been installed.
4. Provide finish coats which are compatible with the prime paints used. Review other Sections of these Specifications in which prime paints are to be provided to ensure compatibility of the total coatings system for the various substrates. CONTRACTOR shall be responsible for the compatibility of all shop primed and field painted items. Furnish information on the characteristics of the finish materials proposed to use, to ensure that compatible prime coats are used. Provide barrier coats over incompatible primers or remove and reprime as required. Notify ENGINEER in writing of anticipated problems using the coating systems as specified with substrates primed by others.

C. Painting Not Included: The following categories of Work are not included as part of the field-applied finish Work, or are included in other Sections of these Specifications.

1. Shop Priming: Unless otherwise specified, shop priming of structural metal, miscellaneous metal fabrications, other metal items and such fabricated components as shop-fabricated or factory-built heating and ventilating, instrumentation and electrical equipment or accessories shall conform to applicable requirements of Section 09900, Painting, but is included under the appropriate Sections of the Specification.
2. Pre-Finished Items:
   a) Items furnished with factory finishes such as baked-on enamel, plastic laminate, alkyd-urea synthetic resin, porcelain, polyvinylfluoride or other similar finishes.
   b) Touchup factory finished items with paint supplied by the item manufacturer. CONTRACTOR shall field paint prefinished items as specified or directed by ENGINEER.
3. Concealed Surfaces:
   a) Nonmetallic wall or ceiling surfaces in concealed from view areas and generally inaccessible areas, such as furred areas, pipe spaces, duct shafts and elevator shafts, as applicable to this project.
   b) Paint all piping, equipment, and other such items within these areas, that do not have galvanized or other corrosion resistant finish as specified.
4. Cement plaster.
5. Exterior above-grade non-submerged concrete.
6. Submerged or intermittently submerged concrete unless otherwise specified.
7. Concrete floors.
8. Millwork.
9. Wood doors.
10. Metal surfaces of anodized aluminum, stainless steel, chromium plate and bronze will not require finish painting, unless shown or specified.
11. Operating Parts and Labels:
    a) Moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts do not require painting unless otherwise specified.

b) Do not paint over any code-required labels, such as UL and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

c) Remove all paint, coating or splatter inadvertently placed on these surfaces.

1.02 Quality Assurance

A. Applicator Qualifications:

1. Submit the name and experience record of the painting applicator. Include the name of utility or industrial installations painted, responsible officials, architects, or engineers concerned with the project and the approximate contract price.
2. Painting applicators whose submissions indicate that they have not had the experience required to perform the Work will not be approved.

B. Source Quality Control: Obtain all materials from the same manufacturer unless otherwise approved. Obtain materials only from manufacturers who will:

1. Provide the services of a qualified manufacturer's representative at the project site at the commencement of Work to advise on materials, installation and finishing techniques.
2. Certify long-term compatibility of all coatings with all substrates, both new and existing.

C. Reference Standards: Comply with applicable provisions and recommendations of the following, except where otherwise shown or specified:

1. ANSI A13.1, Scheme for the Identification of Piping Systems.
2. Great Lakes — Upper Mississippi River Board of State Sanitary Engineers (Ten States Standards), Recommended Standards for Water Works — 1968 Edition, Addendum No. 6, Painting of Water Works Piping for Public Water Supplies.
3. OSHA 1910.144, Safety Color Code for Marking Physical Hazards.
4. SSPC Volume 2, Systems and Specifications, Surface Preparation Guide and Paint Application Specifications.

D. Requirements of Regulatory Agencies: Coatings for surfaces in contact with potable water or water being treated for potable use shall not impart any taste or odor to the water or result in any organic or inorganic content in excess of the maximum contaminant level established by applicable laws or regulations. All such coatings shall be ANSI/NSF certified for use in potable water applications. Revise painting systems specified herein to provide manufacturer's ANSI/NSF certified coating system where required.

1.03 Submittals

A. Samples: Submit for approval each type of marker specified.

B. Shop Drawings: Submit for approval the following:

1. Copies of manufacturer's technical information, including paint label analysis and application instructions for each material proposed for use.
2. Copies of CONTRACTOR'S proposed protection procedures in each area of the Work.

3. List each material and cross-reference to the specific paint and finish system and application. Identify by manufacturer's catalog number and general classification.
4. Copies of manufacturer's complete color charts for each coating system.
5. Pipe Markers: Copies of manufacturer's technical brochure, including color chart and list of standard markers.
6. Maintenance Manual: Upon completion of the Work, furnish copies of a detailed maintenance manual including the following information:
   a) Product name and number.
   b) Name, address and telephone number of manufacturer and local distributor.
   c) Detailed procedures for routine maintenance and cleaning.
   d) Detailed procedures for light repairs such as dents, scratches and staining.
7. ANSI/NSF certificates for all coatings that will be in contact with potable water.

C. Test Reports: Submit for approval certified laboratory test reports for required performance tests.

1.04 Product Delivery, Storage and Handling

A. Delivery of Materials: Deliver all materials to the job site in original, new and unopened packages and containers bearing manufacturer's name and label, and the following information:
1. Name or title of material.
2. Manufacturer's stock numbers and date of manufacture.
3. Manufacturer's name.
4. Contents of volume, for major pigment and vehicle constituents.
5. Thinning instructions where recommended.
6. Application instructions.
7. Color name and number.

B. Storage of Materials:
1. Store only acceptable project materials on project site.
2. Store in a suitable location approved by ENGINEER. Keep area clean and accessible.
3. Restrict storage to paint materials and related equipment.
4. Comply with health and fire regulations including the Occupational Safety and Health Act of 1970.

C. Handling of Materials.
1. Handle materials carefully to prevent inclusion of foreign materials.
2. Do not open containers or mix components until necessary preparatory Work has been completed and application Work will start immediately.

1.05 Job Conditions

A. Existing Conditions:

1. Before painting is started in any area, it shall be broom cleaned and excessive dust shall be removed.
2. After painting operations begin in a given area, broom cleaning will not be allowed; cleaning shall then be done only with commercial vacuum cleaning equipment.

B. Environmental Requirements:
1. Apply water-base paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 55^0F and 90^0F unless otherwise permitted by the paint manufacturer's printed instructions.
2. Apply other paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 65^0F and 95^0F, unless otherwise permitted by the paint manufacturer's printed instructions.
3. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85%; or to damp or wet surfaces.
4. Painting may be continued during inclement weather only if the areas and surfaces to be painted are enclosed and heated within the temperatures limits specified by the paint manufacturer during application and drying periods.
5. Adequate illumination and ventilation shall be provided in all areas where painting operations are in progress.
6. Install piping markers only after all painting and finish Work has been completed.

C. Protection: Cover or otherwise protect finished work of other trades and surfaces not being painted concurrently or not to be painted.

1.06 Measurement and Payment

Payment for work in this section shall be included in the unit price / lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials and incidentals complete.

PART 2 — PRODUCTS

2.01 Material Quality

A. Manufacturer: Provide products of one of the following:
1. Carboline/Kop-Coat, Inc. St. Louis, Missouri
2. Tnemec Company, Incorporated.
3. Or equal.

B. Provide manufacturer's best grade of the various types of coatings suitable for use in water treatment plants and pumping stations as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying the manufacturer's identification as a standard, best-grade product will not be acceptable.

C. Provide primers produced by the same manufacturer as the finish coats. Use only thinners recommended by the paint manufacturer, and use only to recommended limits.

D. Provide paints, and pipe markers of durable and washable quality. Use materials which will withstand normal washing as required to remove grease, oil, chemicals, etc., without showing discoloration, loss of gloss, staining, or other damage.

2.02 Substitutions

No substitutions shall be considered that decrease the film thickness, the surface preparation or the generic type of coating specified. Approved manufacturers must furnish the same color selection as the manufacturers specified, including accent colors and custom colors in all coating systems.

2.03 Colors and Finishes

A. Surface treatment, and finishes, are shown under "Painting Systems" below. All substrates scheduled under "Painting Systems" shall be painted whether or not shown on the Drawings, or in schedules, unless an item is specifically scheduled as not requiring the painting system scheduled below.

B. Color Selection:
1. A maximum of 20 different colors shall be selected for the project, in addition to color coding of all piping and ducts.
2. OWNER reserves the right to select non-standard colors for all paint systems specified within the ability of the manufacturer to produce such non-standard colors. Selection of non-standard colors shall not be cause for CONTRACTOR rejecting OWNER'S color selections and CONTRACTOR shall provide such colors at no additional expense to the OWNER.

C. After approval of submittals and prior to beginning Work, ENGINEER will furnish color schedules for surfaces to be painted listed in the painting systems below.

D. Color Coding: In general, and unless otherwise specified, all color coding of piping, ducts and equipment shall comply with applicable standards of ANSI A13.1 and OSHA 1910.144.

E. Use representative colors when preparing samples for ENGINEERS' review.

F. Color Pigments: Pure, nonfading, applicable types to suit the substrates and service indicated.
1. Lead: Lead content shall not exceed amount permitted by federal, state and local government laws and regulations.
2. Paints specified for application in contact with potable water shall be approved by the United States Environmental Protection Agency.

G. Submit proposed application techniques to ENGINEER. Submit proof of acceptability, of technique proposed, by the paint manufacturer selected.

2.04 Painting Systems

A. Cast-In-Place Concrete (except floors and walks) with "smooth form and grout cleaned finish"; Interior Non-submerged:
1. Surface Preparation: Remove grease, oil and all foreign matter as specified in 3.0B.
2. Product and Manufacturer; Provide one of the following:
a) Carboline/Kop-coat:
(1) Primer: Hi-Gard thinned 25% — 1 coat, 1.5-2.0 dry mils, 370-490 square feet per gallon.
(2) Finish: Hi-Gard — 2 coats, 2.0-3.0 dry mils per coat, 250-370 square feet per gallon per coat.
b) Tnemec:
(1) Primer: 66 H.B. Epoxoline — 1 coat, 2.0-3.0 dry mils, 240-360 square feet per gallon.
(2) Finish: 104 H.S. Epoxy — 2 coats, 2.0-3.0 dry mils per coat, 240-360 square feet per gallon per coat.
c) Or equal.

B. Concrete Block Walls, and Cast-In-Place Concrete (except floors and walks) not conforming to "smooth form and grout cleaned finish"; Interior Non-submerged:
1. Surface Preparation: Remove grease, oil and all foreign matter as specified in 3.0B.
2. Product and Manufacturer: Provide one of the following:
a) Carboline/Kop-Coat:
(1) Primer: Epoxy Block Filler — 1 coat, 10.0 dry mils, 75-100 square feet per gallon.
(2) Finish: Hi-Gard — 2 coats, 2.0-3.0 dry mils per coat, 250-370 square feet per gallon per coat.
b) Tnemec:
(1) Primer: 130 Envirofil Block Filler — 1 coat, 10.0 dry mils, 75-125 square feet per gallon.
(2) Finish: 104 H.S. Epoxy — 2 coats, 2.0-3.0 dry mils per coat, 240-360 square feet per gallon per coat.
c) Or equal.

C. Concrete Block Walls: Exterior Non-submerged:
1. Surface Preparation: Remove grease, oil and all foreign matter as specified in 3.0B.
2. Product and Manufacturer: Provide one of the following:
a) Carboline/Kop-Coat:
(1) Primer: Epoxy Block Filler — 1 coat, 10.0 dry mils, 75-100 square feet per gallon.
(2) Finish: Flexxide Elastomeric — 2 coats, 5.0 dry mils per coat, 120 square feet per gallon per coat.
b) Tnemec:

(1) Primer: 130 Envirofil Block Filler — 1 coat, 10.0 dry mils, 75-125 square feet per gallon.
(2) Finish: 156 Envirocrete — 2 coats, 4.0-8.0 dry mils per coat, 240-360 square feet per gallon per coat.

D. Submerged or Intermittently Submerged Concrete (except Surge Basin) containing wastewater, sludges and other non-potable liquids; including lining for all precast manhole sections and reinforced concrete pipe, and all interior surfaces of the Pump Station Wetwells:
1. Surface Preparation: SSPC-SP 7 Brush-Off Blast Cleaning as specified in 3.0B.
2. Product and Manufacturer: Provide one of the following:
a) Carboline/Kop-Coat:
(1) Primer: Bitumastic No. 300-M thinned 33 percent — 1 coat, 3.0-4.5 dry mils, 200-300 square feet per gallon.
(2) Bitumastic 300-M — 2 coats, 8.0-10 dry mils, 90-115 square feet per gallon per coat.
b) Tnemec:
(1) Primer: 46-41 thinned 20 percent — 1 coat, 4.0-6.0 dry mils, 200-300 square feet per gallon.
(2) Finish: 46-41 — 2 coats, 8.0-10.0 dry mils, 90-120 square feet per gallon.
c) Or equal.
3. Total dry mil thickness of coating system shall be 20 mils minimum.

E. Ferrous Metals including all Structural Steel, Miscellaneous Ferrous Metals, and all Ferrous Piping and all Ferrous Piping to be Covered with Insulation; Interior Non-submerged:
1. Surface Preparation: SSPC-SP 6 Commercial Blast Cleaning as specified in 3.0C.
2. Product and Manufacturer: Provide one of the following:
a) Carboline/Kop-Coat:
(1) Shop Primer: 340 Gold Epoxy — 2 coats, 1.5-2.0 mils per coat, 525-700 square feet per gallon per coat.
(2) Field Primer or Field Touchup: 340 Gold Epoxy — 1 coat, 1.5-2.0 dry mils per coat, 525-700 square feet per gallon.
(3) Finish: Hi-Gard — 2 coats, 2.0-3.0 dry mils per coat, 250-370 square feet per gallon per coat.
b) Tnemec:
(1) Shop Primer: 66-1211 Epoxy — 2 coats, 1.5-2.5 dry mils per coat, 270-460 square feet per gallon per coat.
(2) Field Primer or Field Touchup: 66-1211 Epoxy — 1 coat, 1.5-2.5 dry mils per coat, 270-460 square feet per gallon.
(3) Finish: 104 H.S. Epoxy — 2 coats, 2.0-3.0 dry mils per coat, 240-360 square feet per gallon per coat.
c) Or equal.

F. Submerged or Intermittently Submerged Ferrous Metals; Interior and Exterior:
1. Surface Preparation: SSPC-SP 10 Near-White Blast Cleaning as specified in 3.02.C.
2. Product and Manufacturer: Provide one of the following:

a) Carboline/Kop-Coat:
(1) Primer: 340 Gold Epoxy — 2 coat, 1.5-2.0 dry mils per coat, 525-700 square feet per gallon per coat.
(2) Finish: Hi-Gard — 2 coats, 2.0-3.0 dry mils per coat, 250-370 square feet per gallon per coat.
b) Tnemec:
(1) Primer: 20-1255 Epoxy — 2 coats, 1.5-2.5 dry mils per coat, 285-475 square feet per gallon per coat.
(2) Finish: 139-AA90 Potapox — 2 coats, 2.0-3.0 dry mils per coat, 240-360 square feet per gallon per coat.
c) Or equal.

G. Ferrous, Non-Ferrous Metals and Fiberglass: Exterior Non-Submerged:
1. Surface Preparation:
a) Ferrous Metals: SSPC-SP 5 Commercial Blast Cleaning as specified in 3.02.C.
b) Non-Ferrous Metal: SSPC-SP 1 Solvent Cleaning as specified in 3.02.E and 3.02.D.
c) Fiberglass: Sand as specified in 3.02.F.
2. Product and Manufacturer: Provide one of the following:
a) Carboline/Kop-Coat:
(1) Primer:
(a) Ferrous Metals: 340 Gold Epoxy — 2 coats, 1.5-2.0 dry mils per coat, 525-700 square feet per gallon per coat.
(b) Non-Ferrous: None
(2) Intermediate: Hi-Gard — 1 coat, 2.0-3.0 dry mils, 250-370 square feet per gallon.
(3) Finish: Carbothane 134HS — 2 coats, 1.5-2.5 dry mils per coat, 530-705 square feet per gallon.
b) Tnemec:
(1) Primer:
(a) Ferrous Metals: 66-1211 Epoxy — 2 coats, 1.5-2.5 dry mils per coat, 270-460 square feet per gallon per coat.
(b) Non-Ferrous: None.
(2) Intermediate: 66 H.B. Epoxoline — 1 coat, 2.0-3.0 dry mils, 240-360 square feet per gallon.
(3) Finish: 75 Endura-Shield II — 2 coats, 1.5-2.5 dry mils, 270-460 square feet per gallon.
c) Or equal.

H. Galvanized Metal and Non-Ferrous Metal; Interior, Non-Submerged,including galvanized ductwork in the Operations Building.
1. Surface Preparation: SSPC-SP 1 Solvent Cleaning, as specified in Section 3.0D, and 3.02.E.
2. Product and Manufacturer: Provide one of the following:
a) Carboline/Kop-Coat:
(1) Primer: Hi-Gard — 1 coat, 2.0-3.0 dry mils, 250-370 square feet per gallon.

(2) Finish: Hi-Gard — 1 coat, 2.0-3.0 dry mils, 250-370 square feet per gallon.

b) Tnemec:

(1) Primer: 66 H.B. Epoxoline — 1 coat, 2.0-3.0 dry mils, 240-360 square feet per gallon.

(2) Finish: 66 H.B. Epoxoline — 1 coat, 2.0-3.0 dry mils, 240-360 square feet per gallon.

c) Or equal.

I. Submerged or Intermittently submerged Galvanized Ferrous Metal; Interior and Exterior:

1. Surface Preparation: SSPC-SP 1 Solvent Cleaning, as specified in Section 3.0E.
2. Product and Manufacturer: Provide one of the following:

a) Carboline/Kop-Coat:

(1) Primer: 40 Passivator — 1 coat, 0.3-0.5 dry mils, 260-435 square feet per gallon.

(2) Finish: Hi-Gard — 1 coat, 2.0-3.0 dry mils, 250-370 square feet per gallon.

b) Tnemec:

(1) Primer: 20-1211 Potapox — 1 coat, 1.5-2.5 dry mils, 270-460 square feet per gallon.

(2) Finish: 139-AA90 Potapox — 2 coats, 2.0-3.0 dry mils per coat, 240-360 square feet per gallon per coat.

c) Or equal.

J. All Metal Surfaces Exposed to Temperatures Over 250^0F:

1. Surface Preparation: SSPC-SP 10 Near White blast as specified in Section 3.02.C.
2. Product and Manufacturer: Provide one of the following:

a) Carboline/Kop-Coat: Finish: 1248 Silicon Acrylic — 1 coat, 1.5 dry mils, 428 square feet per gallon.

b) Tnemec: Finish: 1261 Silicone Aluminum — 2 coats, 0.8 dry mils per coat, 500 square feet per gallon per coat.

c) Or equal.

K. All Aluminum in Contact with Dissimilar Materials:

1. Surface Preparation:

a) Remove all foreign matter.

b) Pretreatment Wash Coat of Polyvinyl Butyryl Resin: 1 coat, 0.3-0.5 dry mils.

2. Product and Manufacturer: Provide one of the following:

a) Carboline/Kop-Coat: Hi-Gard — 2 coats, 2.0-3.0 dry mils per coat, 250-370 square feet per gallon per coat.

b) Tnemec: 69 H.B. Epoxoline — 2 coats, 2.0-3.0 dry mils per coat, 240-360 square feet per gallon per coat.

c) Or equal.

L. Pipe and Duct Installation, Cloth; Interior:

1. Surface Preparation: Remove all foreign matter as specified in 3.0G.
2. Products and Manufacturer: Provide one of the following:

a) Carboline/Kop-Coat:
(1) Primer: Kop-Coat D.W. Base — 1 coat, 1.0 dry mils, 400 square feet per gallon.
(2) Finish: Hi-Gard — 2 coats, 2.0-3.0 dry mils per coat, 250-370 square feet per gallon per coat.
b) Tnemec:
(1) Primer: 51-792 PVA Sealer — 1 coat, 1.0 dry mils, 400 square feet per gallon.
(2) Finish: 69 H.B. Epoxoline — 2 coats, 2.0-3.0 dry mils per coat, 240-360 square feet per gallon per coat.
c) Or equal.

M. PVC Piping, Fiberglass, Fiberglass Insulation Covering; Interior:
1. Surface Preparation: Sand as specified in 3.0F.
2. Product and Manufacturer: Provide one of the following:
a) Carboline/Kop-Coat: Finish: Hi-Gard — 2 coats, 2.0-3.0 dry mils per coat, 250-370 square feet per gallon.
b) Tnemec: Finish: 66 H.B. Epoxoline — 2 coats, 2.0-3.0 dry mils per coat, 240-360 square feet per gallon per coat.
c) Or equal.

N. Gypsum Plaster, Gypsum Wallboard; Interior:
1. Surface Preparation: Sand and seal as specified in 3.0H.
2. Product and Manufacturer: Provide one of the following:
a) Carboline/Kop-Coat:
(1) Primer: Kop-Coat D.W. Base — 1 coat, 1.0-2.0 dry mils, 400 square feet per gallon.
(2) Finish: Hi-Gard — 2 coats, 2.0-3.0 dry mils per coat, 250-370 square feet per gallon per coat.
b) Tnemec:
(1) Primer: 51-792 PVA Sealer — 1 coat, 1.0-2.0 dry mils, 400 square feet per gallon.
(2) Finish: 66 H.B. Epoxoline — 2 coats, 2.0-3.0 dry mils per coat, 240-360 square feet per gallon per coat.
c) Or equal.

O. Steel and Galvanized Steel Pipe; Buried Exterior:
1. Surface Preparation: SSPC-SP 10, Near-White Blast, as specified in Section 3.02.C.
2. Product and Manufacturer: Provide one of the following:
a) Carboline/Kop-Coat:
(1) Shop Primer: 340 Gold Epoxy — 2 coats, 1.5-2.0 dry mils per coat, 525-700 square feet per gallon per coat.
(2) Field Primer or Field Touchup: 340 Gold Epoxy — 1 coat, 1.5-2.0 dry mils, 525-700 square feet per gallon.
(3) Finish: Bitumastic No. 300-M — 2 coats, 8.0-10.0 dry mils per coat, 90-115 square feet per gallon per coat.
b) Tnemec:

(1) Shop Primer: 66-1211 Epoxy — 2 coats, 1.5-2.5 dry mils per coat, 270-460 square feet per gallon per coat.
(2) Field Primer or Field Touchup: Surface preparation as specified.
(3) Finish: 46H-413 Tneme-Tar — 2 coats, 8.0-10.0 dry mils per coat, 90-120 square feet per gallon per coat.

c) Or equal.

2.05 Piping Markers

A. Manufacturer: For all interior piping, provide products produced by one of the following:
1. W. H. Bradey Company
2. Seton Name Plate Corporation
3. Or equal

B. General:
1. Piping markers shall be formed from laminated plastic. All printing shall be sealed with a formed butyrate plastic film. Markers for piping up to 6-inch diameter shall be preformed to completely wrap around the pipe requiring no adhesive. Markers for pipes over 6-inch diameter shall be preformed to the contour of the pipe and attached with stainless steel spring fasteners.
2. For pipes under 3/4-inch outside diameter: Provide brass tags, 1½-inch diameter, with depressed 1/4-inch high black filled letters above ½-inch high black filled numbers.
3. Each marker shall consist of at least 1 legend descriptive of the function of the pipe, and a directional arrow.
4. The size of lettering and marker shall conform to ANSI A13.1.
5. Location of Markers:
a) Adjacent to each valve and "T" connection.
b) At each branch and riser takeoff.
c) At each pipe passage through a wall, floor and ceiling.
d) On all horizontal and vertical pipe runs at 25-foot intervals.

C. For all exterior piping, provide stenciled lettering and directional arrow to identify exposed pipe in lieu of laminated plastic. Lettering to be black or white paint conforming with paragraph 2.04 of this Section.

PART 3 — EXECUTION

3.01 Inspection

A. CONTRACTOR and his applicator shall examine the areas and conditions under which painting Work is to be performed and notify ENGINEER in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.

B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to the formation of a durable paint film.

3.02 Surface Preparation

A. General:

1. Perform all preparation and cleaning procedures as specified herein and in strict accordance with the paint manufacturer's instructions for each particular substrate and atmospheric condition.
2. Remove all hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish painted, or provide surface applied protection prior to surface preparation and painting operations. Remove, if necessary, for the complete painting of the items and adjacent surfaces. Following completion of painting of each space or area, reinstall the removed items by workmen skilled in the trades involved.
3. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease with clean cloths and cleaning solvents prior to mechanical cleaning. Program the cleaning and painting so that dust and other contaminants from the cleaning process will not fall in wet, newly painted surfaces.
4. All surfaces which were not shop painted or which were improperly shop painted, and all abraded or rusted shop painted surfaces, which are to be painted, as determined by ENGINEER, shall be prepared as specified below.

B. Cast-In-Place Concrete and Masonry Surfaces:

1. Prepare surfaces of cast-in-place concrete and concrete block to be painted by removing all efflorescence, chalk, dust, dirt, grease, oils, with soap and water.
2. Determine the alkalinity and moisture content of the surfaces to be painted by performing appropriate tests. If the surfaces are found to be sufficiently alkaline to cause blistering and burning of the finish paint, correct this condition before application of paint. Provide ENGINEER with suitable testing materials in order to carry out alkalinity and moisture tests.
3. Do not paint over surfaces where the moisture content exceeds 8%, unless otherwise permitted in the manufacturer's printed directions.
4. Concrete and concrete block surfaces that cannot be adequately cleaned by soap and water shall be acid etched. Exceedingly dense concrete may require a second etching.

C. Ferrous Metals:

1. Clean non-submerged ferrous surfaces including structural steel and miscellaneous metal to be shop primed, of all oil, grease, dirt, mill scale and other foreign matter by commercial blast cleaning complying with SSPC-SP
2. Clean submerged ferrous surfaces including structural steel and miscellaneous metal to be shop primed, of all oil, grease, dirt, mill scale and other foreign matter by near-white blasting complying with SSPC-SP 10.
3. Clean non submerged, ferrous surfaces that have not been shop coated of all oil, grease, dirt, mill scale and other foreign substances by commercial blasting, complying with SSPC-SP 6.
4. Clean submerged ferrous surfaces that have not been shop-coated or that, in the opinion of ENGINEER, have been improperly shop coated, of all oil, grease, dirt, mill scale and other foreign matter by near white blasting complying with SSPC-SP 10.

5. Treat bare and blasted or pickled clean metal with metal treatment wash coat, prior to priming only if recommended by the paint manufacturer.
6. Touch-up shop-applied paint coats which have damaged or bare areas, with primer recommended by the coating manufacturer after commercial blasting complying with SSPC-SP 6.

D. Non-Ferrous Metal Surfaces: Clean non-ferrous metal surfaces in accordance with the coating system manufacturer's instructions for the type of service, metal substrate, and application required.

E. Galvanized Surfaces:
1. Clean free of oil and surface contaminants with a non-petroleum based solvent, recommended by the coating manufacturer, complying with SSPC-SP 1.
2. Remove shop applied chromic acid treatments on galvanized surfaces to be painted. Galvanized metals which have been given a humid storage stain treatment shall be prepared for painting by sanding or by other techniques as recommended by the paint manufacturer at no additional expense to OWNER.

F. PVC Piping and Fiberglass: Lightly sand and clean all surfaces to be painted.

G. Covering on Pipe: Clean free of oil and surface contaminants as recommended by the coating manufacturer for substrate and application required. Do not cut or damage the insulation in any way.

H. Gypsum Plaster and Gypsum Wallboard:
1. Patch, sand and seal all rough spots before prime coat.
2. Touch up all suction spots and hot spots with primer before application of finish coats.

3.03 Materials Preparation

A. General:
1. Mix and prepare painting materials in strict accordance with the manufacturer's directions.
2. Do not mix coating materials produced by different manufacturers, unless otherwise permitted by the manufacturer's instructions.
3. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing, and application of paint in a clean condition, free of foreign materials and residue.
4. Stir all materials before application to produce a mixture of uniform density, and as required during the application of the materials. Do not stir any film which may form on the surface into the material. Remove the film and, if necessary, strain the material before using.
5. Mixing:
   a) Mix only in containers placed in suitable sized non-ferrous or oxide resistant metal pans to protect concrete floor from splashes or spills which could stain exposed concrete or react with subsequent finish floor material.

b) Mix and apply paint only in containers bearing accurate product name of material being mixed, or applied.

3.04 Application

A. General:

1. Apply paint by brush, roller, air spray, or airless spray in accordance with the manufacturer's directions and recommendations of Paint Application Specifications No. 1 in SSPC Vol. 2, where applicable. Use brushes best suited for the type of material being applied. Use rollers of carpet, velvet back, or high pile sheep's wool as recommended by the paint manufacturer for material and texture required. Use air spray and airless spray equipment recommended by the paint manufacturer for specific coating system specified. Submit a list of application methods proposed, listing paint systems and location.
2. The paint film thickness required is the same regardless of the application method. Do not apply succeeding coatings until the previous coat has completely dried.
3. Apply additional coats when undercoats, stains, or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance. This is of particular importance regarding intense primary accent colors. Insure that all surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a film thickness equivalent to that of flat surfaces.
4. Surfaces not exposed to view do not require color coding but require the same coating system specified for exposed surfaces. "Exposed to view surfaces" is defined as those areas visible when permanent or built-in fixtures convector covers, covers, covers for finned tube radiation, grilles, etc. are in place in areas scheduled to be painted.
5. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint as specified, before final installation of equipment.
6. Paint aluminum parts in contact with dissimilar materials as specified with appropriate primer.
7. Omit field primer on metal surfaces which have been shop primed touch-up paint shop prime coats only when approved by ENGINEER.
8. Paint the backs of access panels, and removable or hinged covers to match the exposed surfaces.

B. Heating, Ventilating, Air Conditioning and Electrical Work:

1. Heating, ventilating, and air conditioning items to be painted include, but are not limited to, the following:
   a) Piping, pipe hangers, and supports.
   b) Heat exchangers.
   c) Tanks.
   d) Ductwork and insulation.
   e) Motors, mechanical equipment, and supports Accessory items
2. Electrical items to be painted include, but are not limited to, the following:
   a) Conduit and fittings
   b) Switchgear, panels, junction boxes, motor control centers, motors and accessories.

C. Minimum Coating Thickness:
1. Apply each material at not less than the manufacturer's recommended spreading rate, and provide total dry film thickness as specified.
2. Apply extra coat if required to obtain specified total dry film thickness.

D. Scheduling Painting:
1. Apply the first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
2. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

E. Prime Coats: Recoat primed and sealed walls and ceilings where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects caused by insufficient sealing.

F. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage.

G. Transparent (Clear) Finishes:
1. On exposed to view portions, use multiple coats to produce glass-smooth surface film continuity of even matt luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.
2. Provide satin finish for final coats, unless otherwise indicated.

H. Brush Application:
1. Brush-out and work all brush coats onto the surfaces in an even film. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable. Neatly draw all glass and color break lines.
2. Brush apply all primer or first coats, unless otherwise permitted to use mechanical applicators.

I. Mechanical Applicators:
1. Use mechanical methods for paint application when permitted by governing ordinances, paint manufacturer, and approved by ENGINEER. If permitted, limit to only those surfaces impracticable for brush applications.
2. Limit roller applications, if approved by ENGINEER, to interior wall finishes for second and third coats. Apply each roller coat to provide the equivalent hiding as brush-applied coats.
3. Confine spray application to metal framework, siding, decking, wire mesh and similar surfaces where hand brush work would be inferior and to other surfaces specifically recommended by paint manufacturer.
4. Wherever spray application is used, apply each coat to provide the equivalent hiding of brush-applied coats. Do not double back with spray equipment for the purpose of building up film thickness of 2 coats in one pass.

J. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish, or repaint Work not in compliance with specified requirements as required by ENGINEER.

K. Piping Markers: Apply piping markers in accordance with the manufacturer's written instructions in locations herein specified.

L. Testing: The CONTRACTOR shall furnish an "Elcometer" as distributed by Gardner Laboratories, Bethesda, MD, or a "Mikrotest", as distributed by the Nordsen Equipment Company, Amherst, Ohio, to the ENGINEER to check dry mil thickness. The thickness gauge is to come with a carrying case and operating instructions. The CONTRACTOR shall provide a Holiday tester when requested by the ENGINEER.

3.05 Protection

A. Protect work of other trades, whether to be painted or not, from the Work of this Section. Leave all such work undamaged. Protect offsite areas from overspray from the project site. Correct all damages by cleaning, repairing or replacing, and repainting, as acceptable to ENGINEER.

B. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove all temporary protective wrappings provided for protection of this Contract and other contracts after completion of painting operations.

3.06 Clean-up

A. During the progress of the Work, remove from the site all discarded paint materials, rubbish, cans and rags at the end of each work day.

B. Upon completion of painting Work, clean all paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

C. At the completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces as determined by ENGINEER.

D. Process Piping Color Schedule

USE	GENERAL COLOR
Water Lines	
Raw	Olive Green
Settled or Clarified	Aqua
Non-Potable	Aqua w/Blue Band at 2 foot centers
Potable	Dark Blue
Chemical Lines	
Alum	Yellow
Chlorine	White
Fluoride	Light Blue w/Red Band at 2 foot centers
Lime	Light Green
Polymer	Orange w/Green Band at 2 foot centers
Polyphosphate	Light Green w/Red Band at 2 foot centers
Natural Gas	Red
Waste Lines	
Backwash Waste	Light Brown
Chemical Waste	Light Brown w/Dark Gray Band at 2 foot centers
Sludge, Scum	Dark Brown
Sewer	Dark Gray
Other	
Outside Steel	Gray
Compressed Air Lines	Dark Green
Other Lines	Light Gray

*** * END OF SECTION * ***

SECTION 09 96 00 – HIGH PERFORMANCE COATINGS

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes surface preparation and field application of high-performance coating systems to all exterior structural steel and other steel surfaces (exceptions are brick lintels and hollow metal).

1. This Section includes all painting and coating work associated with the Welcome Center Building and Pre-Engineered Structure, as indicated on Architectural Drawing Sheets 8000 through 8905.

2. Painting and coating work associated with the Plant Building and all other civil-related drawings is specified in Section 09 91 00 – Painting and is not included in this Section.

3. Coating system is a 3-coat system, consisting of first coat, intermediate coat, and two finish coats.

B. Related Sections include the following:

1. Division 7 Section "Joint Sealants"

2. Division 9 Section “Painting and Coating” for exterior painting of steel brick lintels and hollow metal door and frames..

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include preparation requirements and application instructions.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference the specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.

2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each material specified.

3. Preparation requirements.

B. Coating Maintenance Manual (Closeout Document): Provide coating maintenance manual including area summary with finish schedule, area detail designating location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.3 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed high-performance coating system applications similar in material and extent to those indicated for Project and whose work has a record of successful in-service performance.

B. Source Limitations: Obtain primers and undercoat materials for each coating system from the same manufacturer as the finish coats. **No exceptions.**

C. Mockups: Apply mockups of coating system to verify color selection and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one area to represent surfaces and conditions for application of coating system.

2. Final approval of color selections will be based on mockups.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

4. Subject to compliance with requirements, approved mockups may become part of the completed Work if acceptable to the Architect.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacture’s label with the following information:

1. Product name and type (description).

2. Batch date.

3. Color number.

4. Environmental handling requirements and precautions.

5. Surface preparation requirements.

6. Application instructions.

B. Store materials not in use in tightly covered containers in a well-ventilated area with ambient temperatures continuously maintained at not less than 45° F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect materials from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that

workers and work areas are protected from fire and health hazards resulting from handling, mixing, and applying coatings.

1.5 PROJECT CONDITIONS

A. NOTE: Contractor to record temperature and humidity every day. Submit documentation with monthly pay application.

B. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 50° and 95° F.

C. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5° F above the dew point; or to damp or wet surfaces.

D. Do not apply exterior coatings in snow, rain, fog, or mist.

1. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before proceeding with or continuing coating operation.

1.6 MAINTENANCE

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Minimum of 5 gallons of each product specified.

1.7 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Sherwin Williams (Basis of Design)

B. Tnemec Company

C. PPG Protective & Marine Coatings

2.2 MATERIALS

A. First Coat:

1. Sherwin Williams “Macropoxy 646 FCE”

2. Volume Solids: 72% calculated, mixed 70% ASTM D2697 (Helium Pycnometer)

3. Spreading Rate:

a. Wet mils:

(1) Minimum: 7.0

(2) Maximum: 10.0

b. Dry mils:

(1) Minimum: 5.0

(2) Maximum: 8.0

4. Curing Time (at 77°F, 50% RH):

a. To touch: 2 hours

b. Tack free: 8 hours

c. To recoat: 8 hours (minimum); 1 year (maximum)

5. Pot life: 4 hours

6. Sweat-in Time: 30 minutes

B. Second Coat (Intermediate Coat):

1. Sherwin Williams “Macropoxy 646 FCE”

2. Solids:

1. Volume Solids: 72% calculated, mixed 70% ASTM D2697 (Helium

Pycnometer)

2. Spreading Rate:
    a. Wet mils:
        (1) Minimum: 5.0
        (2) Maximum: 7.0
    b. Dry mils:
        (1) Minimum: 3.0
        (2) Maximum: 5.0
3. Curing Time (at 77° F, 50% RH):
    a. To touch: 2 hours
    b. To recoat: 8 hours (minimum); 1 year (maximum)
4. Pot life: 4 hours
5. Sweat-in Time: 30 minutes

C. Finish Coat:

1. Sherwin Williams “Acrolon 7700 HS Acrylic Polyurethane”
2. Solids:
    a. Volume Solids: 65% ±2%, mixed
3. Spreading Rate:
    a. Wet mils:
        (1) Minimum: 3.1
        (2) Maximum: 8.0
    b. Dry mils:
        (1) Minimum: 2.0
        (2) Maximum: 5.2
4. Curing Time (at 77° F, 50% RH):
    a. To touch: 1 hours

b. To recoat: 4 hours (minimum); 60 days (maximum)

5. Pot life: 2.5 hours

6. Sweat-in Time: none required

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Architect present, for compliance with conditions affecting performance of the Work. Verify suitability of substrates, including surface conditions and compatibility with finishes and primers. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.

1. Report in writing conditions that may affect application, appearance, or performance of paint.

2. Do not proceed with surface preparation and application until surfaces are acceptable. Commencement of application of coating to any surface shall be construed as acceptance or surfaces as being proper to receive the finish, and any defects in work resulting from such accepted surfaces shall be corrected by the applicator without additional cost to the Owner.

B. Prior to start of work every day:

1. Verify that site environmental conditions are appropriate for application of coatings specified.

2. Immediately prior to coating application, ensure that surfaces to receive coatings are dry.

3.2 PREPARATION

A. Protection:

1. Take precautionary measures to prevent fire hazards and spontaneous combustion. Remove empty containers from Site.

2. Place cotton waste, cloths and hazardous materials in containers, and remove from Site daily.

3. Provide drop cloths, shields, and other protective equipment.

4. Protect surrounding work from damage or disfiguration.

5. As Work proceeds, promptly remove spilled, splashed, or splattered materials from surfaces.

6. During application of coating materials, post Wet Paint signs.

7. During application of solvent-based materials, post No Smoking signs.

B. Surface Preparation:

1. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

2. Clean surfaces of residual deposits of grease, scale, rust, oil, dirt, incompatible paints, encapsulants, and other foreign matter, immediately prior to first coat. Surfaces to be coated shall be clean, dry, smooth and free from dust and foreign matter which will adversely affect adhesion or appearance.

3. Steel substrates: Remove all rust, loose mill scale, and existing coatings to ensure proper adhesion of new coating system.

a. Pressure wash all surfaces prior to remove all contaminants.

b. After pressure washing, prep all steel surfaces per SSPC-SP3 “Power Tool Cleaning”. Ensure Surfaces are clean prior to new sealant & coating work.

c. Provide and install sealant at all steel to steel locations. Backer rod and/or spray foam may be used in areas not grounded. Refer to Division 7 Section “Joint Sealants” for additional information.

d. Apply coating system as specified herein.

3.3 APPLICATION

A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual” and using application method best suited for obtaining full, uniform coverage of surfaces to coated.

B. Apply first coat, intermediate coat, and two final coats to comply with wet and dry film thickness and spreading rates for each type of material as recommended by manufacturer.
1. Application rates in excess of those recommended and fewer numbers of coats than specified will not be accepted.

C. Number of coats specified shall be minimum number acceptable. Apply additional coats as needed to ensure undercoats or other conditions do not show thru, and to provide a smooth, even application.

1. Closely adhere to re-coat times recommended by manufacturer. Allow each coat to dry thoroughly before applying next coat.

D. Employ only application equipment that is clean, properly adjusted, and in good working order, and of type recommended by coating manufacturer.

E. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks, without overalapping.

3.4 FIELD QUALITY CONTROL

A. Contractor shall engage a testing laboratory to perform the following:

1. Field Painting Inspection:

a. Verify cleaning operations to surfaces are to condition specified.
b. Verify conformance of paint to specification.
c. Check for mil thickness of each coating, final thickness and holidays.
d. Check touchup for final finish.

2. Reports: Submit written progress reports describing tests and inspections made and showing action proposed to correct nonconforming work.

a. Submit test reports to the Architect for review.

B. Manufacturer's Field Service: Coatings manufacturer shall be available to provide on-site inspections, technical assistance, and guidance for application of coating system as needed.

3.5 CLEANING AND PROTECTION

A. At completion of day's work, remove from Site rubbish and accumulated materials.

B. Clean paint spots and other soiling from all surfaces, including pre-finished surfaces and surfaces with integral finish. Use solvents which will not damage finished surface.

C. Leave storage area clean and in same condition indicated for equivalent spaces in Project.

D. Protect work against damage until fully cured. Provide signs identifying wet surfaces until surfaces are adequately cured.

END OF SECTION

SECTION 09 96 53 – ELASTOMERIC COATINGS

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes furnish, substrate preparation, and field application of the following as indicated on the Drawings:

1. This Section includes all painting and coating work associated with the Welcome Center Building and Pre-Engineered Structure, as indicated on Architectural Drawing Sheets 8000 through 8905.

2. Painting and coating work associated with the Plant Building and all other civil-related drawings is specified in Section 09 91 00 – Painting and is not included in this Section.

3. Provide at all vertical surfaces of exterior exposed concrete locations below metal wall panels.

B. Related Sections include the following:

1. Division 3 Section “Cast-in-Place Concrete”.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used. Include manufacturer's Material Safety Data Sheets.

B. Color Samples: A sample of each color shall be applied to the building for color approval by the project owner’s representative.

1.3 QUALITY ASSURANCE

A. Installer's Qualifications: The contractor shall be qualified to perform the work specified by reason of experience. A list of project references should be submitted with company’s proposal.

B. Mock-ups: The contractor shall install a 2’-0” x 2’-0” mock-up using proposed application means and methods to a sample wall area for evaluation and approval by the Architect.

1. Conduct tests in accordance with ASTM D 3359 on mock-up to verify adhesion of installed primer and top coat to prepared substrate. Allow the coatings a minimum of 7 days curing prior to performing the test. Report results to Architect – do not proceed with Work until approval of mockup has been obtained.

1.4 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label:

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg. F. Maintain storage containers in a clean condition, free of foreign materials and residue.

C. Handle products in accordance with manufacturer’s printed recommendations.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. MAPEI Corporation (Basis of Design)

B. Sto Corp.

C. Textured Coatings of America

D. Or equal

2.2 MATERIALS
2.3

A. Provide 100% Acrylic Elastomeric Waterproof Coating system “Elastocolor Flex” as manufactured by MAPEI Corporation or equal.

1. Indicated as “Elastomeric Coating” on Drawings.

B. General:

1. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

2. Color: Refer to Finish Schedule and Paint Legend for paint colors.

C. Primer / Surface Conditioner – equal to MAPEI “Elastocolor Primer WB” will be applied to all direct to all surfaces at the approximate rate of 300 to 400 square feet per U.S. gallon.

1. For bidding purposes, it shall be assumed that a primer is necessary to promote adhesion. Once field adhesion test on mock-up panel is complete, the final determination of whether a primer is needed will be decided.

D. Exterior Coating System:

1. Finish Coating for vertical, above-grade concrete on the exterior of the building.

2. Two finish coats equal to MAPEI Elastocolor Flex over primer

a. Performance and Physical Properties for top coat: must meet or exceed the following values for material cured at 73 degrees F (23 degrees C) and 50 percent relative humidity:

(1) Touch-dry: 6 hours, depending on ambient conditions.

(2) Solids: 45.2 %, by volume

(3) Application: spray, roller, or brush.

(4) Water Vapor Permeability: 12.3 perms, tested at 5 dry mils applied in one coat, ASTM E 96.

(5) Accelerated Weathering: no cracking, peeling, blistering, or other deleterious effects after 5,000 hours exposure, ASTM D 6695

(6) Tensile Strength: 65 psi (0,45 MPa), minimum, ASTM D 638

(7) Mold Resistance: no Mold Growth at 28 days, ASTM D 3273

(8) Wind Driven Rain Resistance: PASS, no water penetration, ASTM D 6904

(9) Elongation (at break): 825% ASTM D638

2.4 ACCESSORIES

A. Patching Compound: equal to MAPEI “Mapeflex EMC-1” smooth brush-grade elastomeric patching compound.

B. Surfaces of exposed concrete must be rubbed to avoid blemishes, honey-combs, fins and other imperfections prior to the application of finish coating.
C. Other materials not specifically indicated but required to perform the scope of work specified must be of commercial quality.

PART 3 – EXECUTION

3.1 PREPARATION

A. General Surface Preparation

1. All surfaces must be clean, dry, sound, and free of frost and contamination such as mildew, dirt, grease, oils, salts, efflorescence and any other contamination that may affect adhesion.

2. Use appropriate repair methods for the substrate to repair pitting, spalls, cracks, peeling, blistering, delamination, or other defects that may exist.

3. Hairline cracks up to 1/16 inch can be repaired with elastomeric patching compound. Prepare surfaces and apply elastomeric crack filler in accordance with manufacturer’s written instructions. Strike excess material flush and feather into existing texture of the surface.

4. Remove any loose, scaling, cracked or peeling coating by chemical or mechanical means. Pressure washing is recommended. Follow necessary safety precautions and adjust pressure to avoid damage to the underlying substrate.

5. Mold & Mildew - Surface areas affected by mold and mildew should be treated with a commercial mildew removal and/or wash product carefully following manufacturer’s application and safety directions. Rinse thoroughly with clean water, and allow a minimum of 24 hours to dry thoroughly.

6. Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas and landscaping from contact due to mixing, handling, and installation of materials.

B. Cementitious Substrates:

1. Prepare concrete to be coated.

2. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods to prepare surfaces.

3. Use abrasive blast-cleaning methods if recommended by coating manufacturer.

4. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish coating to blister and burn, correct this condition before application. Do not coat surfaces if moisture content exceeds that permitted in manufacturer's written instructions.
5. Clean and prepare surfaces to be coated according to manufacturer's written instructions for each particular substrate condition and as specified.

3.2 PROTECTION

A. Contractor shall protect work at all times and shall protect all adjacent work and materials by suitable covering or other methods during progress of work. The contractor will protect all adjacent areas not to be coated by taking appropriate measures. Areas to be protected are windows, brick, surrounding lawn, trees, shrubbery, floor and steps.
B.
Upon completion of work, he/she shall remove all droppings and over-spray from floors, glass, concrete and other surfaces not specified to be coated.

3.3 APPLICATION

A. Mixing: Mix for approximately 3 minutes using a slow-speed drill and paddle to a uniform consistency. Avoid entrapping air in the liquid during mixing.

B. Surface Conditioner Application (Primer):

C. Apply primer evenly with brush, roller or approved spray equipment to properly prepared substrates at the approximate rate of 300 to 400 square feet per U.S. gallon.

D. Finish Coating:

1. Apply One coat at 12 wet mils (5 mils DFT) of MAPEI Elastocolor Flex.

2. Apply Second coat at 12 wet mils (5 mils DFT) of MAPEI Elastocolor Flex

3. Final thickness of MAPEI Elastocolor Flex will be 5 dry mils per coat

3.4 CLEANING

A. Remove and recycle all excess material in accordance with Division 1 Sections.

1. Set aside extra paint for future color matches, or reuse by Owner.

2. Close and tightly seal all partly used paint and finish containers and store

protected in well-ventilated, fire-safe area at moderate temperature.

3. Place empty containers of solvent-based paints in areas designated for hazardous materials.

4. Do not dispose of paints or solvents by pouring on the ground. Place in designated containers for proper disposal.

END OF SECTION

SECTION 09 97 23 – CONCRETE COATINGS

PART 1 – GENERAL

1.1 SUMMARY

A. Apply concrete sealer to exposed concrete floors indicated to receive Sealed Concrete “SCON” on Finish Schedule.

1. This Section includes all painting and coating work associated with the Welcome Center Building and Pre-Engineered Structure, as indicated on Architectural Drawing Sheets 8000 through 8905.

2. Painting and coating work associated with the Plant Building and all other civil-related drawings is specified in Section 09 91 00 – Painting and is not included in this Section.

B. Related Sections include the following:

1. Division 3 Section “Cast-in Place Concrete”.

2. Division 7 Section “Joint Sealants”.

1.2 SUBMITTALS

A. Product Data - Submit manufacturer's product specification, installation instructions and general recommendations for sealing.

1. Include Material Safety Data Sheets.

2. Color samples from manufacturers standard colors.

1.3 DELIVERY, STORAGE AND HANDLING

A. Delivery: Materials shall be delivered in original sealed containers, clearly marked with supplier’s name, brand name and type of material.

B. Storage and Handling: Recommended material storage temperature is 75^{o}F. Handle products to avoid damage to container. Do not store for long periods in direct sunlight.

1.4 PROJECT CONDITIONS

A. Environmental Conditions:

1. Do not proceed with application of materials when substrate temperature is less than 50^{o} F and not above 90 ^{o} F. Maintain a minimum concrete temperature of 50^{o} F for a minimum of 24 hours before, during and after installation.

2. Do not apply materials unless surface to receive coating is clean and dry.

1.5 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.6 WARRANTY

A. Provide manufacturer's standard warranty.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. H & C Concrete (Division of Sherwin Williams)

B. PROSOCO

C. Vexcon Chemicals

2.2 MATERIALS

A. Cleaner/Degreaser: "Cleaner Degreaser" as manufactured by H & C Concrete.

B. Concrete Sealer:

1. Provide "Clarishield Solvent Based Natural Look Clear Concrete Sealer" as manufactured by H & C Concrete.

a. Finish: Low Sheen

b. VOC: <600 g/L

c. Volume Solids: 30 ± 2%

d. Weight Solids: 36 ± 2%

2. Color: Clear sealer.

PART 3 – EXECUTION

3.1 PREPARATION

A. Newly poured concrete must be at least 28 days old. All concrete must be porous, clean, dry and free of grease, oil & any other contaminates.

1. Verify that the concrete surface is free of ridges and sharp projections. In areas that have depressions greater than 1/16”, fill with a 100% solids epoxy material and sand to fill and level to surrounding surfaces.

2. If areas require cleaning, use cleaner/degreaser following manufacturer’s directions. If mold, mildew or fungus is present, kill and remove with a solution of one-cup household bleach to one gallon of water.

B. Do not apply the stain until all surfaces are porous and have been properly prepared.

C. On-grade Concrete Substrates: Prepare according to ASTM F710.

1. Slab Porosity and Adhesion Testing: perform tests recommended by manufacturer, following each individual adhesive manufacturer’s application instructions for use on non-porous substrates if applicable.

2. Moisture Testing: As specified in Division 3 Section “Concrete Moisture Vapor Reduction Admixture”. No further moisture testing shall be required prior to installation of the floor coverings.

3. Alkalinity Testing: not required prior to installation of the floor coverings.

3.2 APPLICATION

A. Apply coatings in strict accordance with manufacturer's recommendations.

B. Stir sealer thoroughly before and during application.

1. When using more than one container, intermix all containers together to ensure color uniformity.

C. A minimum two coats is required. Apply with brush, roller or spray.

1. First Coat: Apply first coat evenly, working in one direction. Allow to dry at least 2 hours before applying second coat.

2. Second Coat: Apply second coat crosswise to the first coat.

D. Allow 72 to 96 hours drying conditions before using the surface.

END OF SECTION

SECTION 10 11 00 – VISUAL DISPLAY BOARDS

PART 1 – GENERAL

1.1 SUMMARY

A. Types of tackboards shown on the Drawings and specified in this section include the following:

1. Factory framed fabric covered cork tackboards.

1.2 SUBMITTALS

A. Product Data: Provide technical data for materials specified. Include Material Safety Data Sheets, when applicable.

B. Shop Drawings: Provide shop drawings for each type of porcelain enamel markerboard and fabric-faced cork tackboard. Drawings should include dimensioned elevations and show all anchors, accessories, layout and installation details. Include sections of typical trim members.

C. Samples and color charts: Provide representative samples of face, core, backing and trim material to illustrate finish, color and texture, as required.

D. Manufacturer’s Instructions: Provide Manufacturer’s installation instructions.

1.3 QUALITY ASSURANCE

A. Manufacturer: Unless otherwise acceptable to Architect, furnish all markerboards and tackboards by one manufacturer for entire project.

B. Regulatory Requirements: Conform to applicable code for flame/smoke rating in fabric-faced cork tackboards in accordance with ASTM-E 84.

C. Operation and Maintenance: Provide Manufacturer’s instructions regarding regular cleaning, stain removal, and relevant precautions.

1.4 DELIVERY AND STORAGE

A. Delivery: Deliver materials in original, unopened, undamaged containers with identification labels intact.

B. Storage: Store materials upright and in a way to ensure protection from exposure to harmful weather conditions.

1.5 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.6 WARRANTY

A. Provide a written warranty that states the vinyl-fabric-faced cork tackboards are guaranteed for one year against defects in materials and/or workmanship.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Claridge Products and Equipment

B. Aywon Chalkboard

C. AJW

D. Or equal

2.2 MATERIALS

A. Fabric-Faced Cork Tackboards: Balanced, high-pressure laminated, fabric-faced cork tackboards of three-ply construction consisting of fabric face sheet, cork sheet core material, and backing.

1. Vinyl Fabric Face Sheet: Mildew-resistant, washable vinyl fabric complying with FS CCC-W-408, weighing at least 13-oz./sq. yd.

2. Cork Sheet Core Material: ¼-inch thick self-healing natural cork sheet.

3. Backing Sheet: ¼-inch thick hardboard.
4. Laminating Adhesive: Manufacturer's standard moisture-resistant, thermoplastictype adhesive.

5. Size and Quantity: As shown in the drawings.

2.3 ACCESSORIES

A. Aluminum Trim: Fabricate frames and trim of at least 0.062-inch thick, extruded aluminum alloy with satin clear anodized finish, of proper size and shape to suit the installation. Joints are to be kept to a minimum. Corners are to be mitered to a neat, hairline closure.

2.4 FABRICATION

A. Assembly: Provide factory-assembled tackboard units.

2.5 FINISHES

A. Tackboard Colors: Provide colors as selected by Architect from manufacturer's standard tack board color selections (equal to Newline Designer Fabrics – Guilford of Maine).

PART 3 – EXECUTION

3.1 EXAMINATION

A. Prior to starting installation, verify that interior moisture and temperature approximate normal occupied conditions.

B. Verify that wall surfaces are properly prepared and free of dirt, scaling paint, and projections or depressions that would affect the smooth, finished surfaces of markerboards.

C. Do not proceed with installation until all unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Deliver factory built units completely assembled and of dimensions shown in Manufacturer’s shop drawings as approved by Architect. Provide all mounting materials and accessories necessary for complete installation.

B. Follow Manufacturer’s instructions for storage and handling of units.

C. Install boards level and plumb, keeping perimeter trim straight in accordance with Manufacturer’s instructions.

D. Verify all accessories have been properly installed and are operating properly.

3.3 CLEANING

A. Clean surfaces and trim in accordance with Manufacturer’s recommendations, leaving all boards ready for use.

END OF SECTION

SECTION 10 14 00 – SIGNAGE AND GRAPHICS

PART 1 – GENERAL

1.1 SUMMARY

A. This section includes the fabrication, finishing, and installation of metal signage and graphics as shown and dimensioned on the drawings, including but not limited to:

1. Room identification
2. Exterior signage
3. Directional Signage
4. Building plaque
5. Aluminum letters
6. Aluminum letters – backlit (mounted on building interior)
7. Exterior Lighted Sign
8. Custom Toilet Room Metal Graphics
9. No Smoking Signs
10. NOTICE - No Pets Allowed
11. Please Use Main Entrance

.

C. Related Sections include the following:

1. Division 6 Section “Translucent Resin Panel System”
2. Division 9 Section “Digitally Printed Wall Cladding”
3. Division 9 Section "Epoxy Terrazzo” – Cast metal floor lettering installed integrally with terrazzo flooring are not included in this Division 10 section.
4. Division 10 Section “Operable Partitions”

1.2 PERFORMANCE REQUIREMENTS

C. Provide architectural metal letters and graphics with concealed fastener connections.

1.3 SUBMITTALS

C. Product Literature

1. Submit product data for all signs.

2. Submit schedule of all signs and shop drawings listing sign size, letterform, and letter heights. Include construction details, layouts, size, and mounting methods.

3. Provide a layout plan showing location of each type of sign.

4. Installer to submit CAD generated location plan noting the location of all signage and cross referenced to message schedule for architect’s approval.

5. Provide one sample of **EACH** sign types for verification of materials, color,

pattern, overall quality, and for adherence to drawings and requirements indicated.

6. Provide patterns as needed for installation.

7. Submit shop drawings illustrating metal letters and graphics as indicated on the drawings for approval by the Architect. For large format pieces, shop drawings must include break marks and piece numbers optimized for installation. These drawings are to ensure accurate fabrication and installation alignment.

8. Preparation instructions and recommendations.

D. Color Samples: Submit manufacturer's standard color chart. Submit actual samples of each chosen color for verification of actual color to be installed. Multiple cured samples may be required for selection.

1.4 QUALITY ASSURANCE

A. All identifying devices shall comply with requirements of 36 CFR 1191 "Americans with Disabilities Act Accessory Guidelines for Buildings and Facilities".

B. Installer Qualifications: Experienced Installer equipped and trained for fabrication and installation of signage and graphics for this Project with record of successful completion of projects of similar scope.

C. Mockups: Provide installation mockup identical to specified system and installation methods.

1.5 DELIVERY, STORAGE AND HANDLING

A. Store in accordance with the manufacturer’s recommendation, with proper precautions concerning storage conditions to ensure the fitness of the material when installed.

1.6 PROJECT CONDITIONS

A. Package to prevent damage or deterioration during shipment, handling, storage and installation.

B. Products should remain in original packaging until removal is necessary. Store products in a dry, indoor location.

1.7 WARRANTY

A. Provide manufacturer’s warranty against defects in materials or workmanship for minimum 5 years.

1.8 BUILD AMERICA, BUY AMERICA (BABA) REQUIREMENTS

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. All signage, letters, graphics listed in this section shall meet BABA – Build America / Buy America and be manufactured in the U.S.

B. Interior/Exterior Signage:

1. Takeform Architectural Graphics

2. GC – Graphic Communications

3. 2/90 Sign Systems

4. Or Equal

C. Plaques / Aluminum Letters:

1. Gemini Incorporated

2. Impact Architectural Signs

3. A.R.K. Ramos

4. Or Equal

D. Backlit Aluminum Letters:

1. Mitchell Signs, 3200 Hwy 45 North, Meridian, MS 39301 Phone (601) 482-7471 signs@mitchellcompanies.com

2. Headrick Signs & Graphics, Inc., One Freedom Square Laurel, MS 39440-3367 Phone (601) 649-1977 / Fax (601) 425-4732 www.headricks.com

3. Or Equal

2.2 SIGN STANDARDS

A. It is the intent of these specifications to establish a sign standard for the Owner including but not limited to primary directories, primary room identification, restrooms, offices, etc., and all code compliant signage.

B. Typography

1. Type style: Helvetica Bold (HB102). Copy shall be a true, clean, accurate reproduction of typeface specified. Upper and lower case shall be used. Letter spacing to be normal and interline spacing shall be set by manufacturer.

2. Arrows, symbols and logo art: To be provided in style, sizes, colors and spacing per manufacturer’s standard.

3. Grade II Braille utilizing perfectly round, clear insertion beads.

2.3 SIGNS

A. Architectural Signage System

1. The signage shall incorporate a decorative laminate face with applied graphics including all tactile requirements in adherence to ADA specifications.

2. All signs, including work station and room ID's, overheads and flag mounts, directionals and directories shall have a matching appearance and constructed utilizing the same manufacturing process to assure a consistent look throughout.

B. Materials:

1. Sign face shall be 0.035" (nominal) standard grade, high pressure surface laminate. A painted sign face shall not be acceptable.

2. The substrate shall be Green 209, a natural fiber wood product with SFI certification. The sign shall incorporate balanced construction with the core sandwiched between laminates to prevent warping. An acrylic substrate shall not be acceptable. Laminate on the sign face only shall not be acceptable.

3. Tactile lettering shall be precision machined, raised 1/32", matte PETG and subsurface colored for scratch resistance.

4. Signs shall incorporate a metal accent bar. Bars shall be anodized with a brushed satin finish. Painted bars shall not be acceptable.

5. Sign and backer edge shall be treated with a hot wax seal for moisture integrity.

C. Construction:

1. The signage shall be capable of accepting paper or acetate inserts to allow changing and updating as required. Insert components shall have a 0.080" thickness non-glare acrylic window and shall be inlayed flush to sign face for a smooth, seamless appearance.

2. The signage shall, with the exception of directories and directionals, be a uniform 8½" width to facilitate inserts printed on standard width paper.

3. The signage contractor shall provide and install all signage inserts.

4. Manufacturer shall provide a template containing layout, font, color, artwork and trim lines to allow Owner to produce inserts on laser or ink jet printer. The template shall be in Microsoft Word format.

5. The laminates (front and back) shall be pressure laminated and precision machined together to a 90-degree angle. Edges shall be smooth, void of chips, burrs, sharp edges and marks.

6. The signage shall utilize an acrylic sphere for Grade II Braille inserted directly into a scratch resistant, high pressure laminate sign face. Braille dots are to be pressure fit in high tolerance drilled holes.

7. Braille dots shall be half hemispherical domed and protruding a minimum 0.025".

8. The signage shall utilize a water based adhesive. The adhesive shall be nonhazardous and shall allow for flexing and deflection of the adhered components due to changes in temperature and moisture without bond failure.

9. All signs shall be provided with appropriate mounting hardware. Hardware shall be finished and architectural in appearance and suitable for the mounting surface.

a. Where signage is to be mounted on glass surfaces, provide a decorative backer panel.

2.4 MANUFACTURED UNITS

A. General:

1. Provide "Quad – Fusion 57" for all **interior** sign types as manufactured by Takeform Architectural Graphics or approved equal.

2. Provide "Signify – Quad" for all **exterior** sign types as manufactured by

Takeform Architectural Graphics or approved equal.

B. Room identification:

1. Standard Room I.D:

a. Takeform #F57B-BH

b. Size: 9.5” x 4”

c. **Quantity:** provide 1 at each support space (including janitor, storage, mechanical, electrical, etc.).

2. Room I.D. w/Small Insert:

a. Takeform #F57B-D1

b. Size: 9.5” x 7”

1.

c. **Quantity:** provide 1 at all rooms not indicated to receive another type.

3. Interior Restrooms:

a. Men’s: Takeform #F57B-G2-BC

b. Womens: Takeform #F57B-G2-BC

c. Familiy Restrooms: Equal to Takeform #F57AB3-BC

d. Size: 9.5” x 10.5”

e. **Quantity:** provide 1 in format required at each restroom

C. Exterior door signage:

1. Takeform “Signify Quad Wall Mount Panel”

2. Size: 9” x 12”

3. Symbols: provide ADA compliant symbols and braille at restroom locations.

4. Materials: Aluminum Composite Material (ACM) with vinyl lettering

5. **Quantity:** provide 1 at each exterior door opening

2.5 FINISHES FOR INTERIOR SIGNAGE

A. Face/background color shall be standard grade, high pressure laminate, all colors and finishes.

B. Standard tactile colors shall match manufacturer's ADA standard color selection.

C. Finishes are to meet current Federal ADA and any State requirements.

D. Interior Finish Schedule:
   1. **A minimum 2 color laminate selections – to be selected by the Architect**

2.6 BUILDING PLAQUE

A. Provide the following Aluminum Plaque with custom etched emblem and Seal of the Mississippi Department of Transportation, along with the names of the Board of Commissioners Executive Staff, the names of the Architect and General Contractor, the name and location of the Project, etc:

   1. Size: 24” wide x 36” high
   2. Thickness: 3/4”
   3. Copy: Raised copy – Horizontal Stroke
   4. Typeset: times new roman
   5. Finish: Pebble w/ Satin Surface
   6. Edge style: inset single line
   7. Background finish: 2025 black painted
   8. Clear Coat: satin
   9. Mount: Blind Mount – Standard Studs
   10. Seal Logo: Raised with recessed detail
   11. All other text: raised brushed

2.7 ALUMINUM LETTERS BACKLIT

A. Equal to cast aluminum letters in a halo-lit configuration with Lexan back and UL listed LED package as manufactured by Gemini Incorporated.

   1. Provide in anodized aluminum finish – color as selected by Architect.
   2. Refer to Division 26 Sections for rough-in and connection to electrical supply.
   3. Gemini sign body UL# E319118 – UL listed.

2.

B. Components:

   1. All components to be UL approved for LED lighting.
   2. LED lighting to be “LuxemBright Sizzle – 5000k” as manufactured by CAO Lighting, Inc.

3. Power supply:

   a. Gemini 60W LUX, manufactured by Meanwell (CLG-60-12).

   b. 110 volt input, 60 watt output

4. Wiring, connectors, and other accessories for a complete working installation.

C. Mounting: 2” standoffs (2-part detachable aluminum 10/24 studs, minimum of 4 per letter).

D. Style: Match MISSISSIPPI style lettering as shown on the drawings.

E. Size:

1. Cast aluminum back-lit letters – size and style as indicating on the drawings.:

2. Quantity: One “MISSISSIPP”

2.8 DECORATIVE CAST BRONZE SIGNAGE - (State of Mississippi / Heron Silhouette)

A. Material: Cast bronze, ASTM B584 Alloy C87600 or C92200 (architectural bronze).

1. Thickness: 1/2 inch nominal.

2. Edges: Single bevel, machined smooth, free of casting pits, voids, or sharp edges.

3. Design and Graphics:
   a. Shape: Profile of State of Mississippi with Heron silhouette and marsh reed detail as indicated on Drawings.

4. Finish:

   a. Dark statuary bronze patina, hand-rubbed, with brushed highlights on raised surfaces.
   b. Apply factory-applied clear protective lacquer suitable for exterior bronze.
   c. Provide anti-graffiti and UV-resistant clear topcoat for exterior bronze signage.

C. Mounting and Hardware:

1. Provide concealed threaded studs for exterior mounting.

2. Provide stainless steel threaded studs, epoxy-set, minimum 3/8 inch diameter.

3. Provide **vandal-resistant mounting system**, including tamper-resistant fasteners and security anchors.

4. Fabricator shall provide full-size installation template showing stud layout.

D. Basis of Design:

1. Gemini Cast Bronze Plaque, Dark Oxide finish with satin highlights, vandal-resistant mounting.
2. Or Equal.

E. Fabrication:

1. Smooth edges; grind and finish to eliminate casting flash lines.

2. Back surface to be flat or equipped with concealed stiffening ribs as needed for rigidity.

3. Provide shop drawings indicating mounting details, locations, thickness, and finish.

F. Backlighting:

1. Provide concealed LED strip lighting mounted on the rear side of the cast bronze signage to create a halo/backlit effect around the perimeter of the graphic as indicated on the Drawings.

2. LED lighting shall be:

   a. Continuous, linear LED strip type suitable for architectural accent lighting.
   b. Rated for exterior use; minimum IP65.
   c. Low-voltage (24V) system.
   d. Warm white, nominal 2700K–3000K, unless otherwise indicated.
   e. High-output type suitable to provide uniform backlighting without visible hot spots.

3. Lighting shall not be directly visible from normal viewing angles. Provide diffusers, spacers, or stand-off depth as required to achieve an even halo illumination.

4. Provide all internal mounting channels, spacers, raceways, and concealed wiring pathways integral to the signage fabrication.

5. Coordinate LED power supplies, drivers, and final electrical connections with Division 26. Drivers may be remotely located unless otherwise indicated.
6. Provide access provisions for maintenance and replacement of LED components without removal or damage to the bronze signage.

7. Backlighting components integral to the signage, including LED strips, mounting hardware, and internal wiring within the sign assembly, shall be provided under this Section; final power connection and switching shall be provided under Division 26

8. Controls

   a. Provide dimming capability for LED backlighting, adjustable from 0–100 percent output.
   b. Dimming shall be smooth and flicker-free throughout the full dimming

range.
c. Dimming control shall be compatible with the LED drivers furnished with the signage.

9. Timeclock Control

a. Provide programmable astronomical timeclock control to automatically turn LED backlighting on at dusk and off at dawn, unless otherwise indicated.
b. Timeclock shall be capable of seasonal adjustment and power-loss memory retention.
c. Locate timeclock in an accessible interior or weather-protected location.

10. Coordination

a. Backlighting controls, including dimmer and timeclock, shall be coordinated with Division 26.
b. Final switching, control wiring, and power connection shall be provided under Division 26 unless otherwise indicated.

2.9 ALUMINUM LETTERS

A. Equal to cast aluminum letters as manufactured by Gemini Incorporated.

B. Size and style: Cast alum letters; letter style – Century Gothic; Color – dark bronze anodized.

1. Provide letters in quantity as follows:

a. One (1) – VENDING – 10”
b. One (1) – RESTROOMS – 10”
c. One each (1 each) – NORTH, CENTRAL, SOUTH – 5”
d. Mounting – Flush stud mounting

2.10 CUSTOM TOILET ROOM METAL GRAPHICS

A. General: Provide custom, large-format toilet-room identification graphics as shown on Drawings and in Architect-provided imagery. Include all hardware, anchors, templates, and accessories necessary for a complete installation.

B. Design Intent:

1. Figures shall replicate the imagery provided by Architect for Men’s, Women’s, and Family Toilet Rooms.

2. Maintain proportions, profiles, and line weights consistent with approved design concept.

3. Submit shop drawings showing full-scale outline profiles, dimensions, mounting system, and finish samples prior to fabrication.

C. Materials and Fabrication:

1. Material: Solid metal with brushed brass finish.

2. Thickness: 1 inch minimum.

3. Front Profile Width: 2 inches.

4. Mounting: Pin-mounted with concealed anchors; provide all templates and hardware. Graphics shall be mounted flush to wall finish.

5. Edges: Machined smooth, free of burrs or sharp corners.

6. Finish: Brushed brass with clear protective coating; maintain uniform grain direction.

7. Finish Sample: Submit 4 in × 4 in sample for approval before production.

D. Sizes and Quantities:

1. Men’s Toilet Room – One (1) figure approximately 6'-0" H × 2'-0" W.

2. Women’s Toilet Room – One (1) figure approximately 6'-0" H × 2'-0" W.

3. Family Toilet Rooms – Four (4) sets comprised of:

a. Girl – 2'-0" H × 1'-0" W (approx.)

b. Boy – 2'-0" H × 1'-0" W (approx.)

c. Mom – 4'-0" H × 18" W (approx.)

d. Dad – 4'-0" H × 18" W (approx.)

E. Submittals:

1. Shop Drawings indicating profiles, dimensions, materials, finishes, and mounting details.

2. Finish sample of brushed brass metal.

3. Mock-Up: Provide one full-scale figure for review of finish and mounting method prior to fabrication of remaining units.

F. Installation: Install plumb, level, and aligned per approved Shop Drawings. Protect adjacent surfaces and finishes. Clean exposed surfaces upon completion.

2.11 NO SMOKING SIGNS

B. General: Provide self-adhesive “NO SMOKING” labels for application to interior face of exterior glass doors.

1. Provide one on each glass door – 16 total

B. Material:

1. Pressure-sensitive vinyl film suitable for application to glass.

2. Minimum thickness: 3 mil.

3. UV-resistant, non-yellowing, fade-resistant material.

C. Graphics: International “No Smoking” symbol and/or text as required by applicable codes.

1. Symbol and text color: White or red/white, as selected by Architect.

2. Typeface: Simple sans-serif, legible at required viewing distance.

D. Finish: Matte or satin finish to minimize glare and reflections on glass surfaces.

E. Adhesive: Clear, permanent adhesive suitable for smooth glass surfaces.

1. Adhesive shall not bleed, bubble, or discolor glass.

2. Removable only by mechanical means without damage to glass.

F. Size: Minimum size sufficient to meet code visibility requirements.

G. Compliance: Provide signage complying with applicable local and state smoking regulations and facility requirements.

2.12 NOTICE – NO PETS ALLOWED

A. General: Provide permanent signage stating that animals are not permitted within the facility except for service animals as defined by the Americans with Disabilities Act (ADA).

1. Provide one side at each Public Entrance – 5 total.

B. Message Content:

NOTICE - NO PETS ALLOWED
Service Animals Specifically Trained to Aid a Person with a Disability are Welcome
(As Defined by the ADA)

C. Compliance:

1. Signage shall comply with the Americans with Disabilities Act (ADA) and applicable state and local regulations.

2. Language shall not imply certification, registration, or identification requirements for service animals.

D. Sign Type:

1. Rigid wall-mounted sign.

2. Not a temporary decal or paper notice.

E. Materials:

1. Aluminum, acrylic, or high-pressure laminate sign panel.

2. Minimum thickness: 1/8 inch (aluminum).

3. Durable, cleanable surface suitable for public facilities.

F. Graphics and Finish:

1. High-contrast text and symbols for legibility.

2. Matte or satin finish to minimize glare.

3. International symbol optional; pictograms shall not conflict with ADA guidance.

G. Mounting:

1. Concealed fasteners or adhesive mounting suitable for exterior wall substrate.

2. Mount plumb, level, and securely anchored.

H. Basis of Design: Architectural wall-mounted regulatory sign as manufactured by approved signage manufacturer.

2.13 PLEASE USE MAIN ENTRANCE

A. General: Provide self-adhesive “PLEASE USE MAIN ENTRANCE” labels for application to interior glass doors.

1. Provide one on north entrance glass doors – 2 total

B. Material:

1. Pressure-sensitive vinyl film suitable for application to glass.

2. Minimum thickness: 3 mil.

3. Height: 2 inches

4. UV-resistant, non-yellowing, fade-resistant material.

C. Graphics: PLEASE USE MAIN ENTRANCE (Located at the front of the Building)

1. Symbol and text color: White, red or white-on-clear, as selected by Architect.

2. Typeface: Simple sans-serif, legible at required viewing distance.

3. High contrast against background for visibility.

D. Finish: Matte or satin finish to minimize glare and reflections on glass surfaces.

E. Adhesive: Clear, permanent adhesive suitable for smooth glass surfaces.

1. Adhesive shall not bleed, bubble, or discolor glass.

2. Removable only by mechanical means without damage to glass.

F. Size: Minimum size sufficient to meet code visibility requirements.

G. Compliance: Decals are informational and directional in nature and are not required to include ADA tactile characters or Braille

PART 3 – EXECUTION

3.1 EXAMINATION

A. Installer shall examine signs for defects, damage and compliance with specifications. Installation shall not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. General: Installation locations shall be in accordance with ADA specifications. Locate signs where indicated by Architect on approved layout plan using mounting methods in compliance with manufacturer's written instructions.

1. The signage contractor will coordinate installation schedules with the Owner and Architect.

2. Installation shall be performed by manufacturer’s personnel trained and certified in manufacturer’s methods and procedures.

3. Installer to conduct a pre-installation survey prior to manufacturing to verify message schedule copy and sign location. Each location shall be noted using low tack vinyl. Full scale renderings of directories and directionals shall also be provided. Any location discrepancy or message issues shall be submitted to architect for review.

4. Signs shall be level, plumb, and at heights indicated with sign surfaces free from defects.

5. Upon completion of the work, signage contractor shall remove unused or discarded materials, containers and debris from site.

B. Building plaque:

1. Mount level where indicated or directed, secured with concealed threaded rods mounted on back of tablet and adhesive.

C. Aluminum letters - backlit:

1. Install per manufacturer using studs and spacers for spacing indicated.

2. Connect backlit letters to electrical system in accordance with Division 26 Sections.

D. Metal Plate Signage:

1. Fabricate and install decorative weathering steel panels true to line, level, and plumb.

2. Provide attachment details and anchors compatible with concrete assemblies as indicated on Drawings.

3. Ensure drainage and ventilation are provided at rear of plate to prevent moisture entrapment and uneven weathering.

4. Protect adjacent concrete from rust runoff during initial exposure period.
5. After installation, clean exposed surfaces; do not use abrasive cleaning methods that alter finish.

6. Verify patina color and uniformity under natural daylight; variations consistent with the natural characteristics of weathering steel are acceptable.

7. Touch up field welds or abrasions with matching patina solution and clear sealer.

3.3 FIELD QUALITY CONTROL

A. A minimum of 2 site visits shall be required by the sign contractor.

1. Prior to submission of schedule for site assessment and evaluation.

2. Final walk-through and punchlist.

3.4 CLEANING

A. Upon completion all identifying devices shall be undamaged, level, plumb, true to line and securely anchored.

B. Clean all exposed surfaces and protect to prevent damage during remainder of construction period.

END OF SECTION

SECTION 10 21 13 – PHENOLIC TOILET COMPARTMENTS

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes the following phenolic-core toilet compartments

1. Floor mounted, overhead braced toilet compartments with no sight-line privacy construction.

B. Related Sections include the following:

1. Division 6 Section “Rough Carpentry” for blocking inside walls

2. Division 10 Section “Toilet and Bath Accessories”

1.2 REFERENCES

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Installation methods.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Include coordinated dimensions for equipment and furnishings specified in other Sections.

C. Verification Samples: For each finish product specified, two samples, representing actual product, color, and finish.

D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

E. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic checking and adjustment, cleaning and maintenance.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 5 years manufacturing phenolic toilet partitions.

B. Installer Qualifications: Minimum 5 years' experience installing similar toilet partition systems.

C. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication where possible to ensure proper fitting of work. However, allow for adjustments within specified tolerance wherever taking of field measurements before fabrication might delay work.

D. Coordination: Furnish inserts and anchorages which must be built into other work for installation of compartments and related work; coordinate delivery with other work to avoid delays.

E. Pre-Installation Meeting: Verify blocking requirements. Discuss handling and installation techniques, coordination with other work, and protection.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store products in the manufacturer's unopened packaging until ready for installation.

B. Protect finished surfaces from soiling or damage during handling and installation.

1.6 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.7 WARRANTY

A. Provide manufacturer's standard warranty in which manufacturer warrants against defects in materials and workmanship during for 25 years.

1.8 BUILD AMERICA, BUY AMERICA (BABA) COMPLIANCE

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Basis of Design: ASI Global Partitions – Alpaco® Classic Collection, Phenolic Color-Thru.

1. System Type: Floor Mounted, Overhead Braced – Privacy Style with No-Sightline Construction.

B. Acceptable Manufacturers (Phenolic only – HDPE not permitted):

1. ASI Global Partitions – Alpaco® Classic Collection (Basis of Design)

2. Privada Toilet Partitions – Phenolic Series

3. Ironwood Manufacturing – Phenolic Series

4. Scranton Products – Phenolic (where available)

5. Other approved equal complying with this specification

C. Substitutions:

1. Submit requests per Division 01.

2. Provide documentation verifying phenolic material and compliance with project requirements.

3. Only phenolic compact laminate systems meeting or exceeding requirements of this Section and complying with Build America, Buy America Act (BABA) requirements will be considered.

2.2 MATERIALS

A. Phenolic-Core Toilet Compartments

A. Aluminum Extrusions: ASTM B221, 6463-T5 alloy and temper.

B. Aluminum Die Castings: ASTM B85, A380 alloy.

C. Stainless Steel Castings: ASTM A167, Type 304.

D. Rubber: Abrasion resistant Styrene Butadiene Rubber, 65 to 80 Shore A durometer, black.

2.3 PHENOLIC TOILET COMPARTMENT SYSTEM

A. Style: Floor mounted, overhead braced toilet compartments.

B. Construction: No-sightline interlocking doors and pilasters. Provide continuous privacy profiles to eliminate sight gaps.

C. Doors and Panels: Phenolic compact laminate (HPL) constructed under high pressure with phenolic resin core. Provide Color-Thru construction with color consistent through the core and surface.

D. Thickness:
1. Door and panel thickness: 1/2 inch (13 mm) with beveled edges.

2. Pilaster thickness: 3/4 inch (19 mm) with beveled edges.

E. Edges: Machine finished with smooth, beveled edges.

F. Height: 80 inches high and mounted 4 inches above finished floor.

G. Color: As selected by Architect from full manufacturer’s phenolic Color-Thru range.

2.4 HARDWARE

A. Hinges: Heavy-duty stainless steel surface-mounted hinges with adjustable cam for self-closing operation. Provide emergency access feature allowing door to be lifted for entry.

B. Latch and Keeper: Concealed or surface-mounted stainless steel hardware with manufacturer’s standard indicator latch showing occupancy status.

C. Fasteners: Theft-resistant stainless steel.

D. Headrail: Anti-grip aluminum headrail, 1 inch x 1-3/4 inch minimum, securely fastened to pilasters and walls, brushed finish.

E. Pedestals: Grade 304 stainless steel, brushed stainless finish.

F. Brackets: Continuous stainless steel brackets at all panel-to-wall and panel-to-pilaster conditions.

G. Indicator Latches: Manufacturer’s standard brushed nickel zamac indicator latch assembly with antimicrobial coating showing red in the window when in locked position and green when unlocked.

H. Door Pulls: Manufacturer's standard brushed nickel zamac pulls with antimicrobial coating at outswinging doors that comply with accessibility requirements.

I. Coat Hooks and Bumpers: Manufacturer’s standard stainless steel hook and bumper combination.

1. Inswing Doors: Stamped stainless steel door hook, Grade 304 stainless steel, #4 brushed finish, combined coat hook and bumper.

2. Outswing Doors: Stainless steel flat coat hook, Grade 304 stainless steel, #4 brushed finish.

3. Handicap Door: Equip with second door pull and door stop.

2.5 PERFORMANCE REQUIREMENTS

A. Provide phenolic toilet partitions that are resistant to moisture, impact, graffiti, bacteria, and cleaning chemicals. Panels shall not delaminate, warp, crack, or discolor under normal usage and cleaning conditions.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Examine areas to receive toilet partitions for correct height and spacing of anchorage/blocking and plumbing fixtures that affect installation of partitions. Report discrepancies to the architect.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved Shop Drawings.

B. Install partitions rigid, straight, plumb, and level.

C. Locate bottom edge of doors and panels 4” above finished floor.

D. Clearance at vertical edges of doors shall be uniform top to bottom and shall not exceed 3/8 inch.

E. No evidence of cutting, drilling, and/or patching shall be visible on the finished work.

F. Provide no-sightline construction at all doors and pilasters.

G. Finished surfaces shall be cleaned after installation and be left free of imperfections.

3.4 ADJUSTING

A. Adjust doors and latches to operate correctly.

3.5 PROTECTION

A. Clean surfaces promptly after installation.

B. Remove excess adhesives, sealants, and markings.

C. Protect installed products until completion of Project.

D. Replace damaged components prior to Final Completion.

END OF SECTION

SECTION 10 28 00 – TOILET AND BATH ACCESSORIES

PART 1 – GENERAL

1.1 SUMMARY

A. Provide toilet and other accessory items in locations as indicated on the Drawings and as specified in the schedule herein.

1. Refer to Toilet Accessory Schedule on Drawings for complete schedule.

2. Contractor to coordinate installation and provide blocking in metal stud walls for all items specified.

B. Related Sections include the following:

1. Division 6 Section “Rough Carpentry”

2. Division 8 Section “Glazing” for custom size mirrors

3. Division 22 Sections

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's data sheets for each product specified, including the following:

1. Installation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Cleaning and maintenance instructions.

4. Replacement parts information.

B. Shop Drawings: Provide shop drawings showing locations, mounting heights, clearances, etc. for each accessory.

C. Schedule: Submit a complete toilet accessory schedule, indicating the type and quantity to be installed in each washroom. Use room numbers as indicated on the Drawings.

D. Setting Drawings: Where cutouts are required in other work, provide templates, substrate preparation instructions, and directions for preparing cutouts and for installation of anchorage devices.

1.3 QUALITY ASSURANCE

A. Manufacturer: Provide products manufactured by a company with a minimum of 10 years successful experience manufacturing similar products.

B. Accessibility Requirements: Comply with requirements applicable in the jurisdiction of the project, including but not limited to ADA and ICC/ANSI A117.1 requirements as applicable.

C. Inserts and anchorages: Furnish inserts and anchoring devices that must be set in concrete or built into masonry; coordinate delivery with other work to avoid delay.

D. Accessory Locations: Coordinate accessory locations with other work to avoid interference and to assure proper operation and servicing of accessory units.

E. Single-Source Responsibility: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise acceptable to Architect.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations. Protect from damage.

1.5 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered.**

1.5 WARRANTY

A. Manufacturer's Warranty for Washroom Accessories: Manufacturer's standard 1 year warranty for materials and workmanship.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Bobrick Washroom Equipment (Basis of Design)

B. American Specialties Inc. (ASI)

C. Bradley Corporation

2.2 MATERIALS

A. Stainless Steel: AISI Type 304, 22 gauge minimum thickness, unless otherwise indicated.

B. Brass: Leaded and unleaded, flat products, ASTM B 19; rods, shapes, forgings, and flat products with finished edges, ASTM B 16: castings, ASTM B-30

C. Sheet steel: Cold-rolled, commercial quality ASTM A366, 20-gauge minimum, unless otherwise indicated. Surface preparation and metal pretreatment as required for applied finish.

D. Galvanized Steel Sheet: ASTM A527, G60.

E. Galvanized Steel Mounting Devices: ASTM A153, hot-dip galvanized after fabrication.

F. Fasteners: Screws, bolts, and other devices of same materials as accessory unit or of galvanized steel where concealed.

G. Keys: Unless otherwise indicated, provide universal keys for access to toilet accessory units requiring internal access for servicing, resupply, etc. Provide minimum of 6-keys to Owner and obtain receipt.

2.3 GRAB BARS

A. Compliance: Universal/accessibility design, including ADA-ABA and ICC/ANSI for structural strength.

1. Capacity: Designed to support 900 lbs in compliant installations.

B. Description: Grab bar with 90 degree return to flange. Clearance between grab bar and finished wall is 1-1/2 inches.

C. Grab Bar Materials: 18-8, Type 303, 18 gauge stainless steel tubing with satin finish, ends of grab bar pass through flanges and are heliarc welded to flanges to form one structural unit, outside diameter 1-1/2 inches.

D. Mounting Flanges: Concealed, 18-8, Type 303, 1/8 inch thick, stainless steel plate.

1. End Flanges: 2 inches x 3-1/8 inches with two holes for attachment to wall.

2. Intermediate Flanges: 2-5/8 inches x 3-1/8 inches wide x 3-1/8 inch diameter.

E. Snap Flange Covers: 18-8, Type 303, 22 gauge drawn stainless steel with satin finish, 2 inch diameter x 5/16 inches deep; snap over mounting flange to conceal mounting screws.

F. Mounting Accessories: Provide mounting accessories as required for complete installation.

G. Toilet Accessory Schedule Symbol / Manufacturer / Model No.:

1. A – 36” Grab Bar: equal to Bobrick, No. B-9806.MBLK x 36 – Fino Collection.

2. B – 42” Grab Bar: equal to Bobrick, No. B-9806.MBLK x 42 – Fino Collection

3. C – 18” Vertical Grab Bar: equal to Bobrick, No. B-9806.MBLK x 18 – Fino Collection.

2.4 JUMBO TOILET TISSUE DISPENSER – GANG RESTROOMS

A. Surface-Mounted Multi Roll Tissue Dispensers:

1. Cabinet: Type 304, 22 gauge stainless steel with matt black finish, all welded construction.

2. Door: Type 304, 18 gauge stainless steel with satin-finish; equipped with a lock keyed like other washroom accessories.

3. Dispensing Mechanism::

a. One-piece molded ABS spindle.

b. Unit holds two standard-core toilet tissue rolls up to 9" diameter.

B. Toilet Accessory Schedule Symbol / Manufacturer / Model No.:

1. D – Multi-Roll Toilet Tissue Dispenser: equal to Lavex 712MBDBLTPDJR

2. With view window and lock and key.

2.5 SANITARY NAPKIN DISPOSAL

A. Surface-Mounted Sanitary Napkin Disposal Units:

1. Container: All-welded, 18-8, Type 304, 22 gauge stainless steel with satin finish on exposed surfaces. Front of container shall have radius on corners and edges.

2. Cover: Drawn, one-piece, seamless, 18-8, Type 304, 22 gauge stainless steel with satin finish. construction. Front of cover shall have radius on corners and edges.

3. Hinge: Full-length stainless steel piano-hinge.

B. Toilet Accessory Schedule Symbol / Manufacturer / Model No.:

1. E – Bobrick No. B-35139.MBLK

C. Disposable Liners: Provide waxed paper liners compatible with the B-35139 model – two boxes of 500 count.

2.6 SOAP DISENSER

A. Recessed Soap Dispenser with Soap Vessel:

1. Recessed Mounting Box — 18-8, Type-304 stainless steel. All-welded construction. Completely enclosed.

2. Door — 18-8, Type-304, 18-gauge (1.2mm) stainless steel with satin finish or matte black, as specified. 1/4" (6mm) 90° return edges for maximum rigidity. Secured to mounting box with a concealed stainless steel piano-hinge. Equipped with a polycarbonate refill-indicator window and a tumbler lock keyed like other Bobrick washroom accessories.

3. Soap Vessel — Molded plastic. Large opening equipped with plastic cover. Capacity: 45-fl oz (1.3-L).
4. Soap Valve — Valve mechanism with O-ring seals. Stainless steel inner spring and spout. Chrome-plated brass housing.

5. Operation: Corrosion-resistant valve dispenses commercially marketed all-purpose hand soaps. Valve operates with one hand, without tight grasping, pinching, or twisting of the wrist, and with less than 5 pounds of force to comply with accessible design. Window indicates when refilling is required. Door secured to mounting box unlocks with key provided and swings open 90° for filling without removing from wall.

B. Toilet Accessory Schedule Symbol / Manufacturer / Model No.:

1. F – Bobrick No. B-306.MBLK

2.7 MIRROR UNITS

A. Frame — Aluminum channel, 1mm thick anodized AL6061 frame with mounting holes.

B. Reflective surface shall be 0.6" (1.5mm) thick and covered with a 0.14mm PVC film backer with frosted sandblasting. Lead free silver backing shall exceed ISO

9227:2012 and exceed 120-hour corrosion testing.

C. Toilet Accessory Schedule Symbol / Manufacturer / Model No.:

1. G – Size as shown on drawings: equal to Bobrick No. B-2908 Series

2. G1 and G2 – Furnish under Division 8 Glazing

2.8 COMBINATION HAND DRYER, SOAP DISPENSER, FAUCET

A. Toilet Accessory Schedule Symbol / Manufacturer / Model No.:

1. H – Refer to Plumbing Drawings and Specifications

2.9 MOP HOLDER WITH SHELF

A. Utility Shelf With 3 Mop/Broom Holders and 4 Rag Hooks:

1. Mounting Base: All-welded, 18-8, Type 304, 18 gauge stainless steel with satin finish.

2. Length: 34 inches.

3. Shelf: All-welded, 18-8, Type 304, 18 gauge stainless steel with satin finish; 8 inches deep with 3/4 inch return edges on three sides, hemmed front edge.

4. Shelf Support Brackets: 18-8, Type 304, 16 gauge stainless steel with satin finish. Welded to mounting base and shelf.

5. Mop and Broom Holders: Replaceable, spring-loaded rubber cams with anti-slip coating; accommodates handles from 7/8 inch to 1-1/4 inch in diameter; with plated steel retainers.

6. Hooks: 18-8, Type 304, 12 gauge stainless steel with satin finish; attached to mounting strip with two rivets each.

B. Toilet Accessory Schedule Symbol / Manufacturer / Model No.:

1. J – Bobrick No. B-239 x 34

2. J – ASI No. 1308-3

3. J – Bradley Model 9933

4. Or equal

2.10 PAPER TOWEL DISPENSER AND WASTE RECEPTACLE (RECESSED)

A. Cabinet — 18-8, Type-304, heavy-gauge stainless steel. Welded construction. Exposed surfaces have satin-finish. Equipped with a tumbler lock keyed like other Bobrick washroom accessories.

B. Door — 18-8, Type-304, 18-gauge (1.2mm) stainless steel with satin finish or matte black, as specified. 9/16" (14mm) 90° return for maximum rigidity. Secured to cabinet with a concealed, full-length, stainless steel piano-hinge. Equipped with a stainless steel cable door-swing limiter and two tumbler locks keyed like other Bobrick washroom accessories. Tumbler locks flush with the door - no protrusion.

C. Paper Towel Dispenser — 18-8, Type-304, 22-gauge (0.8mm) stainless steel with satin finish or matte black, as specified. Rounded towel tray has hemmed opening to dispense paper towel without tearing. Capacity: 600 C-fold or 800 multifold paper towels. Unit equipped with TowelMate consisting of a 90° return towel guide angle inside cabinet to prevent paper towels from falling forward out when door is opened for servicing.

D. Towel Rod Assembly — Consisting of a round Nylon Rod and (2) stainless steel Rod Screws for attachment, is field replaceable. Stainless steel Stop Screws (2) lock TowelMate Rod assembly in place.

E. Waste Receptacle — Leak-proof rigid molded plastic. Removable for servicing. Capacity: 3.8-gallon

F. Operation: Paper towel dispenser is adjustable to dispense C-fold, multifold, or singlefold paper towels without use of additional adapters or towel trays. To service waste receptacle, unlock door with key provided and remove waste container. Cable door-swing limiter prevents damage to washroom accessories and walls.

G. Toilet Accessory Schedule Symbol / Manufacturer / Model No.:

1. K – Bobrick No. B-38034.MBLK

2. All units to be fully stocked at Completion. This includes paper towels.

2.11 TRASH RECEPTACLES

A. Diaper Disposal Receptacle:

1. Mounting Base: All-welded, 18-8, Type 304, 18 gauge stainless steel with satin finish.

B. Circular Waste Chute: Type-300, 22-gauge (0.8mm) stainless steel. Exposed surfaces have satin finish. 10” diameter x 3” deep

C. Waste Receptacle: Type-300, 22-gauge (0.8mm) stainless steel. Exposed surfaces have satin finish. Floor standing waste receptacle, open top, 13 gallon capacity.

D. Toilet Accessory Schedule Symbol / Manufacturer / Model No.:

1. L1 – Bobrick No. B-279– 6 gallon – Diaper Disposal

2. L2 – Circular Waste Chute
3. L3 – Bobrick 2260 – Waste Receptacle

4. Or equal

2.12 CLOTHES HOOKS

A. Stainless Steel Clothes Hook:

1. Post: 18-8, type-304, 19mm (3/4") diameter, solid stainless steel rod. Post and Concealed Mounting Threaded Flange are machined as one piece.

2. Hook Pin — 18-8, type-304, 6.4mm diameter (1/4"), solid stainless steel rod with thread to screw into Post.

3. Concealed Mounting Threaded Flange — 18-8, type-304, 5.6mm (7/32") thick, stainless steel plate with thread on outside edge for fastening cover. 46mm (1-13/16") outside diameter with two holes for attachment to wall.

4. Threaded Flange Cover — 18-8, type-304, 1.4mm (17-gauge), machined stainless steel. 49mm (1-15/16") diameter 13mm (1/2") deep. Cover fastens over mounting flange to conceal mounting screws.

5. Projection from Wall: 1-1/16 inch.

B. Toilet Accessory Schedule Symbol / Manufacturer / Model No.:

1. M – equal to Bobrick No. B-9542 – Fino Collection, black.

2. For toilet compartment doors (hook/door stop) refer to division 10 section “Toilet Compartments”.

2.13 BABY CHANGING STATION (HORIZONTAL)

A. Recessed-Mounted Vertical Design Stainless Steel Baby Changing Station:

1. Handle: Replaceable, aluminum with satin stainless finish. Positioned to operate unit with less than 5 lbs. of force.

2. Front Panel shall be deep drawn, one-piece, seamless, 18-8, Type 304, 20 gauge stainless steel with satin finish and laser etched logo with rounded corners.

3. Aesthetics: Unit shall have no plastic covering or visible plastic on the front of the unit and no adhesive labels applied to the front panel.

4. Flange: Deep drawn, one-piece seamless, 18-8, Type 304, 18 gauge stainless steel with satin finish. Flange edges and corners shall have radii that complements the arc on the top, bottom, and side edges of the front panel.

5. Frame and Hinge Mechanism: Concealed 11-gauge chassis, compromised of 1” diameter integral steel-tubing that supports the changing bed and interacts with 11-gauge steel wall mounting bracket to provide steel-on-steel hinge

stop. The wall frame shall serve as wall-mounting bracket.

6. External Diaper Bag Hook: 18-8, Type 304, 3/4 inch diameter, wall-mounted, solid stainless steel rod with satin-finish.

7. Bed Surface: injection molded polypropylene with Microban® antimicrobial additive, and ISO 22196 tested for efficacy.

8. Surface is contoured, concave and smooth. Bed surface shall be minimum 535 sq. in.

9. Performance: Unit has minimal deflection from 90 degrees with a 150 lbs. static load placed in the center of the changing surface. Unit exceeds ASTM Standard F2285 static load requirement of 100 lbs.

10. Complies with requirements applicable in the jurisdiction of the project, including but not limited to ADA, ICC A117.1, International Building Code (IBC), and state building code requirements as applicable. Also complies with ASTM Standard F2285, Standard Consumer Safety Performance Specification for Diaper Changing Stations for Commercial use and EN 12221 for changing units for domestic use.

11. Dual Cavity Dispenser: Includes integral spring tab to make dispensing bed liners and diaper disposal sacks easier. Total 50 liner capacity. Equipped with tumbler lock, keyed alike Bobrick restroom accessories.

12. Operation: Concealed pneumatic cylinder providing controlled opening and closing of the changing station bed.

13. Instruction Graphics: Universal instruction graphics and safety messages in multiple languages.

14. Safety Straps: Replaceable, restraining straps.

B. Toilet Accessory Schedule Symbol / Manufacturer / Model No.:

1. N – Baby Changing Station: Koala Kare Products (Bobrick) No. KB300.

2. All units to be fully stocked with liners at Completion.

2.14 ADULT CHANGING STATION

A. Surface-Mounted Adjustable Height Changing Station:

1. Powered-Height Adjustability: Changing surface shall electronically adjust from 12” to 41” from floor.
2. Unit shall have two sets of built-in electronic controls for height adjustment. One located on face of wall cover and one on the front of changing surface.

3. Weight Capacity: Tested to support up to 500 lbs. (227 kg.) static load.

4. Changing Surface shall be polyethylene and meet IK10 standard for

resistance to high impact and sharp objects.

5. Back-Up Battery: Unit shall have a built-in backup battery system that allows for continuous operation in the event of a power interruption.

6. Emergency Stop: Unit shall include a wall-mounted emergency stop to break power to actuator.

7. Changing Surface shall be a minimum 75 ¼" long, and 31 ½" wide, and can be opened and closed with one-hand.

8. Unit shall have a safety rail with a curved dip in the center for easier patient changing by caregiver. Safety rail rotates and locks under changing bed when in closed position.

9. Unit shall withstand significant exposure to water without damage to electrical components. It shall include a grounded power cord and have a splash-proof control system. Electrical components and wiring shall not come in contact with station users or caregivers.

10. Changing surface shall not have covered areas to help ensure cleanliness.

11. Durability: Cycle tested through range of motion 28,000 times at 500lbs. Stress tested to 100,000 cycles with 500lbs. bounce load test.

12. Frame shall be constructed of 2" powder coated steel tubing.

B. Toilet Accessory Schedule Symbol / Manufacturer / Model No.:

1. O – Adult Changing Station: Koala Kare Products (Bobrick) No. KB3000-AHL.

2. All units to be fully stocked with liners at Completion.

2.15 STAINLESS STEEL SPLASH

A. Fabricate panels from Type 304, minimum 22 gauge stainless steel.

B. Toilet Accessory Schedule Symbol:

1. P – 36-inch-high, length extending out minimum 6 inches from edge of sink. Provide on both sides of mop sinks.

2.16 TOILET SEAT COVER DISPENSER

A. Cabinet — 18-8, Type-304, heavy-gauge stainless steel. All-welded construction.

B. Door — 18-8, Type-304, 22-gauge stainless steel with satin finish or matte black, as specified. Secured to cabinet with a concealed, full-length stainless steel piano-hinge. Equipped with a tumbler lock keyed like other Bobrick washroom accessories. Tumbler lock flush with the door - no protrusion.

C. Surface mounted toilet-seat-cover dispenser shall be Type-304 stainless steel with

all-welded construction; exposed surfaces shall have satin finish or matte black, as specified. Dispenser shall have a minimum capacity of 250 paper toilet seat covers.

D. Toilet Accessory Schedule Symbol / Manufacturer / Model No.:

1. Q – Toilet Seat Cover Dispenser: Bobrick No. B-2221.MBLK.

2. Dispenser shall be stocked full at Completion.

2.17 SELF-RETRACTING STAINLESS STEEL STEP

A. Product Description: Self-Retracting Stainless Steel Step with non-slip tread by Step-N-Wash or equal.

1. Provide four total – one in each of the large public restrooms. Locate at lavatories as directed by Architect

B. Materials & Finish: Type 304 stainless steel; marine-grade rubber tread

C. Anchorage: Floor anchors set per manufacturer instructions

D. Operation: Self-retracting mechanism

E. Compliance: Performance requirements, load capacity, safety standards

F. Installation: Field installation instructions per manufacturer.

1. Secure units to floor structure using manufacturer-recommended anchorage to ensure stable, rigid, and safe installation.
2. Coordinate installation with adjacent lavatories, cabinetry, and wall-mounted accessories to maintain proper alignment and intended operation.

G. Submittals: Cut sheets, templates, warranty info

H. Toilet Accessory Schedule Symbol / Manufacturer / Model No.:

1. R – Lavatory Access Step.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Installer must examine substrates, previously placed inserts and anchorages necessary for mounting of toilet accessories and other conditions under which installation is to occur, and must notify Contractor in writing of conditions detrimental to proper and timely completion of work.

1. Verify blocking has been installed properly.

2. Verify location does not interfere with door swings or use of fixtures.
3. Comply with manufacturer’s recommendations for backing and proper

support.

B. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to installer.

3.2 INSTALLATION

A. Install products in strict compliance with manufacturer’s written instructions and recommendations, including the following:

1. Use fasteners and anchors suitable for substrate and project conditions.

2. Install units rigid, straight, plumb, and level, in accordance with manufacturer’s installation instructions and approved shop drawings.

3. Conceal evidence of drilling, cutting, and fitting to room finish.

4. Test for proper operation.

3.3 ADJUSTING

A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly.

3.4 CLEANING

A. Clean and polish all exposed surfaces of compartments, hardware, and fittings after removing protective coatings.

B. Touch-up, repair or replace damaged products until Completion.

END OF SECTION

SECTION 10 30 00 – PASSIVE WALL VENTILATION ACCESSORIES

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes passive wall ventilation accessories installed in gypsum board chase walls to permit air circulation from top to bottom of enclosed wall cavities.

B. Accessories are **non-mechanical** and are not connected to ductwork or HVAC systems.

C. Related Sections:

1. Division 09 Section “Gypsum Board” – Openings, backing, and patching.

2. Division 09 Section “Painting” – Field touch-up of finishes, if required.

1.2 PERFORMANCE REQUIREMENTS

A. Provide passive ventilation openings sufficient to allow natural air movement within chase walls without mechanical assistance.

B. Accessories shall be durable, corrosion-resistant, and suitable for concealed or semi-concealed architectural locations.

1.2 SUBMITTALS

A. Product Data:

1. Manufacturer’s data sheets indicating material, finish, dimensions, and installation method.

B. Samples:

1. One sample of each vent type and finish for Architect review.

C. Coordination Drawings:

1. Indicate vent locations relative to wall framing and gypsum board assemblies.

1.6 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Semetall stainless steel circular vent, or approved equal. Part Number: 8Q77NS3

B. Substitutions will be considered only after Contract award and in accordance with Section 01 25 00. Substitutions during bidding are not permitted.

2.2 MATERIALS

A. Vent Body:

1. Stainless steel.

2. Minimum thickness suitable to maintain rigidity and flatness.

B. Screen:

1. Integral fine mesh insect screen, stainless steel or corrosion-resistant metal.

2. Securely attached and not removable without tools.

2.3 SIZE AND CONFIGURATION

A. Shape: Circular.

B. Nominal Diameter: 1-1/8 inch (29 mm) unless otherwise indicated.

C. Configuration:

1. Open vent with integral louver or perforated face.

2. Designed for passive airflow only.

2.4 FINISH

A. Factory-applied finish.

B. Color: Black, unless otherwise indicated.

C. Finish shall be uniform, non-glossy, and suitable for architectural interiors.

2.5 ACCESSORIES

A. Provide all fasteners, sleeves, and trim components required for a complete installation.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify substrates and wall conditions are suitable for installation.

B. Verify locations are clear of obstructions and conflicts prior to cutting openings.

3.2 INSTALLATION

A. Install vents in accordance with manufacturer’s written instructions.

B. Provide vents at high and low locations within chase walls as indicated to promote vertical air circulation.

C. Install vents flush with finished wall surface, plumb, level, and securely seated.

D. Do not connect vents to ductwork or mechanical systems.

3.3 ADJUSTING AND CLEANING

A. Clean exposed surfaces after installation.

B. Remove protective coverings and debris.

3.4 PROTECTION

A. Protect installed vents from damage during remainder of construction.

B. Replace damaged units prior to Substantial Completion.

END OF SECTION

SECTION 10 44 13 – FIRE EXTINGUISHER CABINETS

PART 1 – GENERAL

1.1 SUMMARY

A. Provide fully charged portable fire extinguisher where noted. The types of fire extinguishers are as follows:

1. Semi-Recessed Cabinet mounted (FEC)

a. Stainless steel model – Cosmopolitan Series

b. Powder coated black model – Academy Series

2. Bracket Mounted (FE)

1.2 SUBMITTALS

A. Product Data: For extinguishers and cabinets. Include installation instructions for cabinets and brackets.

1.3 QUALITY ASSURANCE

A. Conform to NFPA 10 requirements for portable fire extinguishers.

B. Provide fire extinguishers, cabinets, and accessories by single manufacturer.

C. Conform to UBC 43-6 (ASTM E814-83) for fire resistive wall performance where necessary.

D. Conform to Americans with Disabilities Act on maximum cabinet projection in corridors where necessary.

1.4 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. J.L. Industries (Activar, Inc.)

B. Larsens Manufacturing Company

C. Potter Roemer

D. Or equal

2.2 MATERIALS

A. Type 1 Fire Extinguisher Cabinets (FEC): To be installed in Restroom Lobby/Corridor.

1. Provide at all locations unless noted otherwise.

2. Style shall be aluminum, semi-recessed sized for the applicable fire extinguisher as specified herein.

a. Model:

(1) All areas unless noted otherwise: equal to J.L. Industries "Academy C1036 Series, tub size = 10.5" x 24" x 6".

b. Door Style and Glazing:

(1) Door Style: Vertical Duo with ADA pull

(2) Door Glazing: Clear 1/4 inch Acrylic

c. Door & Trim Construction: Flush cabinet doors with a 5/8" door stop are attached by a continuous hinge and equipped with zinc-plated handle and roller catch. All models have 1-3/4" trim on face and door.

d. Trim Style & Depth: 1 ½" square trim projection with recessed ADA pull.

e. Tub: The door, trim and tub is constructed of cold rolled steel with black powder-coat finish.

B. Type 2 Fire Extinguisher Cabinets (FEC): To be installed in Administrative "back-of-house" area.

1. Style shall be aluminum, semi-recessed sized for the applicable fire extinguisher as specified herein.

a. Model:

(1) All areas unless noted otherwise: equal to J.L. Industries "Cosmopolitan C1036 Series, tub size = 10.5" x 24" x 6".

b. Door Style and Glazing:

(1) Door Style: Vertical Duo with ADA pull

(2) Door Glazing: Clear 1/4 inch Acrylic

c. Door & Trim Construction: 20 gauge 304 #4 stainless steel. Flush cabinet doors with a 5/8" door stop are attached by a continuous hinge and equipped with zinc-plated handle and roller catch. All models have 1-3/4" trim on face and door.

d. Trim Style & Depth: 1 ½" square trim projection with recessed ADA pull.

e. Tub : The tub is constructed of 304 stainless steel with #4 finish.

C. Fire Extinguisher Brackets (FE): Provide Extinguisher Brackets for the applicable fire extinguisher as indicated below in locations as indicated on the Drawings.

D. Fire Extinguishers:

1. ABC Dry Chemical Type (All areas): equal to J.L. Industries "Model Cosmic 10E"

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install items included in this section in locations and at mounting heights indicated, or if not indicated, at heights to comply with applicable regulations of goveming authorities.

B. Prepare recesses in walls for fire extinguisher cabinets as required by type and size of cabinet and style of trim and to comply with manufacturers instructions.

C. Securely fasten mounting brackets and fire extinguisher cabinets to structure, square and plumb, to comply with manufacturer's instructions.

D. Provide and verify servicing, charging and tagging of all fire extinguishers.

END OF SECTION

SECTION 10 82 11 - ARCHITECTURAL COILED WIRE GRILLES AND SCREENS

PART 1 GENERAL

1.1 SECTION INCLUDES

1. Architectural coiled wire grilles and screens.

1.2 DEFINITIONS

A. Coiled Wire Fabric: Building material created by interlocking strands of coiled wire to form a larger flexible sheet; coiled wire fabric is made from various metals and gauges of wire, and in a wide variety of sizes, weaves, finishes, and levels of fullness.

B. Attachment Systems: Components and materials required to provide coiled wire fabric in designated shape and form (i.e., flat under tension in two directions, under tension in two directions with a percentage of fullness, flat under tension in four directions, hanging in one direction, or wrapping a form, etc.). Attachment systems are used to connect coiled wire fabric to built environment and maintaining designated performance capability. Engineered attachments may allow coiled wire fabric systems to remain in fixed position or to move, either manually or mechanically.

1.3 REFERENCE STANDARDS

A. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2014, with Editorial Revision (2017).

B. ASTM A380/A380M - Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems 2017.

C. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs 2017.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate field measurements and fabrication schedule with progress of construction to avoid construction delays.

B. Preinstallation Meetings: Conduct meetings including Contractor, Architect, fabricator, installer and other subcontractors whose work involves coiled wire fabric to confirm project requirements, framing and support conditions, mounting surfaces and manufacturer's installation requirements.

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's data sheets on each product used, including preparation instructions, storage and handling requirements, and installation methods.

B. Shop Drawings: Submit detailed shop drawings for fabrication and installation, including plans and elevations, detailed sections, materials, finishes, fittings, hardware, anchorages, fastening details, and manufacturer's technical and descriptive data.

1. Indicate distinction between factory-assembled and field-assembled work on shop drawings.

C. Samples: Submit samples for color verification of each specified finish, at least 6 inch (254 mm) wide by 10 inch (254 mm) long.

D. Manufacturer's Qualification Statement.

E. Installer's Qualification Statement.

F. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1. Submit "Final Installation Contractor Checklist" to ensure warranty requirements have been met; see CCD website for copy of checklist.

1.6 QUALITY ASSURANCE

A. Designer Qualifications: Perform structural design under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience.

1.7 BUILD AMERICA, BUY AMERICA (BABA) REQUIREMENTS

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials

shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site in manufacturer's original, unopened packaging, with labels clearly identifying manufacturer and material.

B. Exercise care not to scratch, mark, dent, or bend metal components during delivery, storage, and installation.

C. Store materials indoors, protected from moisture, humidity, and extreme temperature fluctuations until ready for installation.

1.9 FIELD CONDITIONS

A. Verify dimensions of actual openings by field measurements before fabrication; provide recorded measurements on shop drawings.

1.10 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a one year period after Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Architectural Coiled Wire Grilles and Screens

B. Manufacturers: Basis of Design = Cascade Coil Drapery, Inc, dba Cascade Architectural: www.cascade-architectural.com.

i. Address: PO Box 3707, 19505 SW 90th Court, Tualatin, OR 97062.
ii. Phone - Toll Free: (800) 999-2645.
iii. Phone: (971) 224-2188.
iv. Fax: (971) 224-2199.
v. Email: geoff@cascadecoil.com.
vi. Web: www.cascade-architectural.com.

C. Or Approved Equal

2.2 ARCHITECTURAL COILED WIRE GRILLES AND SCREENS SYSTEMS

A. Provide architectural coiled wire grilles and screens system with attachment method, materials, weaves, and finish as indicated; manufacturer and contractor to engineer and fabricate components and assemblies as required for installation in accordance with manufacturer's Custom Architectural System.

B. Attachment Method: Left Side Opening Gate with Double Galvanized Steel Secura Track with Direct Ceiling Mounting System. Key Lock on un-secured side , Thumb turn on secured side.

C. Fabricoil Coiled Wire Fabric Weaves:

1. Materials: Aluminum
2. Weaves available: 5/16 14 gauge

D. Key Locking Mesh Mounted Footbolts installed ~ 4’ O.C.

E. Operating Wands: Provide removable or fixed operating wands to assist with opening and closing architectural coiled wire screens and gates. Locate on the “Concourse” side of the screen.

1. Material: Stainless steel or powder-coated aluminum, corrosion resistant, suitable for interior public-use environments.

2. Length: Length as required to allow comfortable operation without excessive reach or pulling force.

3. Grip: Non-slip grip or formed handle end suitable for repeated use.

4. Attachment: Provide hook, loop, eye, or concealed engagement device compatible with screen leading edge or pull point. Attachment method shall not damage coiled wire fabric or finishes.
5. Finish: Match or complement screen hardware and adjacent metal finishes.

6. Performance: Operating wand shall allow smooth, controlled opening and closing of the screen without undue force, distortion of fabric, or disengagement from track or guides.

F. Factory Finishes: Powder coated color – Powder Coated – TBD

G. Fullness: 15 percent.

2.3 PERFORMANCE REQUIREMENTS

A. Structural Requirements: Architectural coiled wire fabric systems capable of withstanding applied loads and stresses within designated limits and under conditions as indicated on drawings.

1. Provide coiled wire fabric and attachment system components in accordance with applicable building code to withstand dead and live loads resulting from environmental conditions including, but not limited to wind, seismic events, vegetation, rain, snow and ice.

2. Provide coiled wire fabric systems capable of accommodating expansion and contraction of metal components without causing undue stress, buckling, opening of joints, and distortion.

3. Provide structural framing and hardware of coiled wire fabric systems capable of withstanding loads and maintain deflection limitations in accordance with applicable building codes when systems are fully installed.

2.4 FABRICATION

A. Tolerances: Verify field dimensions prior to start of shop fabrication.

B. Fabricate steel and stainless steel components in accordance with manufacturer's requirements and the following:

1. Comply with requirements indicated for metal materials, thickness, design, and details of construction; fabricate metal accurately and without any burrs.

2. Provide welded connections in compliance with American Welding Society (AWS) standards for recommended practice in shop welding.

3. Provide welds located behind finished surfaces that are without distortion or discoloration of exposed side.

4. Provide components that are accurately cut, drilled and/or tapped to receive coiled wire fabric, hardware, fasteners, and accessories.

5. Shop fabricate components in accordance with requirements indicated on drawings and specified performance requirements.

6. Shop fabricate hardware, inter-connected parts, and assemblies to eliminate necessity for any field cutting adjustments.

7. Coordinate system requirements, dimensions and spacing of attachment components to ensure required factory drilled holes in supporting framework are properly located.
8. Provide exposed joints that are butt, flush, and hairline.

9. Fabricate exterior connections that will be exposed to weather in a manner that prevents water from entering interior portions of structure, in accordance with Architect.

10. Upon completion of fabrication, clean and prepare applicable coiled wire fabric system in accordance with ASTM A380/A380M.

2.5 ACCESSORIES

A. Fasteners: Comply with ASTM F593 for stainless steel or ASTM A307 for carbon steel, sizes to suit installation conditions.

B. Anchors and Inserts: Corrosion resistant; type, size, and material required for loading and installation as indicated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Prior to start of installation, verify that existing conditions are acceptable for installation of coiled wire fabric and attachment systems in accordance with manufacturer's installation instructions.

B. Coordinate with setting diagrams, plans, templates, and drawings to ensure that proper installation of necessary anchors and supporting devices has been completed.

C. Ensure that supporting system for coiled wire fabric has been properly prepared for attachment of framework, hardware, anchors, wire rope, and transfer of calculated loading.

D. Where existing conditions are responsibility of another installer, notify Architect of unsatisfactory conditions prior to proceeding.

E. Coordinate with appropriate entity to correct any unsatisfactory conditions.

F. Start of this work indicates acceptance of areas and conditions as satisfactory by installer.

3.2 PREPARATION

A. Verify inventory of system components to ensure required components are available for installation; inspect components for damage, and replace damaged components as necessary.

B. Verify that alignment, support dimensions, and tolerances are correct.

C. Verify that necessary structural framing is installed prior to mounting coiled wire fabric attachment system components.

D. Verify that support framing and other surfaces to receive coiled wire fabric and attachment systems are clean and free of obstructions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's written installation instructions.

B. Attach coiled wire fabric to structural framing using applicable hardware provided by manufacturer as indicated on approved shop drawings.

C. Provide necessary anchorage devices and fittings to securely fasten to on-site construction; including additional knife plates, embeds, framework, blocking, threaded rods, and anchors.

D. Provide for separation of dissimilar materials using bushings, grommets, or washers to prevent electrolytic corrosion.

E. Upon completion of final adjustments, provide tamper-resistant lock-tight material at mechanical fittings.

F. Provide for tension in coiled wire fabric as indicated on drawings, or as necessary to remove slack.

G. Coiled Wire Fabric Attachment System:

1. Install coiled wire fabric attachment system components in accordance with approved shop drawings.

2. Install attachment system assemblies based on manufacturer's dimensions.

3. Install joints that accommodate for expansion and contraction of metal components without causing undue stress, buckling, joint fatigue and/or distortion.

4. Install structural blocking at wall locations used for mounting of attachment system.

5. Install coiled fabric mounting hardware onto attachment systems as indicated on approved shop drawings for specified attachment system; attach with approved fasteners and techniques to ensure that framing members are horizontal and parallel to grade or slab, and straight to within 1/16 inch (1.6 mm) in 4 feet (1.2 m).

6. Install attachment system plumb, level, square, and rigid without having any kinks or sags in coiled wire fabric.

H. Coiled Wire Fabric:

1. Install coiled wire fabric in accordance with approved shop drawings.

2. Install coiled wire fabric based on manufacturer's dimensions.

3. Install joints that accommodate for expansion and contraction of metal components without causing undue stress, buckling, joint fatigue and/or distortion.

4. Install coiled wire fabric mounting hardware onto coiled wire fabric as indicated on approved shop drawings for specified attachment system; attach with

approved fasteners and techniques to ensure that sections are horizontal and parallel to grade or slab, and straight to within 1/16 inch (1.6 mm) in 4 feet (1.2 m).

5. Install coiled wire fabric infill with attachment system plumb, level, square, and rigid without having any kinks or sags.

3.4 CLEANING

A. Remove temporary protective coverings of adjacent work areas, and clean installed materials prior to Date of Substantial completion.

B. In heavy traffic areas, establish cleaning program to pressure wash or hand-wash coiled wire fabric and attachment system on a monthly basis prior to Date of Substantial Completion.

C. Clean coiled wire fabric system components with mild detergent and water applied with wet wrap and wiped with clean dry rag; abrasive cleaners are not permitted.

D. Remove from project site and legally dispose of construction debris associated with this work.

3.5 PROTECTION

A. Provide protection of installed coiled wire grilles and screens and finished surfaces to ensure they are without damage until Date of Substantial Completion.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

C. Replace defective or damaged components as directed by Architect.

END OF SECTION

SECTION 11 40 00 – FOODSERVICE EQUIPMENT

PART 1- GENERAL

1.1 SUMMARY

A. The extent of Food Service Equipment is indicated on the drawings and by schedules and equipment lists associated with either the drawings or this section.

1.2 FOOD SERVICE EQUIPMENT CONTRACTOR

A. Food Service Equipment Contractor or abbreviation FSEC or the term Bidder means the person, company or corporation that will contract for the work specified. For this project the General Contractor may also act in the capacity of the FSEC.

B. Food Service Equipment Contractor's Work Includes:

1. All labor, materials, equipment necessary for complete installation of equipment as indicated and specified.

2. Delivery, unloading, storing, assembly and setting in place indicated of all equipment specified.

3. Delivery of all loose fittings to other trades and coordination of same.

4. Protection of all equipment from fire, theft and damage, and coordination of same.

5. Inspection to see that all rough-ins and connections to equipment: mechanical, electrical, refrigeration, and ventilation; are made according to the intent of these specifications.

1.3 MECHANICAL AND ELECTRICAL

A. Mechanical and Electrical Contractors shall furnish utility rough-ins for all equipment, and all materials, fittings, labor, etc. required to extend from rough-in locations and make final connections to Food Service Equipment unless otherwise specified.

1.4 QUALITY ASSURANCE

A. General Standards: Except as otherwise indicated, comply with the following standards as applicable to the manufacture, fabrication and installation of the equipment and work of this section.

1. ADA Requirements.
2. NSF Standards: Provide NSF "Seal of Approval" on each manufactured item and on major items of custom-fabrication.
2. UL Standards: For electrical components and assemblies provide

either UL labeled products, or where no labeling service is available “Recognized Markings” to indicate listing in the UL “Recognized Component Index” or ETL.

3. NFPA Standards: Comply with NFPA Bulletin 96, NEC Volume 5 and NEC for electrical wiring and devices.
4. National Electrical Code: Comply with NFPA Volume 5 for electrical wiring and devices included with Food Service Equipment.

B. All fabricated assemblies or electrically operated equipment shall have Underwriter’s Laboratories Approval, or UL Reexamination of Listing, or ETL in every case where such approval has been established for the type of device in question. Approval has been established when at least one type of device has been approved by UL or ETL.

C. All manufactured items of electrically operated equipment shall have UL or ETL, or UL/ETL Reexamination listing, in every case where such approval has been established for the type of device in question. Approval has been established when at least one type of device has been approved by UL or ETL.

1.5 SUBSTITUTIONS

A. Refer to Section 01 60 00 Product Requirements. It is intended for specifications to establish minimum quality and performance standards, which if met or are exceeded may qualify such equipment as an acceptable alternate source. The Architect will determine if an item of equipment submitted as an alternate to those listed in the documents is an acceptable substitute.

It is the responsibility of the FSEC to verify that any and all equipment items submitted for review as alternate(s) correspond and coordinate with the project drawings and specifications. Any project cost(s) incurred for structural, mechanical or electrical alterations to accommodate variances in approved alternate equipment will be the responsibility of the FSEC supplying the equipment.

1.6 SUBMITTALS:

A. Submit manufacturer’s or shop fabricator’s product information. Provide maintenance manuals, operating instructions, parts lists, precautions against hazards, manufacturer’s warranties and similar information. Mark each data sheet or brochure with FSEC’s name and address, project name and location, and applicable project equipment item number(s). Indicate all options to be provided.

1.7 PRODUCT HANDLING

A. Protect all equipment from damage during shipping, storage, handling, installation and construction of other work in same spaces. Wrap and crate each item of equipment as needed for protection from damage.

1. Cover all exposed stainless steel surfaces with self-adhesive protective paper of a type recommended by the manufacturer. Do not remove until work is installed and equipment is ready for cleaning and start-up.

1.8 BUILD AMERICA, BUY AMERICA (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.9 WARRANTY

A. Provide standard manufacturer's warranties for each piece of equipment.

PART 2 – PRODUCTS

2.1 Refer to Equipment List.

PART 3 – EXECUTION

3.1 INSPECTION AND PREPARATION

A. Inspect all submittals to see that they do not conflict with documents published by Architect. FSEC is responsible for verifying all dimensions, quantities, construction details, finishes, sizes, etc.

B. Rough-In Work: FSEC must visually examine the rough-in mechanical and electrical services by others, prior to pouring of floors or closing of walls, and the installation of floors, walls, columns and ceilings by others, and the conditions under which the work is to be done. He must visually verify dimensions of the services and substrates before fabricating the work.

3.2 INSTALLATION

A. Installation equipment according to manufacturer's written instructions.

3.4 CLEANING, RESTORING FINISHES

A. After completion of installation, and completion of major work in Kitchen area, remove protective coverings, if any, and clean Food Service Equipment, internally and externally. Restore exposed and semi-exposed finishes to remove abrasions and other damages. Polish exposed metal surfaces and touch-up painted surfaces. Replace work which cannot be successfully restored.

3.5 TESTING, START-UP AND DEMONSTRATION

A. General: Delay the start-up of Food Service Equipment until service lines have been tested, balanced, and adjusted for pressure, voltage and similar considerations, and until water lines have been cleaned and treated for sanitation.

B. Test each item of operational equipment to demonstrate that it is operating properly, and that controls and safety devices are functioning. Repair or replace equipment which is found to be defective in its operation, including units which are below capacity or operating with excessive noise or vibration.

C. Final Cleaning: After testing and start-up, clean and sanitize the Food Service Equipment, and leave in a condition ready for use in food service.

D. After compliance of the work and after the final inspection has been completed and approved scheduled demonstration must take place for all items of equipment. Such demonstration shall be supervised by Architect/Owner showing operational as well as preventive maintenance procedures.

3.6 FOOD SERVICE EQUIPMENT LIST

Item #1 Microwave

Basis of Design: Frigidaire 2.2 Cu. Ft. Capacity Built-In Microwave with Sensor Cook
Model #: GMBS3068BF; 13.625 H x 24.4375 W x 19.625 D; Stainless Steel

Provide and install as shown (1) with the following features:

FEATURES	
Case Color	Black
Color Appearance	Stainless Steel
Door Color	Stainless Steel
Installation	Built-In

Control Features	Child Lock WiFi Connect Time & Weight Defrost Cancel/Off Timer On/Off Clock - 12 Hr. Add 30 Seconds Melt/Soften
Control Type	Touch Pad
Cooking Technology	Microwave Sensor Cook
Microwave Convenience Cooking Controls	Popcorn Reheat Beverage Vegetables Potato Pizza
Microwave Watts (IEC-705)	1,100 W
Power Levels	10
Product Type	Built-In Microwave
Turntable	Glass
Turntable Size	16.5

Item #2 Refrigerator / Freezer

Basis of Design: GE® ENERGY STAR® 23.0 Cu. Ft. Side-By-Side Refrigerator or approved equal. Model #: GSE23GYPFS; 69.625 H x 32.75 W x 34.75 D; Stainless Steel

Provide and install as shown (1) with the following features:

FEATURES	
Control Type	Upfront Electronic Touch Temperature Controls Actual Temperature Display
Defrost Type	Frost Guard
Dispenser	Cubes, Crushed Ice and Chilled Water
Dispenser Features	Child Lock LED Dispenser Light Door Alarm Water Filter Indicator Light
Door Alarm	Yes
Door Liner	ABS
Exterior Style	Free-Standing
Filter Location	Upper right corner
Freezer Cabinet Shelf Features	Sweet Spot Shelf - 1/2 Fixed
Freezer Cabinet Shelves	3 Total 2 Adjustable
Freezer Door Bins	3 Total 2 Adjustable
Freezer Features	Interior Light Ice Storage Bin
Freezer Storage Baskets	1 Slide-Out 1 Total

Fresh Food Cabinet Drawers	Multi-Level Drawers 2-Stack drawer system
Fresh Food Cabinet Shelves	4 Total - Glass 3 Adjustable 2 Slide-Out 3 Spill Proof
Fresh Food Door Bins	4 Total 2 Adjustable with Gallon Storage 2 Fixed
Fresh Food Door Features	Dairy Compartment
Fresh Food Features	Integrated Shelf Support System Interior Lighting - Dual Level Interior Storage Drawers
Icemaker	Factory-Installed
Leveling System	2 Point
Middle Drawer	Adjustable Humidity
Performance Features	Easily Removable Door Gaskets Never Clean Condenser Vacation Mode
Product Type	Side-by-Side Refrigerator
Refrigerant Type	R600a
Temperature Display	External Digital
Temperature Management Features	4 Electronic Sensors
Top Drawer	Snack Drawer
Water Filtration	GE Water Filtration (XWFE Filter)

Item #3 Stackable Washer and Dryer

Basis of Design: GE Unitized Spacemaker® ENERGY STAR® 3.9 cu. ft. Capacity Washer with Stainless Steel Basket and 5.9 cu. ft. Capacity Electric Dryer. Size: 75.875 H x 26.75 W x 30.875 D.

Provide and install as shown with the following features:

APPEARANCE	
Color Appearance	White on White
Control Knobs	White
Door Style	Steel
CAPACITY	
Dryer Capacity	5.90 cu ft
Wash Basket Type	Stainless Steel
Washer Capacity	3.90 cu ft
FEATURES	
Additional Cycles	Dewrinkle, Quick fluff
Additional Dryer Features	Up-Front Lint Filter
Additional Washer Features	Inlet Fill Hoses Included
Automatic Dry Control	Yes
Exhaust Options	3-Way (Rear; Left; Right)
Fuel Type	Electric
Heat Selections	4
Maximum Spin Speed	800 RPM

Number of Cycles	12 Washer/4 Dryer
Exhaust Options	3-Way (Rear; Left; Right)

END OF SECTION

SECTION 12 48 00 – ENTRANCE FLOOR GRILLES

PART 1 – GENERAL

1.1 SUMMARY

A. This section includes the following types of entrance flooring systems:

1. Floor Grids & Frame Assemblies

B. Related Sections include the following:

1. Division 3 Section “Cast-in-Place Concrete” for recess.

2. Division 22 and/or 33 Sections for connection of drain.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)

B. The Aluminum Association

C. The National Floor Safety Institute (NFSI)

1.3 SUBMITTALS

A. Product Data:

1. Include Data for each type of floor mat/grid and frame specified, including manufacturer's specifications and installation instructions.

B. Shop Drawings:

1. Include drawings of sufficient detail showing layout of mat/grid and frame specified including details indicating construction relative to materials, direction of traffic, spline locations, profiles, anchors and accessories.

C. Samples for verification purposes:

1. Submit an assembled section of floor mat/grid and frame members with selected tread insert showing each type of color for exposed floor mat/grid, frame and accessories required.

D. Maintenance data in the form of manufacturer's printed instructions for cleaning and maintaining floor mats/grids.

1.4 QUALITY ASSURANCE

A. Flammability in accordance with ASTM E648, Class I, Critical Radiant Flux, minimum 0.45 watts/m2.

B. Slip resistance in accordance with ASTM D-2047-96, Coefficient of Friction, minimum .060 for accessible routes.

C. Standard rolling load performance is 300 lb./wheel with larger loading requirements as specified (load applied to a solid 5” x 2” wide polyurethane wheel, 1000 passes without damage).

D. Single Source Responsibility: Obtain floor mats/grids and frames from one source of a single manufacturer.

E. Utilize superior structural stainless steel Type 304 components.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the project site ready for use and fabricated in as large sections and assemblies as practical, in unopened original factory packaging clearly labeled to identify manufacturer.

1.6 PROJECT CONDITIONS

A. Field measurements: Check actual openings for mats/grids by accurate field measurements before fabrication. Record actual measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.

B. For recess application coordinate frame installation with concrete construction to ensure recess and frame anchorage are accurate and that the base is level and flat. Defer frame installation until building enclosure is complete and related interior finish work is in progress.

1.7 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer (Basis of Design): Provide products by Kadee Industries, LLC, Twinsburg, OH 44087 Phone: 800-321-3827 Fax: 440-439-6889; email: floormats@kadeeindustries.com

B. Construction Specialties, Inc.

C. Balco, Inc.

D. Equal as approved

2.2 MATERIALS

A. General: Drawings and specifications are based on manufacturer's literature from Construction Specialties, Inc. unless otherwise indicated.

B. Stainless steel - Type 304 stainless steel for surface wires and support bars.

2.3 FLOOR GRIDS/FRAMES

A. Provide “SSS Clean Tread – KD98 Stainless Steel Grating”. Frame shall be Type 304 stainless steel. Grille thickness shall be 1 1/8”.

1. Tread Material shall be manufactured from Type 304 stainless steel .071” x .177” surface wires spaced with a .125” slot opening, and resistance welded to .070 x.1.0” Type 304 stainless steel support rods spaced 1” on center.

B. Lock Down Mechanism: Hidden Lockdowns [standard construction]: Entrance Floor Grilles shall include hidden locking devices manufactured from formed Type 304 stainless steel saddle clip slotted to receive a spring clip and an ASTM A193 Grade B8 18-8 stainless steel machine screw. Hidden Lockdowns shall be spaced no greater than 2’0” on center.

C. Drainage Pit Frames: Provide welded frames fabricated from 1-1/4” x 1-1/4” x 1/8” thick Type 304 stainless steel angle with splice plates as required, complete with grouting strap anchors for a permanent recessed application. Provide welded intermediate framing supports manufactured from 11/2” x 1-1/2” x 3/16” Type 304 stainless steel angle spaced no grater that 3’0” on center for a uniform floor load of 300 lbf/sq. ft. and no greater than 2’0” on center a uniform floor load of 500 lbf/sq. ft.

D. Drain Pans: Provide .053” thick [16 gage] Type 304 stainless steel pit liners as shown on the approved shop drawings**. [2” drain, pipe, stainless steel strainer, and drain trap shall be furnished under the plumbing contract.]**

E. Level Bed Frames: Provide welded frames fabricated from 1-1/4” x 1-1/4” x 1/8” thick Type 304 stainless steel angle with 1” x 1/8” intermediate members and splice plates as required, complete with grouting strap anchors for a permanent recessed application.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Manufacturer shall offer assistance and guidance to provide a template or irregular shaped mat/grid assemblies to ensure a proper installation.

3.3 INSTALLATION

A. Install the work of this section in strict accordance with the manufacturer's recommendations.

B. Set grid at height recommended by manufacturer for most effective cleaning action.

C. Coordinate top of grid surfaces with bottom of doors that swing across to provide ample clearance between door and grid.

D. Use all the lockdowns as provided by the Manufacturer. Ensure that all the lockdown machine screws are tight, and the Entrance Floor Grilles are level, coplanar with the adjacent floor and obstruction free.

3.4 PROTECTION

A. After completing frame installations, provide temporary filler of plywood or fiberboard in Entrance Floor Grille recesses and cover frames with protective flooring. Maintain protection until construction traffic has ended and project is near substantial completion.

B. Defer installation of floor grids until time of substantial completion of project.

3.5 MAINTENANCE

A. After installation, inspect the Entrances Floor Grilles regularly to ensure that all the lockdown machine screws are tight, and the Entrance Floor Grilles are level, coplanar with the adjacent floor and obstruction free.

B. Maintain Entrance Floor Grilles and frames to comply with the Manufacturer’s written instructions.

END OF SECTION

SECTION 12 49 40 – ROLLER SHADES

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes the following:

1. Provide manually operated, roller shades.

B. Related Sections include the following:

1. Division 6 Section “Rough Carpentry” for wood blocking and grounds for mounting roller shades and accessories.

2. Division 9 Section for coordination with wall/ceiling assemblies.

1.2 REFERENCES

A. ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

B. NFPA 701 - Fire Tests for Flame-Resistant Textiles and Films.

1.3 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.

3. Storage and handling requirements and recommendations.

4. Mounting details and installation methods.

B. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, and relationship to adjacent work.

C. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details

D. Selection Samples: For each finish product specified, one set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified

requirements. Shadecloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.

F. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in this section.

B. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.

C. Fire-Test-Response Characteristics: Passes NFPA 701 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

D. Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.7 BUILD AMERICA, BUY AMERICA (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.8 WARRANTY

A. Roller Shade Hardware and Chain Warranty: Manufacturer's standard non-depreciating twenty-five year limited warranty.

B. Standard Shadecloth: Manufacturer's standard twenty-five year warranty.

C. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. MechoShade Systems, Inc.

B. Draper

C. Hunter Douglas

2.2 ROLLER SHADE TYPE AND SHADECLOTH

A. Provide “Slim Line” Manual roller shade as manufactured by MechoShade Systems, Inc. or approved equal.

B. Manual Shades:

1. Mounting: Surface mounted with fascia.

2. Configuration: Single solar shadecloth.

3. Shadecloths:

a. SoHo 1600 series. 3% open; finely woven in a 2x2 basket weave pattern. 76% PVC and 24% polyester.

b. Mesh Weight: 13.5 oz/yard

c. Fabric Thickness: 0.024in

d. Bacterial and Fungai Resistance: ASTM G21 and ASTM E2180

e. Color: Selected from manufacturer's standard colors.

2.3 SHADE BAND

A. Shade Bands: Construction of shade band includes the fabric, the hem weight, hem-pocket, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.

1. Hem Pockets and Hem Weights: Fabric hem pocket with RF-welded seams (including welded ends) and concealed hem weights. Hem weights shall be of appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be similar, for all shades within one room.

2. Shade Band and Shade Roller Attachment:

a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Roller tubes less than 1.55 inch in diameter for manual shades.

b. Provide for positive mechanical engagement with drive / brake mechanism.

c. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable / replaceable with a "snap-on" "snap-off" spline mounting, without having to remove shade roller from shade brackets.

d. Mounting spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.

e. Any method of attaching shade band to roller tube that requires the use of: adhesive, adhesive tapes, staples, and/or rivets are not acceptable.

2.4 SHADE FABRICATION

A. Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise.

B. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shadebands. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.

C. For railroaded shadebands, provide seams in railroaded multi-width shadebands as required to meet size requirements and in accordance with seam alignment as

acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shadebands.

D. Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shadebands.

2.5 COMPONENTS

A. Access and Material Requirements:

1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.

2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.

3. Use only Delrin engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics, and /or polyester, or reinforced polyester will not be acceptable.

B. Manual Operated Chain Drive Hardware and Brackets:

1. Provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.

2. Provide hardware capable for installation of a removable fascia, for both regular and/or reverse roll, which shall be installed without exposed fastening devices of any kind.

3. Provide shade hardware system that allows for removable regular and/or reverse roll fascias to be mounted continuously across two or more shade bands without requiring exposed fasteners of any kind.

4. Provide shade hardware system that allows for operation of multiple shade bands (multi-banded shades) by a single chain operator, subject to manufacturer’s design criteria. Connectors shall be offset to assure alignment from the first to the last shade band.

5. Provide shade hardware system that allows multi-banded manually operated shades to be capable of smooth operation when the axis is offset a maximum of 6 degrees on each side of the plane perpendicular to the radial line of the curve, for a 12 degrees total offset.

6. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not acceptable.

7. Provide shade hardware constructed of minimum 1/8-inch thick plated steel or heavier as required to support 150 percent of the full weight of each shade.

8. Drive Bracket / Brake Assembly:

    a. MechoShade Drive Bracket model M5 shall be fully integrated with all MechoShade accessories, including, but not limited to: SnapLoc fascia, room darkening side / sill channels, center supports and connectors for multi-banded shades.

    b. M5 drive sprocket and brake assembly shall rotate and be supported on a welded 3/8 inch steel pin.

    c. The brake shall be an over running clutch design which disengages to 90 percent during the raising and lowering of a shade. The brake shall withstand a pull force of 50 lbs. in the stopped position.

    d. The braking mechanism shall be applied to an oil-impregnated hub on to which the brake system is mounted. The oil impregnated hub design includes an articulated brake assembly, which assures a smooth, non-jerky operation in raising and lowering the shades. The assembly shall be permanently lubricated. Products that require externally applied lubrication and or not permanently lubricated are not acceptable.

    e. The entire M5 assembly shall be fully mounted on the steel support bracket, and fully independent of the shade tube assembly, which may be removed and reinstalled without effecting the roller shade limit adjustments.

9. Drive Chain: #10 qualified stainless steel chain rated to 90 lb. minimum breaking strength. Nickel plate chain shall not be accepted.

2.6 ACCESSORIES

A. Fascia:

1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.

2. Fascia shall be able to be installed across two or more shade bands in one piece.

3. Fascia shall fully conceal brackets, shade roller and fabric on the tube.

4. Provide bracket / fascia end caps where mounting conditions expose outside of roller shade brackets.

5. Notching of Fascia for any reason shall not be acceptable.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches to interior face of glass. Allow proper clearances for window operation hardware.

B. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

C. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

D. Engage Installer to train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 12 50 00 – FURNITURE

PART 1 – GENERAL

1.1 SUMMARY

A. Movable furniture and fixtures specified in this Section are furnished under the Allowances described in Section 01 21 Allowances.

B. Section includes movable furniture and fixtures including:

1. Desk chairs
2. Breakroom table
3. Breakroom chairs
4. Rocking chairs
5. Lounge chairs
6. Benches (interior)
7. Desk
8. Guest chairs
9. Pouf split seating (large and small)
10. Waste receptacle (interior)
11. Custom area rugs
12. Conference table
13. Custom vitrines
14. Side tables

B. Related Requirements:

1. Division 1 Section - “Allowances”.

1.2 REFERENCES

A. ANSI/BIFMA X5.1 – General-Purpose Office Chairs.

B. ANSI/BIFMA X5.5 – Desk/Table Products.

C. ANSI/BIFMA M7.1 – VOC Emissions.

D. UL 962 – Household and Commercial Furnishings.

E. ASTM E84 – Surface Burning Characteristics.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate locations of power and data outlets with furniture layouts.

2. Coordinate delivery and installation with Owner’s occupancy schedule.

1.4 SUBMITTALS

A. Product Data: Manufacturer’s product information for each furniture item.

B. Shop Drawings: Layout plans showing furniture locations and identification tags.

C. Samples: Manufacturer’s standard finish and fabric samples.

D. Sustainability Submittals:

1. BIFMA LEVEL certification.

2. VOC compliance documentation.

E. Warranty Documentation.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver furniture in original factory packaging with labels intact.

B. Store indoors, protected from weather, moisture, and damage.

1.6 FIELD CONDITIONS

A. Do not install furniture until building is fully enclosed and conditioned.

B. Maintain temperature between 60–85°F and humidity between 30–60 percent.

1.7 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.8 WARRANTY

A. Provide manufacturer’s standard commercial warranty:

1. Seating: Minimum 10 years.
2. Tables and casegoods: Minimum 5 years.
3. Mechanisms and moving components: Minimum 2 years.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design:

1. Haworth
2. Herman Miller
3. Steelcase
4. Teknion
5. Global Furniture Group
6. Or approved equal

2.2 MATERIALS

A. Wood Products: MDF or particleboard core with high-pressure laminate (HPL) surface.

B. Metal Components: Welded steel frames with powder coat finish.

C. Upholstery: Minimum 100,000 double rubs (Wyzenbeek).

D. Foam: CAL 117 compliant.

E. Hardware: Concealed fasteners; adjustable leveling glides.

2.3 PERFORMANCE REQUIREMENTS

A. Furniture shall comply with ANSI/BIFMA standards.

B. VOC emissions shall meet BIFMA M7.1 limits.

C. Seating shall support a minimum load capacity of 250 pounds.

2.4 ACCESSORIES

A. Provide accessory components where indicated:

1. Power modules.
2. Monitor arms.
3. Privacy screens.
4. Wire management systems.

2.5 FINISHES

A. Colors and surface finishes shall be as selected by Architect from manufacturer's full standard line.

B. Edge banding: PVC, 3 mm minimum thickness at exposed edges.

2.6 AREA RUGS

A. Description: Area rugs are furnished under the Allowance specified in Section 01 21 00.

1. Loose area rugs for Concourse Room 102.
2. <u>Custom pattern design as indicated on Interior Finish Plans.</u>

B. Materials:

1. Face Fiber: 100% New Zealand wool, long staple 4–6 inch fibers.
2. Construction: Hand tufted.
3. Surface Texture: Loop pile.
4. Pile Height: 1/4 inch (6.35 mm) nominal.
5. Primary Backing: 100% cotton.
6. Secondary Backing: Cotton mesh.
7. Latex: Revertex KCB 500 low VOC adhesive.

C. Performance Requirements:

1. ASTM D2859 (CPSC FF 1-70) flammability compliant.
2. ASTM E662 smoke density ≤ 450.
3. Minimum pile density: 13,000.
4. Heavy commercial rating suitable for public spaces.

D. Basis of Design Product:

1. Avenue Rugs – Hand Tuft 550W Custom Wool Rug.

a. Gross Yarn Weight: 88 oz/sq yd
b. Rows per 10 cm: 26
c. Stitches per 10 cm: 35
d. Ends/Insertions: 4
e. Pile Density: 13,411

E. Installation Requirements:

1. Provide non-slip rug pad under each rug.
2. Rugs shall not obstruct door swings or accessible routes.
3. Layout and placement shall be coordinated with Architect.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install furniture in accordance with manufacturer’s written instructions.

B. Set furniture plumb, square, and level.

C. Secure freestanding items where required for stability and safety.

3.2 CLEANING

A. Remove packaging and debris from site.

B. Clean exposed surfaces using manufacturer-recommended cleaners.

3.3 PROTECTION

A. Protect installed furniture from damage until Date of Substantial Completion.

B. Repair or replace damaged items prior to final acceptance.

END OF SECTION

SECTION 12 93 00 – SITE FURNISHINGS

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Benches.
2. Picnic Tables
3. Litter (waste) Receptacles
4. Pet Waste Station
5. Cigarette Receptacle

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Detail drawing of product including overall dimensions and options.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver products to site in manufacturer’s original, unopened containers and packaging. Upon delivery, examine packages immediately to ensure all products are complete and undamaged.

B. Storage: Store products in a protected, dry area in manufacturer’s unopened containers and packaging.

C. Handling: Protect product’s finish from damage during handling and installation.

1.4 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.
2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Wausau Tile – Basis of Design for Benches and Picnic Tables

B. Thomas Steele, Division of Graber Manufacturing, Inc. – Basis of Design for Litter Receptacles

C. Or equal

2.2 MANUFACTURED UNITS

A. Benches:

1. Type: Wausau Tile Bench “Concrete Tech Bench - Model TF5027”

a. Size: 72” x18” x 16” H

b. Material: Reinforced Concrete

c. Reinforcing: Steel Rebar

d. Anchoring: Threaded inserts on bottom for anchoring (Contractor to provide anchoring rods if not provided by manufacturer)

e. Finish: Weatherstone Porcelain

f. Color: As selected from manufacturer’s available standard colors

g. Quantity: As shown on drawings.

B. Wheelchair Accessible Concrete Picnic Table:

1. Type: Wausau Tile Wheelchair Accessible Concrete Table “Model TF3212”

a. Size: 96”L x 66”W x 16”H

b. Material: Reinforced Concrete

c. Reinforcing: Steel Rebar

d. Anchoring: Four 3/8”-16 threaded inserts on bottom for anchoring (Contractor to provide anchoring rods if not provided by manufacturer

e. Finish: Standard Ground & Polish Top & Bench – Acid Wash Legs

f. Color: As selected from manufacturer’s available standard colors

g. Quantity: As shown on drawings.

C. Litter (Waste) Receptacle:

1. Type: Chandler Receptacle – CHTR 32 gallon, Basis of Design or equal.

a. Provide with covered square lid.

b. Provide with a receptacle door.

c. Provide with side opening.

2. Frame Materials:

a. Horizontal Rings shall be constructed of ¼” x 2” carbon steel flat bar.

b. Base shall be constructed of 2/16” carbon steel plate.

3. Siding Materials:

a. Straps shall be constructed of 3/8” x 1” (9.6mm x 25.4mm) carbon steel flat bar.

4. Finish / Color:

a. The site furnishing steel shall be completely shot blasted to white metal with cast iron media. Furnishings shall be treated with zinc phosphate and primed with an e-coat epoxy primer in an environmentally friendly closed loop 18 stage finishing process. Furnishings shall be cleaned with detergent and powder coated with super durable triglycidyl isocyanurate (TGIC) polyester powder. The coatings thickness shall not be greater than 6 mils to ensure a durable finish that resists corrosion, chipping, abrasion, cracking and UV damage. (The use of silicone caulk for gap filling of joints shall not be allowed.)

b. Color as selected by architect from manufacturer’s full range of standard colors.

5. Quantity: As shown on drawings.

D. Pet Waste Station:

1. Type: Waste disposal system by Carnegy Avenue, Kessler 42lb. Steel Waste Disposal System - Model # CGA-YAN-524606-GR-HD or equal.

   a. Green powder coated galvanized steel.
   b. Provide pet waste station with 600 waste bags and 50 trash liners. Made from rust-resistant galvanized steel with glow in the dark signage for visible throughout all times of the day.
   c. Locking pull-out bag dispenser capable of holding up to three boxes of roll bags and features a rain guard, with lidded trash can receptacle
   d. Hand sanitizer bottle
   e. Mount pole onto 18” deep concrete base as recommended by manufacturer.

2. Provide each disposal system with dispenser keys, 600 pull-out bags and 50 trash liners. Fill disposal system at project completion.

3. Quantity: As shown on drawings.

E. Cigarette Receptacle:

1 Type: Concrete Ash Urn Outdoor Ashtray Smokers Receptacle, Model TF2040, or equal.

2 Free-standing, heavy-duty, sand-ballasted concrete cigarette receptacle designed for exterior, high-traffic public environments. Unit shall be serviceable from the top without moving or tipping the concrete body.

3. Construction: Precast concrete, integrally colored, weather-resistant, suitable for exterior use.

   a. Snuffer Bowl: Minimum 10-1/2 inch diameter top snuffer bowl for cigarette and ash disposal.

   b. Drain: Brass drain opening in snuffer bowl, discharging into interior metal receptacle; sand ballast isolated from drain path.

   c. Interior Receptacle: Removable metal liner, minimum 18-1/4 inches tall, sized to receive cigarette waste and ash; liner removable from top for cleaning and maintenance.

   d. Include 10lb. bag of black sand and compatible drain screen with each receptacle.

D. Graphics / Identification: Provide permanently applied cigarette symbol/logo on exterior face, factory applied or integrally cast, suitable for exterior exposure and cleaning.

E. Finish options to be selected by Architect.

F. Quantity: As shown on drawings.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated.

B. Surface Mounting: Mount to concrete sidewalks or pavement as recommended by manufacturer.

C. Complete field assembly of site furnishings where required.

END OF SECTION

SECTION 13 14 22 - PRE-ENGINEERED STRUCTURES

PART 1 – GENERAL

1.1 SUMMARY

A. The extent of Metal Building Systems work is shown on Drawings.

1. Type is rigid frame, straight or tapered column, metal building of nominal width, length, wall height and roof pitch indicated.

2. Manufacturer's standard components may be used, providing components, accessories, and complete structure conform to architectural design appearance shown and to specified requirements.

3. Metal roof and wall panels is specified herein.

4. All metal building system components are to be galvanized.

B. Related Sections include the following:

1. Section 03 30 00 “Cast-in-Place Concrete” for concrete floor and foundations and installation of anchor bolts.

2. Division 5 Section “Metal Fabrications”.

3. Division 8 Section “Sectional Overhead Doors”.

4. Division 8 Section “ Hollow Metal Doors and Frames”.

5. Division 9 Section “Paintings and Coatings”

1.2 SYSTEM DESCRIPTION

A. The building system described herein includes the structural steel primary and secondary structural system, metal roof system, wall system, roof and wall trim and accessories as required by the drawings and specified herein.

B. These specifications and the drawings are based upon the Butler Building System as manufactured by Butler Manufacturing Company and establish the standard to be met for this project.

C. Design of the structural system shall be a multi-span rigid frame with straight end columns, wide flange interior columns and tapered roof beams.

D. All components and parts of the structural system shall be as indicated on the drawings and specifications. All components and parts shall be clearly marked and erection drawings shall be supplied for identification and parts assembly.

E. Field modification of parts shall be in accordance with the best standard procedures, require the approval of the manufacturer, and be the responsibility of the Contractor.

F. Anchor bolt diameter shall be as specified by the building manufacturer's standard anchor bolt layout drawings.

G. All reactions for the building columns shall be supplied by the building manufacturer.

H. Structural Steel Design:

1. All structural mill sections or welded-up plate sections shall be designed in accordance with the latest edition of AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings."

2. All cold-formed steel structural members shall be designed in accordance with the latest edition of AISI "Specifications for the Design of Cold-Formed Steel Structural Members."

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product information, specifications, and installation instructions for building components and accessories.

1. Provide certification that roof system has been tested and listed by Underwriters Laboratories, Inc. to have a Wind Uplift Classification of Class 90.

B. Shop Drawings: Submit complete erection drawings showing anchor bolt settings, sidewall, endwall, and roof framing, fascia framing, transverse cross sections, covering and trim details, and accessory installation details to clearly indicate proper assembly of building components.

C. Samples: Provide small chips for initial review.

D. Certification: Submit written Certification prepared, signed, and sealed by a Professional Engineer, registered to practice in the State of Mississippi, verifying that building design meets requirements of specified building code, before delivery of the materials to the building site.

1. Reaction Design to be performed and approved by Architect prior to fabrication.

1.4 QUALITY ASSURANCE

A. AISC Certification: Building System Manufacturer shall be American Institute of Steel Construction - Category MB certified.

B. Letter of Certification: Certification: Submit written certification prepared and signed by a Professional Engineer, registered to practice in Mississippi verifying

that the building system design and metal roof system design (including panels, clips, and support system components) meet indicated loading requirements and codes of authorities having jurisdiction. The certification must reference specific dead loads, live loads, snow loads, wind loads/speeds, tributary area load reductions (if applicable), concentrated loads, collateral loads, seismic loads, end use categories, governing code bodies including year, and load applications.

C. Material Testing: In addition to mill certifications of structural steel, the manufacturer shall provide, upon request, evidence of compliance with specifications through testing independent of the manufacturer's suppliers. This quality assurance testing to include structural bolts, nuts, screw fasteners, mastics, and metal coatings (primers, metallic coated products, and painted coil products).

D. Design Loads

1. Structural design for the building structural system will be provided by the building manufacturer for the following design criteria. Refer to Structural Drawings for additional information.

a. Governing Building Code: IBC 2018

b. Importance factor to be as indicated based on type of occupancy and type of load.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver and store prefabricated components, sheets, panels, and other manufactured items so they will not be damaged or deformed. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight ventilated covering. Store metal sheets or panels so that water accumulations will drain freely. Do not store sheets or panels in contact with other materials which might cause staining.

1.6 WARRANTY

A. Provide manufacturer’s written weathertightness warranty for a maximum of twenty (20) years against leaks in roof panels arising out of or caused by ordinary wear and tear under normal weather and atmospheric conditions. Warranty shall be signed by both the metal roofing system manufacturer and the metal roofing system contractor.

B. Provide manufacturer’s standard written warranty for 25 years against perforation of metal roof panels due to corrosion under normal weather and atmospheric conditions and for the following:

1. Not to peel, crack, or chip.

2. Chalking: Not to exceed ASTM D 4214, #8 rating.

3. Fading: Not more than 5 color-difference units, ASTM D 2244.

1.7 BUILD AMERICA, BUY AMERICA (BABA) REQUIREMENTS

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Butler Manufacturing Company

B. Other Manufacturers will be evaluated after Bidding. Prior approval is not allowed.

2.2 MATERIALS

A. Hot-Rolled Structural Shapes: ASTM A36 or A529.

B. Tubing or Pipe: ASTM A500, Grade B; ASTM A501; or ASTM A53.

C. Members Fabricated from Plate or Bar Stock: 42,000 psi minimum yield strength; ASTM A529, A570, or A572.

D. Members Fabricated by Cold Forming: ASTM A607, Grade 50.

E. Galvanized Steel Sheet: ASTM A446 with G90 coating; “Class” to suit building manufacturer’s standards.

2.3 STRUCTURAL FRAMING COMPONENTS

A. Rigid Frames:

1. Frames shall consist of welded-up plate section columns and roof beams complete with necessary splice plates for bolted field assembly.

a. All base plates, cap plates, compression splice plates and stiffener plates shall be factory welded into place and have the connection holes shop fabricated.

b. Columns and roof beams shall be fabricated complete with holes in webs and flanges for the attachment of secondary structural members and bracing except for field work as noted on manufacturer's erection drawings.

2. All bolts for field assembly of frame members shall be high strength bolts as indicated on erection drawings.

B. Provide in tolerances as indicated on Drawings. No member is to extend outside of the wall line or ceiling line.

2.4 SECONDARY STRUCTURAL MEMBERS

A. Purlins and Girts

1. Purlins and girts shall be "Z" shaped, precision roll formed.

2. Girts shall be "Z" sections. First girt to be located as indicated.

3. Purlins shall be "Z" sections.

4. Outer flange of all girts shall contain factory-punched holes for panel connections.

5. Outer flange of purlins shall contain factory-punched holes for panel connections.

B. Eave Struts: Eave Struts shall be factory pre-punched "C" sections.

C. Bracing:

1. Bracing shall be provided as required to resist structural forces and located as indicated on drawings.

2. Portal frames shall be hot-rolled steel sections of size required to resist lateral forces and attached to columns per manufacturer requirements and as shown on the drawings.

3. Flange braces, purlin braces, etc., when required, shall be cold-formed and installed as indicated on drawings.

2.5 WELDING

A. Welding procedure and operator qualifications and welding quality standards shall be in accordance with the American Welding Society structural welding code. Inspection other than visual inspection as defined by AWS paragraph 8.15.1, shall be identified and negotiated prior to bidding. Certification of welder qualification shall be supplied when requested.

2.6 STRUCTURAL PAINTING

A. Galvanizing:
   1. All structural steel components, secondary framing members, bracing, fasteners, clips, and accessories shall be hot-dip galvanized prior to delivery to the Project Site. Provide galvanizing in accordance with ASTM A123 for structural shapes and plates, ASTM A153 for hardware and fasteners, and ASTM A653 (minimum G90 coating) for sheet steel components.

B. Field Painting:
   1. Field painting of galvanized surfaces shall be performed in accordance with Division 9 Section “Painting and Coatings.” Surface preparation of galvanized steel shall conform to SSPC-SP16 and manufacturer’s recommendations for paint adhesion.

C. Touch-Up:
   1. Touch-up of minor abrasions, field welds, or bolts damaged during erection shall be performed using zinc-rich coating conforming to ASTM A780.

D. Note: No shop-applied primer shall be used on galvanized steel surfaces.

2.7 ROOFING

A. Metal Roof System: Butler Manufacturing “MR-24®” roof system or equal. Color as selected by Architect from manufacturer’s standard colors.

B. Roof System Design:
   1. Design roof panels in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
   2. Design roof paneling system for a minimum roof slope as shown on drawings.
   3. Design roof paneling system to support design live, snow, and wind loads.
   4. Endwall Trim and Roof Transition Flashings: Allow roof panels to move relative to wall panels and/or parapets as roof expands and contracts with temperature changes.

C. Roof System Performance Testing:
   1. UL Wind Uplift Classification Rating, UL 580: Class 90.
   2. Structural Performance Under Uniform Static Air Pressure Difference: Test roof system in accordance with ASTM E 1592.
   3. Roof system has been tested in accordance with U.S. Army Corps of Engineers Unified Facilities Guide Specification Section 07 61 13.

4. FM Global (Factory Mutual):
   a. Roof system has been tested in accordance with FMRC Standard 4471 and approved as a Class 1 Panel Roof.
   b. Metal Building System Manufacturer: Provide specific assemblies to meet required wind rating in accordance with FM Global.
   c. Installation modifications or substitutions can invalidate FM Global approval.

D. Roof Panels:
1. Factory roll-formed, 24 inches wide, with 2 major corrugations, 2 inches high (2-3/4 inches including seam), 24 inches on center.
2. Flat of the Panel: Cross flutes 6 inches on center, perpendicular to major corrugations in entire length of panel to reduce wind noise.
3. Variable Width Panels:
   a. For roof lengths not evenly divisible by the 2'-0" panel width, factory-manufactured variable-width (9-inch, 12-inch, 15-inch, 18-inch, and 21-inch-wide) panels shall be used to ensure modular, weathertight roof installation.
   b. Supply continuous panel lengths from gutter to ridge.
4. Panel Material and Finish:
   a. 24-gauge steel coated both sides with layer of acrylic-coated Galvalume aluminum- zinc alloy (approximately 55 percent aluminum, 45 percent zinc) applied by continuous hot-dip method.
   b. Minimum 0.55-ounce coated weight per square foot as determined by triple-spot test, ASTM A 792.
   c. Apply clear acrylic film for additional protection.
5. Use panels of maximum possible lengths to minimize end laps.
6. Extend eave panels beyond structural line of sidewalls.
7. Factory punch panels at panel end to match factory-punched holes in eave structural member.
8. Panel End Splices: Factory punched and factory notched.
9. Panel End Laps: Locate directly over, but not fastened to, a supporting secondary roof structural member and be staggered, to avoid 4-panel lap-splice condition.
10. End Laps: Floating. Allows roof panels to expand and contract with roof panel temperature changes.
11. Self-Drilling Fasteners: Not permitted. **No exposed fasteners will be acceptable.**
12. Ridge Assembly:
    a. Design ridge assembly to allow roof panels to move lengthwise with expansion and contraction as roof panel temperature changes.
    b. Factory punch parts for correct field assembly.
    c. Install panel closures and interior reinforcing straps to seal panel ends at ridge.
    d. Do not expose attachment fasteners on weather side.
    e. Use lock seam plug to seal lock seam portion of panel.
    f. High-Tensile Steel Ridge Cover: Span from panel closure to panel closure and flex as roof system expands and contracts.

E. Provision for Expansion and Contraction:
1. Provision for Thermal Expansion Movement of Roof Panels: Clips with movable

tab.
a. Stainless Steel Tabs: Factory centered on roof clip when installed to ensure full movement in either direction.
b. Maximum Force of 8 Pounds: Required to initiate tab movement.
c. Each Clip: Accommodates a minimum of 1.25-inch movement in either direction.

2. Roof: Provide for thermal expansion and contraction without detrimental effects on roof panels, with plus or minus 100-degree F temperature difference between interior structural framework of building and of roof panels.

F. Fasteners:
1. Make connections of roof panels to structural members, except at eaves, with clips with movable stainless steel tabs, seamed into standing seam side lap.
2. Fasten panel clips to structural members with "Scrubolt™" fasteners in accordance with erection drawings furnished by metal building system manufacturer, using factory-punched holes in structural members.
a. Fasteners: Metal-backed rubber washer to serve as torque indicator.

G. Accessories:
1. Accessories (i.e., fascia): Standard with metal building system manufacturer, unless otherwise noted and furnished as specified.
2. Exterior Metal Coating on Gutters, Downspouts, Gable Trim, and Eave Trim: "Butler- Cote™ " finish system, full-strength, 70 percent "Kynar 500" or "Hylar 5000" fluoropolymer (PVDF) coating. Color as selected by Architect from manufacturer's standard colors unless noted otherwise to be a custom color..
3. Location of Standard Accessories: Indicated on erection drawings furnished by metal building system manufacturer.
4. Material used in flashing and transition parts and furnished as standard by metal building system manufacturer may or may not match roof panel material.
a. Parts: Compatible and not cause corrosive condition.
b. Copper and Lead Materials: Do not use with Galvalume panels.
5. Provide "beauty caps" over plumbing penetrations and curbs in metal to match gauge and roof color.

2.8 WALL PANELS

A. Exterior Metal Wall System: "Fluted StylWall®II" wall system by Butler Manufacturing is the basis of design or equal.

B. Wall System Design: Design wall panels in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.

C. Wall Panels:
1. 16 inches wide with interlocking joints.
2. Roll-form panels with alternating 4-inch by 7/16-inch box corrugations

with hidden joint concealing fasteners between panels.
3. Roll-form panels to provide hidden joint concealing fasteners between panels.
4. One piece from base to top of wall with a maximum length of 40'-0".
5. Both Ends of Each Panel: Square cut and unpunched.
6. Panel Material and Finish:
   a. 24-gauge galvanized steel, ASTM A 653, G90.
   b. Embossed finish. Color as selected by Architect from manufacturer's standard colors
   c. Panel Exterior: Pre-finished with "Butler-Cote™" finish system, full-strength, 70 percent "Kynar 500" or "Hylar 5000" fluoropolymer (PVDF) coating.
   d. PVDF Coating Warranty: Metal building system manufacturer shall warrant coating for 25 years for the following.
      1) Not to peel, crack, or chip.
      2) Chalking: Not to exceed ASTM D 4214, #8 rating.
      3) Fading: Not more than 5 color-difference units, ASTM D 2244.

D. Fasteners:
   1. Base, Top, and Girt Connections: Self-drilling sheet metal screws.
   2. Reinforcement Clip: Use in conjunction with self-drilling sheet metal screws at wall panel to structural connections.
      a. Not required with fascia panels.
   3. Panel-to-Panel Fasteners: Not required.
      a. Make connections from outside, hidden in panel joint, eliminating exposed fasteners.

E. Accessories:
   1. Accessories (i.e., doors, windows): Design to fit wall panel system and furnish as standard by metal building system manufacturer, unless otherwise noted.
   2. Location of Standard Accessories: Indicated on erection drawings furnished by metal building system manufacturer.

PART 3 – EXECUTION

3.1 ERECTION

A. Framing: Erect structural framing true to line, level and plumb, rigid and secure. Level base plates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use a non-shrinking grout to obtain uniform bearing and to maintain a level base line elevation. Moist cure grout for not less than 7 days after placement.

B. Purlins and Girts: Provide rake or gable purlins with tight fitting closure channels and fascias. Locate and space wall girts to suit door and window arrangements and heights. Secure purlins and girts to structural framing and hold rigidly to a straight line by sag rods.

C. Bracing: Provide diagonal rod or angle bracing in both roof and sidewalls. Cable

or wire rope will not be allowed.

1. Movement resisting frames shall be used instead of sidewall rod bracing, where indicated.

D. Framed Openings: Provide shapes of proper design and size to reinforce opening and to carry loads and vibrations imposed, including equipment furnished under mechanical or electrical work. Securely attach to building structural frame.

3.2 PROTECTION

A. Protect installed metal building system to ensure that, except for normal weathering, metal building system will be without damage or deterioration at time of Substantial Completion.

B. Touch-up: Touch-up abrasions, marks, skips or other defects to shop-primed surfaces with same type material as shop primer.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Testing and Inspecting: A Special Inspector employed by the Owner’s representative shall perform inspections per Section 1704 and Section 1705 in accordance with the 2018 International Building Code. Special Inspection for structural steel shall be in accordance with the quality assurance inspection requirements of AISC 360. A Testing Agency shall be employed by the Owner’s representative per Section 1703 in accordance with the 2018 International Building Code to perform field tests as required and outlined in the Contract Documents.

B. Inspect the steel frame and joint details for compliance with the Contract Documents.

1. Verify material identification for structural steel conform to AISC 360 criteria or other specified standards.

2. Member placement.

3. Application of joint details at each connection.

4. Bracing and stiffening details.

C. High Strength Bolting:

1. Verify material identification of bolts, nuts and washers with specified ASTM requirements. Review manufacturer’s Certificate of Compliance.

2. Inspect bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

3. Visually inspect bolt installation for all of bolted connections for general conformance with the Contract Documents. Confirm that all plies of connected elements have been brought into contact.

4. Test bolt tightening in ten percent (10%) of all slip critical and pre-tensioned bolts. Test a minimum of two (2) bolts in each connection. Verify that all tips are removed from “twist-off” bolts and direct tension indicators are properly installed.

D. Welding:

1. Verify qualifications of welders as AWS certified.

2. Verify material identification of weld filler materials conform to AWS specifications. Review manufacturer’s Certificate of Compliance

3. Verify proper weld procedures are being applied.

4. Verify adequate preparation of faying surfaces.

5. Verify preheat and inter-pass temperatures of steel, proper technique and sequence of welding, cleaning and number of passes are provided as required.

6. Visually inspect all fillet welds, plug or slot welds for size, length and quality in accordance with AWS D1.1.

7. Test 100% of all complete and partial penetration welds in accordance with the requirements of AWS D1.1 using Ultrasonic Inspection (ASTM E164). . Test each root layer of all tested complete and partial penetration welds using Magnetic Particle Inspection (ASTM E709), Liquid Penetrant Inspection (ASTM E165), or another acceptable NDT procedure.

8. Shear Stud Connector welds. Inspect size, number, placement and welding of all shear connectors. Visually inspect 100% of installed studs for full 360-degree flash. Ring test all shear connectors with a 3 lb hammer. Test all questionable studs, not showing full 360-degree flash, by bending studs 15 degrees from vertical away from the weld discontinuity in accordance with AWS D1.1. Randomly test all other studs by bending to 15 degrees from vertical.

9. Miscellaneous fasteners. Visually inspect all fasteners for specified size, spacing, embedment and location.

END OF SECTION

SECTION 13 21 19

PLANT BUILDINGS

1.0 GENERAL

1.1 The Work in this Section shall include furnishing all materials, equipment, and labor necessary to install a complete and serviceable building, as shown and specified.

1.2 RELATED SECTIONS

Section 00 70 00 General Conditions
Section 09 91 00 Painting

1.3 MEASUREMENT AND PAYMENT

Payment for Work in this section shall be included in the unit price / lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials, and incidentals complete.

1.4 REFERENCES

The publications listed below form part of this specification. Each publication shall be the latest revision and addendum in effect on the date this specification is issued for construction unless noted otherwise. Except as modified by the requirements specified herein or the details of the drawings, Work included in this specification shall conform to the applicable provisions of these publications.

ASTM C33	Standard Specification for Concrete Aggregates
ASTM C90	Standard Specification for Loadbearing Concrete Masonry Units
ASTM C150	Standard Specification for Portland Cement

1.5 SUBMITTALS

The following shall be submitted in accordance with the General Conditions, in sufficient detail to show full compliance with the specification:

SD-01 Pre-construction: Contractor shall submit cut sheets to the Engineer for the following for review and approval prior to ordering or installing:
- a. All electrical fixtures
- b. Block color
- c. Paint

SD-02 Data Warranty.

1.6 WARRANTY

1.6.1 The Contractor shall provide a written warranty for the building and all appurtenances contained herein to be free of defects for a period of one year.

2.0 PRODUCTS

2.1 MATERIALS

2.1.1 Concrete Slab Materials

2.1.1.1 Cement

2.1.1.1.1 Structures containing or permanently or periodically in contact with wastewater - Portland cement, ASTM C 150, Type II.

2.1.1.1.2 All other structures - Portland cement, ASTM C 150, Type I.

2.1.1.1.3 Use portland cement made by a well-known acceptable manufacturer and produced by not more than one plant.

2.1.1.1.4 Do not use cement which has deteriorated because of improper storage or handling.

2.1.1.1.5 If fly ash is used, not more than 20% of the cement may be replaced by fly ash. Fly ash may not be used in concrete slabs to receive a float, trowel, or non-slip finish.

2.1.1.2 Aggregates: ASTM C 33 and as herein specified.

2.1.1.2.1 Do not use aggregates containing soluble salts or other substances such as iron sulfides, pyrite, marcasite, ochre, or other materials that can cause stains on exposed concrete surfaces.

2.1.1.2.2 Fine Aggregate:
(1) Clean, sharp, natural sand free from loam, clay, lumps or other deleterious substances.
(2) Dune sand, bank run sand and manufactured sand are not acceptable.

2.1.1.2.3 Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter, as follows:
(1) Crushed stone, processed from natural rock or stone.
(2) Washed gravel, either natural or crushed. Use of slag and pit or bank run gravel is not permitted.
(3) Coarse Aggregate Size: Size to be ASTM C 33, Nos. 57 or 67, except that No. 467 may be used for footings, foundation mats and walls 16 inches or greater in thickness.

2.1.1.3 Water: Clean, free from injurious amounts of oils, acids, alkaline, organic materials or other substances that may be deleterious to concrete or steel.

2.1.1.4 Concrete mix shall provide for a minimum compressive strength of 3,000 psi.

2.1.1.5 Finishes: Interior building surface shall be finished smooth. Bathroom floor shall be sloped slightly to drain to the center of the room drain. Exterior building surface shall be light broom finished.

2.1.2 Concrete Block

2.1.2.1 Concrete block shall be structural units conforming to ASTM 90, medium weight. Final painted color shall be selected by Owner.

2.1.2.2 Accessory Units: Provide units as required for window sills and jambs, doors, control joints, bond beams, lintels and other locations as indicated on drawings with a minimum of block cutting.

2.1.3 Carpentry Materials

2.1.3.1 All framing lumber shall be No. 2 grade or better.

2.1.3.2 All exterior surfaces (trim, siding, facia, etc.) shall be fiber cement board.

2.1.3.3 Toggle bolt fasteners shall be used to anchor framing to hollow masonry.

2.1.4 Roofing Materials

2.1.4.1 Roof decking shall be ¾" CDX C-D grade plywood.

2.1.4.2 Underlayment shall be synthetic, contractor grade.

2.1.4.3 Asphalt shingles shall be architectural style with a 25+ year life rating.

2.1.5 Electrical Materials

2.1.5.1 All electrical materials shall conform to NEC. Lights shall be LED, flush mount, commercial grade.

2.1.6 Structural Steel

2.1.6.1 All structural steel shall be AISC standard structural members, A36.

2.1.7 Doors

2.1.7.1 Doors shall be commercial grade steel in steel frames, fitted with stainless steel hardware (hinges, knobs). Doors shall have lockable handles (keyed outside, button inside) along with having separate deadbolt locks. All locks shall be keyed the same. Doors and frames shall come primed from the manufacturer.

2.1.8 Paint

2.1.8.1 Refer to Section 09 91 00 of these specifications.

3.0 EXECUTION

3.1 CONCRETE SLAB

3.1.1 Concrete slab shall be formed and poured per the dimensions and details shown on the plans.

3.1.2 Interior slab finish shall be smooth.

3.1.3 Exterior slab finish shall be light broom.

3.1.4 Exterior slab shall be sloped slightly to shed water away from doors.

3.1.5 Slab shall be allowed to cure for seven days before any vertical construction is added to the top of it.

3.2 BLOCK

3.2.1 Block shall be installed per the dimensions shown on the plans. Grout color shall match color of block chosen by Owner. Block shall be laid plumb and level. Grout shall be finished flush with block surface interior and exterior.

3.3 FRAMING AND CARPENTRY

3.3.1 All framing and carpentry work shall be performed per the latest addition of the IBC or local building codes, whichever is more stringent and shall be hurricane rated for the area of construction.

3.4 STEEL FRAMING

3.4.1 All steel framing shall be welded together at connection points using continuous filet welds having widths equal to the thickness of the thinnest member being connected.

3.5 ELECTRICAL

3.5.1 All electrical work shall be performed per the latest addition of the NEC.

3.6 PAINTING

3.6.1 All painting shall be performed per Section 09 91 00 of these specifications.

*** END OF SECTION ***

SECTION 21 01 00 - FIRE PROTECTION GENERAL PROVISIONS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered.**

1.2 WORK INCLUDED

A. Provide all labor, materials, tools, and services for a complete installation of equipment and systems contained in contract documents.

B. Principal features of work included are:

1. Fire Protection system.

1.3 RELATED WORK

A. Electrical power and interlock and control wiring and conduit.

B. Field painting of exposed pipe.

1.4 GENERAL

A. The contract documents form a guide for a complete system. Provide all items necessary to provide a complete system but not specifically mentioned, such as hangers, transitions, offsets, and drains.

B. Layouts indicated on drawings are diagrammatical only. Coordinate exact location of equipment, ductwork, and piping to eliminate conflict with other divisions. Designer reserves right to make reasonable changes in location of equipment, and piping prior to construction.

C. Should Contractor find during progress of work that in his judgment existing conditions make desirable a modification, report such item promptly to Designer for instructions. Do not make deviations from contract documents without review of Designer.

D. Supervise all work with a competent mechanic specifically qualified in fire protection work.

E. The installing sprinkler contractor shall be licensed or permitted by the state and local authority having jurisdiction to perform fire protection installations. This shall be in compliance with all applicable state and local laws.

1.5 PERMITS

A. Secure and pay for permits, licenses, and inspections for work under this Division, including water connections.

1.6 CODES

A. All products, materials, and equipment shall comply with the Buy American Act.

B. Comply with all pertinent local, state, and national codes.

1.7 STANDARDS

A. Comply with all pertinent standards. This list is provided as a convenience to the contractor and is not to be considered all inclusive.

1. NFPA 13: Standard on automatic sprinkler systems.

1.8 SUBMITTALS

A. Submit for review complete brochures and shop drawings for materials and equipment proposed.

1. Brochures: Submit complete descriptions, illustrations and specification data for materials and equipment proposed. Clearly indicate proposed items when other items are shown on same sheet. Submit samples on request and/or set up for inspection. Samples will be returned to Contractor.

2. Shop Drawings: Complete equipment, and piping systems.

1.9 PROJECT MAINTENANCE MANUALS

A. Prior to final acceptance of project, provide Owner with bound maintenance manuals.

1.10 PROJECT TECHNICAL INSTRUCTION

A. Prior to final inspection of project, provide technical instruction to Owner as follows:

1. Field Instruction: Provide explanation of how systems and equipment are to operate.

2. Field Demonstration: Demonstrate operation and routine maintenance for systems and equipment.

1.11 CONSTRUCTION RECORD DOCUMENTS

A. Provide construction record documents. Keep at the project one set of drawings and daily record changes at the time they are made. Give drawings to Owner at project completion.

1.12 EXISTING SERVICES

A. Maintain existing services in operation during construction. Coordinate and schedule all service interruptions with Owner.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. All products, materials, and equipment shall comply with the Buy American Act.

B. Provide materials and equipment of domestic manufacturer bearing the U.L. and F.M. label when such label is available.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate location of fire protection piping with equipment, ductwork, and other piping to eliminate conflict with other divisions.

B. Provide proper chases and openings. Place sleeves and supports prior to pouring concrete or installation of masonry.

3.2 CUTTING AND PATCHING

A. Repair or replace routine damage caused by cutting in performance of contract.

B. Correct unnecessary damage caused due to installation of fire protection work.

C. Perform repairs with materials that match existing in accordance with the appropriate sections of these specifications.

3.3 TRENCHING, EXCAVATION AND BACKFILLING

A. Provide trenching, excavation and backfilling necessary for performance of fire protection work in accordance with the appropriate section of these specifications.

3.4 IDENTIFICATION

A. Identify exposed or accessible piping with stenciling contents indicating pipe contents and direction of flow on piping not more than 20 feet apart, at valves, at access panels, and at least once above each space.

B. Contractors option to identify exposed or accessible piping with snap-on or strap-on type markers. Color code markers in accordance with ANSI. Indicate pipe contents and direction of flow on marker. Install markers on piping not more than 20 feet apart, at valves, at access panels, and at least once above each space.

C. Color code piping exposed in equipment rooms. Paint to be Sherwin Williams Metalatex fire protection red.

D. Identify all mechanical equipment with engraved brass, aluminum, or stainless steel nameplates or tags. Use equipment names and numbers appearing in schedules on drawings. Fasten nameplates to equipment using screws. Glue or adhesive is not acceptable. Fasten tags to equipment using brass, aluminum or stainless steel chains.

E. Identify each valve with engraved brass, aluminum, or stainless steel identification tag indicating valve service and sequential identification number. Attach tag to valve handle with brass, aluminum or stainless steel chain. Provide two bound manuals to Owner listing each valve sequentially and indicating valve manufacturer, style, size, service, normal position, and specific location for each valve.

F. Frame and mount control diagrams and sequences in each equipment room. Use non-fading black and white prints encased in aluminum frame with plexiglass cover.

3.5 CLEANING

A. Repair damaged factory finishes covering all bare places and scratches.

3.6 FOUNDATIONS AND PADS

A. Provide foundations, pads, and bases required for equipment. Concrete to be in accordance with concrete division of specifications.

B. Coordinate proper sizes and locations of foundations, pads, bases, anchors, supports, and other items to be built into structure.

3.7 TESTING

A. Test all installed equipment and systems and demonstrate proper operation. Correct and retest work found defective when tested.

B. Thoroughly check piping system for leaks. Do not add any leak-stop compounds to the system. Make repairs to piping system with new materials. Peening, doping, or caulking of joints or holes is not acceptable.

END OF SECTION

SECTION 21 13 13 - AUTOMATIC SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered.**

1.2 WORK INCLUDED

A. Furnish materials, accessories, equipment, tools, and transportation and performance of all services and labor required to completely execute the sprinkler and fire protection work for this project, as indicated on the drawings and as herein specified.

1.3 SCOPE OF WORK

A. Shop drawings.

B. Valves including check valves, system valves, backflow preventer, and indicator valves.

C. Pipe, fittings, interior.

D. Hangers, supports and sleeves.

E. Sprinkler heads, extra sprinkler cabinet.

F. Alarm check valves and accessories.

G. Testing and flushing.

H. Excavation and backfill.

I. Hydraulically calculate sprinkler system, wet and/or dry as required by drawings. Maximum water velocity shall be 25 feet per second for interior piping and 10 feet per second for exterior piping.

J. Cutting of holes necessary for the installation of work specified under this Section. Coordinate cutting of material with other Divisions. Employ services of other trades for patching of concrete, masonry, and other material. Use same material for patching and finish neatly.

K. Unless otherwise noted on the drawings or these specifications, the entire project shall be fully protected, excluding no spaces.

1.4 DESIGN REQUIREMENTS

A. Install system(s) in accordance with the drawings, specifications, and requirements of NFPA 13 and NFPA 25.

B. Furnish material and labor necessary to fully comply with the drawings and specifications and with the rules, regulations, and ordinances.

C. Include in sprinkler system design the following requirements:

1. Light Hazard Occupancies (offices, patient rooms, corridors, lobbies, classrooms, hotel guest rooms, institutional, residential, libraries with 8 ft. high shelves max, unused attics) shall be 0.10 GPM/sq. ft. over 1500 sq. ft.

2. Ordinary Hazard Group 1 Occupancies (electrical rooms, mechanical rooms, storage rooms, kitchens, parking garages, laundries, restaurant service areas, and similar areas) shall be 0.15 GPM/sq. ft. over 1500 sq. ft.

3. Ordinary Hazard Group 2 Occupancies (medical record, boiler rooms, loading docks, machine shop, mercantile, libraries with large stack areas, trash rooms and similar areas) shall be 0.20 GPM/sq. ft. over 1500 sq. ft.

4. Extra Hazard Group 1 Occupancies (emergency generator room and similar areas) shall be 0.30 GPM/sq. ft. over 2500 sq. ft.

5. Canopies and overhangs utilizing Dry Pipe sprinkler systems shall be designed on an Ordinary Hazard Group 1 basis, utilizing 30 percent additional square footage for coverage (i.e., 0.15 GPM/sq. ft. over 1950 sq. ft.).

6. Provide 286 degree F. sprinkler heads in mechanical rooms, boiler rooms, elevator shafts and machine rooms, and other related high ambient temperature spaces.

7. Provide hose streams as required by NFPA 13.

8. Provide a minimum of 18 inches clearance between bottom of sprinkler deflector and top of storage.

9. Provide a 3/4 inch ball drip for all types of fire department connections. Route discharge to outside of building.

10. Provide the results of a Contractor independently performed flow test in accordance to NFPA 291 within 6 months to determine the adequacy of the water supply before construction begins. The Contractor shall use this data obtained to hydraulically design the system. Submit this with sprinkler system drawings and calculations.

11. The hydraulic calculations shall be carried to the site water supply taking into account all fittings, valves, etc. The contractor shall be responsible for hydraulically sizing all new piping not sized on the drawings and shall take into consideration the existing piping to remain.

    a. Design calculations shall have a minimum of 5% difference of system demand including hose stream and the available water supply flow and pressure.

1.5 QUALITY ASSURANCE

A. Materials bearing UL and FM approval, where such approval is applicable or required by the agencies having jurisdiction over fire protection work.

B. The installing sprinkler contractor shall be licensed or permitted by the state and local authority having jurisdiction to perform fire protection installations. This shall be in compliance with all applicable state and local laws.

C. All sprinkler piping from “Point of Service” including underground used for sprinkler or standpipe system shall be installed by a Registered Sprinkler Contractor. Underground mains and hydrants must be installed and in service prior to starting construction.

D. All castings used for coupling housings, fittings and valve bodies shall be date stamped for quality assurance and traceability.

1.6 SUBMITTALS AND SHOP DRAWINGS

A. Prepare complete detailed working drawings for Fire Protection System. Submit drawings to Designer and to owner's insurance underwriter for approval. After receiving this approval, submit shop drawings to State Fire Marshal and local AHJ for his review and approval prior to starting installation. Prior approval by above listed authorities is required before sprinkler installation is begun.

B. The Sprinkler Contractor shop drawings and calculations shall be stamped and signed by a firm employee who has a minimum NICET III level certification and signed by a Responsible Managing Employee. Shop drawings and calculations shall be submitted by a licensed and registered fire protection contractor.

C. Equipment submittal drawings and data are required on all items named by manufacturer, including the following:

1. Sprinkler Heads - Type and Manufacturer. The mixing of sprinkler manufacturer shall not be permitted.

2. Valves - Type and Manufacturer, interior and exterior. Sprinkler devices (alarm check valves, dry pipe valves, etc. shall be listed and approved as component packages and no intermixing of valve manufacturers shall be allowed.

3. Water Flow, Pressure and Tamper Switches - Type and Manufacturer.

4. Piping and fittings.

D. The sprinkler system shall be hydraulically designed by industry standard computer software. The Contractor shall submit computer calculations and copy of original water flow test report with working plans. Include in calculations allowance for outside hose streams and domestic water as required.

E. Contractor will supply as-built drawings to the Owner, the Owner's Insurer, the Architect, the Engineer and other entities as required by the Owner or the Authority Having Jurisdiction.

1.7 SPRINKLER SYSTEM COORDINATION

A. The contractor will be responsible for ensuring that the reflected ceiling plan shown on the working drawings is the latest revision from the Architect before commencing work.

B. The contractor shall be responsible for providing to the Architect notification for any drawing changes resulting from movement of sprinkler piping or heads during installation.

C. Failure to coordinate sprinkler system and building systems (including, but not limited to: ductwork, mechanical piping, and lighting fixtures) prior to fabrication or installation of sprinkler systems shall be corrected, modified, or changed as necessary at the expense of the contractor.

D. The contractor is to completely investigate, PRIOR TO BID, all requirements of local water utility and fire department. Devices such as ADT and/or local alarm systems, double check valve assemblies, detector checks, tamper switches shall be provided complete, wired, connected, and installed in accordance with local authorities by this Contractor. In the event the authorities have no installation details, the Contractor shall submit for approval proposed installation.

1.8 APPLICABLE CODES

A. NFPA 13

B. NFPA 25

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Products listed indicate standard.

2.2 VALVES

A. Acceptable Valve Manufacturers: Ames, Nibco, Anvil, Kennedy, Wilkins, Tyco or Victaulic.

B. Backflow Preventer

1. Double check detector valves: Ames C300 or Wilkins 350 ADA with 2" bronze by-pass meter or local water department standard. Size as indicated on drawings.

C. Interior Valves

1. Check valves

a. Iron body, Kennedy Valve 1126A swing check valve with resilent disc, flanged body.

b. Bronze body, Nibco KT-403-W threaded swing check valve with dielectric unions.

c. Ductile iron body, Tyco CV-1F swing check valve with grooved ends.

2. Gate valves

a. Iron body, OS&Y gate valve, Kennedy Valve FW-8068A, flanged.

b. Bronze body, OS&Y gate valve, Nibco T-104-0, threaded with dielectric unions.

c. Ductile iron body, OS&Y gate valve, Tyco with grooved ends.

3. Butterfly valves

a. Ductile iron body, indicating type, Kennedy Valve W300 with integral supervisory tamper switch, flanged.

b. Ductile iron body, indicating type, Tyco BFV-N with grooved ends.

c. Butterfly valves are not allowed on suction side of fire pumps.

D. Wall-Mounted Indicator Valves

1. Gate valve, Kennedy Valve 8701ASS, flanged NRS.

2. Wall indicator post, Kennedy Valve 641.

2.3 PIPE AND FITTINGS

A. Interior Pipe and Fittings

1. Piping for Dry Pipe systems and for drainage systems shall be Schedule 40 galvanized steel pipe, conforming to ASTM A795 with galvanized fittings, ANSI B16.4, galvanized coated, both interior and exterior of pipe and fittings.

2. Fittings for dry pipe systems

a. Fittings shall be threaded or grooved for pipe 2 inch and smaller and flanged or grooved for pipe 2-1/2 inch and larger. Contractor has option of providing threaded piping for 6 inch and larger.

b. Ductile iron threaded fittings, ANSI B16.3 Class 300 hot-dipped galvanized conforming to ASTM A153.

c. Cast iron threaded fittings, ANSI B16.4 Class 125 and 300 (extra heavy) hot-dipped galvanized conforming to ASTM A153.

d. Cast iron flanged fittings, ANSI B16.1 Class 125 and 300 hot-dipped galvanized conforming to ASTM A153.

e. Grooved couplings and fittings, as manufactured by Tyco, Anvil, Victaulic or equivalent. Couplings shall be rigid type, equivalent to Tyco 577 Rigid Coupling with Tri-Seal Grade “E” EPDM gasket. All groove couplings and fittings shall be hot-dipped galvanized conforming to ASTM A153 and furnished by a single manufacturer. Associated piping shall be roll-grooved.

f. Weldolet pipe outlets for branch connections shall be of approved manufacturer.

3. Flexible sprinkler drops shall be UL Listed and FM approved. The maximum length shall not exceed 4’-0” and the minimum bend radius shall not exceed the more stringent of the UL and FM guidelines. Flexible drops shall be installed per manufacturers printed instructions with mounting brackets supplied by the same manufacture. Hydraulic calculations shall allow for length of flexible drop used. Submit all product data including manufacturers mounting instructions with shop drawings submitted.

4. Mechanical tees are not allowed on this project.

B. Hangers, Supports, and Sleeves

1. Support piping with UL and FM approved hangers. Acceptable manufacturers: Anvil, B-Line, Fee & Mason.

2. Adjustable Clevis: Anvil Fig. 260.

3. Adjustable Swivel: Anvil Fig. 69. Beam Clamp with Anvil Fig. 92 or Anvil Fig. 218 with retaining strap. If Fig. 218 is used provided Fig. 157 rod attachment.

4. Concrete Fasteners: Anvil steel shell and expander plug.

5. Concrete Insert: Anvil Fig. 152.

6. Riser Clamp: Anvil Fig. 261.

7. Powder-driven inserts shall not be accepted.

8. All pipes passing through rated floors or walls shall be sleeved and/or firestopped to an equivalent rating of the floor or wall assembly. Firestop materials shall meet ASTM E814 requirements.

9. All piping hangers shall be listed for use with sprinkler systems.

10. All hangers, bracing, etc., shall be designed to constrain the sprinkler discharge resulting from a system pressure of 175 psig at the base of the riser.

2.4 SPRINKLER HEADS, EXTRA SPRINKLER CABINET

A. Provide the following sprinkler heads of proper types, ratings, and spacings for areas involved. Provide appropriate finishes compatible with space finishes being served. Acceptable manufacturers: Tyco, Viking, Victaulic and Reliable.

1. Quick Response Type

a. Pendent and upright: Tyco TY-FRB (UL and F.M. approved). K-Factor = 5.6

b. Recessed, chrome: Tyco TY-FRB (UL and F.M. approved). K-Factor = 5.6

c. Fully concealed: Tyco-RF II, custom color coverplate as selected by Architect. Coordinate with Architect for quantity of custom colors required and location of custom color coverplates (UL approved). K-Factor = 5.6

d. Horizontal sidewall: Tyco-FRB (UL and FM approved).

2. Extended Coverage Quick Response Heads

a. Pendent and Upright: Tyco EC-11; (UL and FM approved) K Factor = 11.2.

b. Recessed, Chrome: Tyco EC-11 (UL and FM approved) K-Factor=11.2.

c. Sidewall: Tyco FRB.

d. Fully Concealed: Tyco-RF 11, custom color coverplate as selected by Architect. Coordinate with Architect for quantity of custom colors required and location of custom color coverplates. (UL approved) K-Factor=5.6

B. Pendent heads in ceilings and horizontal sidewall heads shall have one-piece, non-adjustable escutcheons. Two-piece or slip type escutcheons shall not be accepted. This does not apply to recessed heads. Escutcheon shall be approved for use and supplied by the sprinkler manufacturer.

C. Sprinkler body shall be integrally cast with a hex-shaped wrench boss to reduce the risk of damage during installation. Wrenches shall be provided by the sprinkler manufacturer which directly engages the wrench boss.

D. Provide sprinkler cabinet equal to Tyco with spare sprinkler wrench.

E. Contractor shall coordinate dry barrel length as required for field conditions.

2.5 SWITCHES

A. Water Flow Switch: System Sensor Model WFD or Notifier Model No. WFD-60 vane type flow switch with pneumatic retard adjustable from 0 to 70 seconds, complete with two sets of single pole, double throw micro feature. Coordinate final voltage with Division 26.

B. Tamper Switches: System Sensor PIBV2(A) or Notifier Model No. PIBV2(A) for 4" and larger, Potter Model No. OSYSU-2 for pipe size less than 4", tamper switch double pole, double throw micro feature for ½-inch to 12-inch valves. Coordinate final voltage with Division 26.

2.6 WATER FLOW ALARMS

A. Electric Alarm: Electrically operated 24 VDC red enameled 10” round gong with pressure alarm switch. Coordinate final voltage with Division 26. Notifier MB-G10 or approved equal.

2.7 DRY PIPE SYSTEM CHECK VALVE AND ACCESSORIES

A. Dry Pipe System Check Valve

1. Provide check type valve with divided seat ring, rubber faced clapper to automatically activate water motor alarm or electric alarm. Alarm check valve shall be equal to TYCO DPV-1, differential style valve with trim package.

2. Accelerator. Where an accelerator is used, provide an electronic accelerator.

3. Test and drain.

4. Air Maintenance device with low pressure alarm.

5. Alarm switch with supervisory capability.

6. Pressure gauges where required by NFPA 13.

B. Air Compressor

1. Coordinate with Division 26 for all wiring connection to approved air compressor.

2. Contractor to select air compressor to:

a. Restore system pressure within 30 minutes or as required by NFPA 13.

b. Maintain system pressure as required by approved dry pipe valve or shall be 20 psi in calculated trip pressure of dry pipe valve.

C. Calculations

1. Provide calculations for water delivery time by approved software.

2. Water delivery shall be:

a. Light Hazard – 60 seconds.

b. Ordinary Group 1 Hazard – 50 seconds.

c. Ordinary Group 2 Hazard – 50 seconds.

3. Provide quick opening device as required.

D. Drainage

1. System branch lines shall be pitched at least ½ inch per 10 feet.

2. Mains shall be pitched at least ¼ inch per 10 feet.

3. Auxiliary Drains:

a. Located in areas subject to freezing shall be readily accessible.

b. If capacity of trapped section is less than 5 gallon drain shall consist of valve not less than ½ inch and drain plug.

c. If capacity of trapped section more than 5 gallon drain shall consist of two 1 inch valves and one 2 inch by 12 inch condensate nipple and shall be accessibly located.

4. Test connection shall be located on end of most distant sprinkler pipe and equipped with readily accessible shut off valve and plug not less than 1 inch, at least one of which shall be brass.

5. Gridded systems are not acceptable.

2.8 INSPECTOR TEST AND DRAIN

A. Where indicated on drawings (riser or remote location), Inspector test and equal to AGF3011ASG. Inspector test and drain shall have:

1. Body Material: Bronze body, brass stem, steel handle, chrome-plated bronze ball, virgin Teflon valve seat. Sight Glass: Bronze housing with viewing window.

2. Components: A tamper resistant test orifice and a tapped port for system access.

3. Pressure Relief Valve and Drainage Piping: AGF Model 7000.

a. Pressure Rating: Factory rated at 175 psi.

b. Body Material: Bronze body and stainless steel spring.

c. Components: Nylobraid flexible tube, two 1/2” NPT by barbed 90 degree elbows, external identification plate and integral flushing handle to remove debris.

d. 1/2 inch MIPT inlet, 1/2 inch FIPT outlet.

e. Relief pressure shall be factory set to project specifications.

f. Relief valve shall operate to the OPEN position between 90% and 105% of the set pressure.

g. Relief valve shall reseat or CLOSE at a minimum of 80% of set pressure.

4. Test Orifice Size as required by NFPA 13, latest edition.

5. Size: F.I.P.T., same as connected piping.

6. Inlet and Outlet: Threaded.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate installation with other Divisions to ensure there are no conflicts. Fire protection piping shall not take priority in routing over HVAC ductwork.

3.2 PIPE INSTALLATION

A. Connect to water main as shown on drawings.

B. Install underground piping to provide a minimum cover of 2.5 feet over the top of the pipe. Provide 3 feet of cover under roads and driveways.

C. Install underground service utility tape approximately 18 inches above pipe.

D. Attach hangers to structural steel work as specified above, except that structural work shall not be drilled and punched. Wherever necessary, furnish, install, and securely anchor to or between building members suitable angle iron or other steel members to support sprinkler work.

E. Provide support for grooved piping in conformance with requirements of MSS-SP-69, "Pipe Hangers and Supports - Selection and Application". In addition to these requirements, leave no horizontal pipe unsupported between any two couplings nor shall any pipe be left unsupported whenever a change in direction of flow takes place. Provide supports meeting the requirements stated above, but ensure that the distance between supports does not exceed the following:

PIPE SIZE	MAXIMUM SPAN BETWEEN HANGERS
1 Inch	8 Feet
1-1/4 through 2 Inch	10 Feet
2-1/2 through 4 Inch	12 Feet
5 through 8 Inch	14 Feet
10 through 12 Inch	15 Feet

F. Support vertical piping at every other floor or every other pipe length, whichever is most frequent. Set the base of the riser or base fitting on a pedestal or foundation.

G. Piping Above Grade:

1. In areas with no ceilings, run piping as high as possible. Minimum head room shall be 10'-0".

2. Grooved joint shall be installed in accordance with the manufacture's written recommendations. Grooved ends shall be clean and free from indentations, projections or roll marks. The gasket shall be molded and produced by the coupling manufacturer of an elastomer suitable for the intended service. The coupling manufacturer's factory trained representative shall provide on-site training for the Contractor's field personnel in the use of grooving tools and installation of product. The representative shall periodically visit the job site to ensure the best practices in grooved product installation are being followed. (A distributor's representative is not considered qualified to conduct the training.

H. Underground Pipe

1. Underground pipe and fittings shall be listed in the Underwriters' Laboratories approved fire protection equipment list.

2. All underground piping for fire mains shall be installed, clamped and anchors, flushed and hydrostatically pressure tested according to the requirements of the Authorities Having Jurisdiction and NFPA 13 and 24.

3. Trench and excavation work of the depth required by the Authorities and/or Agencies Having Jurisdiction for the proper installation of underground piping and valve shall be furnished by the sprinkler contractor.

4. Trench and excavation work shall include excavating, cutting of holes through foundation walls and floors, preparing of trenches, backfilling as specified.

I. Provide section valves where shown on drawings, complete with tamper switch, water flow alarm, and drain connections. Provide sight-glass where inspector's test discharge cannot be readily seen when operating valve.

J. All control valves and indicating valves shall be chained into the open position and equipped with remote or central station signaling devices per 2013 NFPA 13 – 8.16.1.1.2.1.

K. All metallic sprinkler piping, including but not limited to, all risers, cross mains, drains, and branches are to be primed with at least one coat of rust inhibitive primer before installation. (Except where stainless steel or chrome plated piping is used.)

L. All sprinkler piping shall be hydrostatically tested at 200 psi and shall maintain that pressure with no loss for 2 hours or as required by NFPA 13 for normal pressure in excess of 150 psi.

M. Provide drain valves, pipes and test connections as required by NFPA 13. Pipe drain lines and test connections to outside building as shown on the drawings and details. Test lines must originate from the most hydraulically remote point of each sprinkler zone. All drain piping and fittings shall be galvanized coated, no exception.

N. Cross mains and feed mains shall not pass through electrical rooms or similar spaces. Only the branch line serving such spaces shall be permitted within the boundaries of these rooms.

O. Drain plugs shall be installed on trapped sections of piping between 5 and 50 gallons. Auxiliary drain valves, 1 inch or larger, shall be installed on trapped sections of pipe greater than 50 gallons, and piped to an accessible location.

P. All dry pipe systems shall be tested in addition to hydrostatic test, an air pressure leakage test at 40 psi for 24 hours with a maximum pressure loss of 1-1/2 psi.

3.3 SPRINKLERS

A. Install sprinkler heads and required piping in areas such as concealed spaces and spaces as required by NFPA 13, NFPA 101, applicable state and local codes.

B. Install sprinkler heads centerline of corridors and locate in the center of the ceiling tiles. Install sprinkler heads in other designated spaces in the center of the ceiling tiles and symmetrically locate with other heads within the ceiling. (Refer to Architectural reflected ceiling plans.) Do not install sprinkler heads in other locations any closer than six (6) inches to any ceiling grid or wall.

C. Pendant sprinklers below ceiling shall be in alignment and parallel to ceiling features, walls, etc.

D. When the light fixtures extend below the ceiling, the sprinklers shall be spaced so that the sprinkler spray pattern is not obstructed. Refer to electrical plans for light fixture layout and types.

E. Provide guards on sprinkler heads where within 7’-6” of finished floor or wherever sprinklers may be subject to mechanical injury.

F. Do not install sprinklers which have been dropped, damaged or show a visible loss of fluid. Never install sprinklers with cracked bulb.

G. Furnish one sprinkler cabinet complete with 12 sprinklers of assorted temperature ratings of the type necessary and in use throughout the installation, including one sprinkler wrench. Locate and mount adjacent to riser.

3.4 MATERIAL AND TEST CERTIFICATE

A. Provide copy of Contractor's Material and Test Certificate for underground and above ground piping as required by NFPA 13 and NFPA 24 in Owners O&M Manual.

3.5 OWNER'S INFORMATION CERTIFICATE

A. Before commencing work, the sprinkler contractor shall obtain from the Owner, or his Agent, an Owner's Information Certification containing the elements outlined in 2013 NFPA 13 – 4.3.

B. The Contractor shall provide a copy of the Owner's Certificate to the Engineer.

3.6 GUARANTEE

A. The fire protection installation, as specified under this section of the specifications, shall be guaranteed for one year against defective equipment, materials, and workmanship.

B. Guarantee shall not be construed as requiring the sprinkler contractor to render service or maintenance required in the normal operation of the equipment or to make repairs that may be needed due to normal wear and tear or the Owner's negligence, abuse, or breakage.

3.7 INSPECTION SERVICE

A. After completion of the fire protection installation and at the start of the guarantee year, the Contractor shall execute the National Fire Sprinkler Association., Standard form of "Inspection Agreement," without charge to the Owner, calling for four inspections of the sprinkler system during the guarantee year. These inspections will, at a minimum, comply with the provisions and requirements of NFPA 25. During the guarantee year, the inspections shall be made as per the inspection agreement, plus the following maintenance to be performed during the course of the fourth inspection.

B. Operation of all control valves.

C. Lubrication of operating stems of all interior control valves.

D. Operation of water motor gong and/or electric alarms.

E. Cleaning of alarm valves.

F. Cleaning of dry pipe valves.

G. Lubrication of Fire Department Connection inlets.

H. The Standard Form of the National Fire Sprinkler Association., "Report of Inspection" shall be filled out in triplicate after each inspection and the copies sent to the Owner, Insurance Carriers, Fire Department, or other authorities that the Owner may designate.

END OF SECTION

SECTION 21 31 13
ELECTRIC-DRIVE CENTRIFUGAL FIRE PUMP

1.0 GENERAL

1.1 The Work in this Section shall include furnishing all materials, equipment, and labor necessary for delivery and installation of a packaged fire pump system. This packaged system shall consist of an electric motor driven fire pump sized as indicated on the project plans with an associated electrical jockey fire pump capable of providing a minimum of 20 gpm at 148 psi along with all necessary piping, electrical and controls housed in a pre-fabricated, skid mounted building complete and functional, except for external piping and electrical connections, ready to be mounted on a concrete foundation.

The system as supplied shall meet all requirements of NFPA with UL/FM listed equipment utilized throughout where appropriate. Enclosure shall meet all requirements of the International Building Code (IBC). All electrical components shall be per NEC.

1.2 RELATED SECTIONS
Section 00 72 00 General Conditions

1.3 MEASUREMENT AND PAYMENT

Payment for Work in this section shall be included in the unit price / lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials, and incidentals complete.

1.4 SUBMITTALS

The following shall be submitted in accordance with the General Conditions, in sufficient detail to show full compliance with the specification:

SD-01 Product Data:

a. Detailed, descriptive information for all equipment, piping, building, electrical and controls associated with the system.
b. Drawings showing the dimensions and locations of all components associated with the system.
c. Highlighted information where any external connections are required for the system.

SD-02 Shop Drawings: Submit shop drawings of the packaged fire pump system and all accessories for review and approval by the engineer prior to beginning any related shop fabrication or erection. Include sufficient data to show that the packaged fire pump system conforms to the requirements to these Specifications.

SD-03 Contract Close-out:

a. Project Record Documents
b. Operation and Maintenance Manuals: Two Sets of complete operation and maintenance manuals shall be provided to the Engineer to convey to the Owner. Manuals shall be bound in hard cover, three ring binders with a Table of Contents and dividers between the applicable sections. These manuals shall include:
    1. Cut sheets for every piece of equipment included in the system.
    2. Maintenance schedules for all equipment including all fluid volumes and recommended types (oil, antifreeze, fuel, etc.).
    3. Operation manuals for all equipment. This includes programming guides for all controllers.
4. Trouble-shooting matrix.

SD-04 Data Warranty: The Contractor shall warrant, along with the packaged fire system manufacturer, the entire installed packaged fire system against any defects in workmanship and materials for a period of one (1) year from the date of acceptance by the Owner. In the event any such defect should appear, it should be reported in writing to the manufacture during the warranty period.

1.5 QUALITY ASSURANCE

1.5.1 Qualifications

1.5.1.1 The packaged fire pump system supplier shall be solely responsible for the proper supply and installation of all components of the system pre-fabricated and supplied on the skid mounted enclosure. The supplier shall have a minimum of five years of experience in the manufacture of such systems and shall provide references with the bid documents showing three like installations within the last five years with contact information for those installations.

2.0 PRODUCTS

2.1 GENERAL

2.1.1 The packaged fire pump system shall consist of an electric motor driven fire pump sized as indicated on the project plans, an electrical jockey pump having a minimum capacity of 20 gpm at 148 psi, all with the necessary piping, fittings, valves, gages, sensors and electrical components and controls all pre-fabricated and mounted in a skid mounted, pre-manufactured building.

2.2 EQUIPMENT

2.2.1 Pump. Pump shall be a split-case pump sized as indicated on the project plans and shall be UL/FM listed with the following features:

1. Cast iron casing with 125 lb suction and 125 lb discharge FF ANSI flanges.
2. Brass impeller with integral rings.
3. Brass casing rings.
4. Standard grease lubed bearings.
5. RH steel shaft double row outboard bearing.
6. Double row outboard, single row inboard bearings with standard lip seals.
7. 304SS shaft seals.
8. Standard packing for suction pressure less than 100 psi.
9. UL/FM lantern ring with seal piping standard.
10. UL/FM approved fire pump nameplate.

Pump shall be Peerless or approved equal.

2.2.2 Jockey Pump. Jockey pump shall be a multi-stage centrifugal type with direct connection 182TC, 5 hp, 3 Ph, 208 230/460V TEFC framed motor with a cast iron base and 1-1/4 inch suction and discharge flanged connections. Pump shall be Grundfos Model CR5-12 or approved equal.

2.2.3 Piping and Valves. All piping, valves and hardware shall be designed, supplied and installed in compliance with NFPA 20.

1. Piping shall be steel meeting either NFPA 13 or ASTM 53B as applicable. Any welded fitting shall be done by ASME Section IX qualified welders. Piping within the packaged unit shall be fully supported, allowing for future replacement of valves or other components without supplemental support.
2. Diesel fire pump suction and discharge piping shall be 10 inch diameter with 150 lb. flanged fittings for all external connections.
   a. Suction line shall be fitted with a 10 inch, flanged 250 psi OS&Y gate valve direct bolted to the pump suction flange. Valve shall be manufactured by NIBCO, Model F-607-RW or approved equal, fitted with a tamper switch and shall be UL/FM rated. Suction line shall have 15-300 psi, liquid filled pressure gage mounted with an isolation valve.
   b. Discharge line shall be fitted with a 10 inch, grooved connection, butterfly valve, Victaulic Series 705 or approved equal with a tamper switch and a 10" grooved connection, check valve, wafer type, Victaulic Series 717 or approved equal. Discharge pipe shall have a 0-300 psi, liquid filled pressure gage mounted with an isolation valve.
   c. Discharge piping shall include a 10x10x6 grooved connection tee for the pressure relief valve connection and a 10x10x8 grooved connection tee for the hose header connection.

d. Pressure relief valve shall be 6 inch, 100 – 300 psi rated with 125 lb flanged connections and a sight glass cone, CLA-VAL Model 2050B-4KG1 or approved equal.
e. Hose header valve shall be an 8 inch grooved connection, butterfly valve, Victaulic Series 705 or approved equal with a tamper switch.
f. Hose test header shall be 8 inch diameter, 150 lb. flanged and include six, 2-1/2" angle style hose valves, caps w/chains and a ½" drain valve all manufactured by CLA-VAL or approved equal.

3. Jockey pump piping shall be 1-1/4" diameter with threaded connections.
   a. Suction line shall be fitted with a threaded connection, 1-1/4" gate valve, rising stem, OS&Y solid wedge disc, UL/FM rated as manufactured by Nibco Model T-104-0 or approved equal installed at the connection with the 10 inch fire pump suction line.
   b. Discharge line shall be fitted with a threaded connection, 1-1/4" check valve UL/FM rated manufactured by Nibco Model KT-403-W or approved equal.
   c. Discharge line shall be fitted with a threaded connection, 1-1/4" gate valve, rising stem, OS&Y solid wedge disc, UL/FM rated as manufactured by Nibco Model T-104-0 or approved equal installed at the connection with the 10 inch fire pump discharge line.

4. Fire pump and Jockey pump sensing piping shall be ½" diameter, hard drawn brass tubing installed per NFPA 20 between the respective pump and its controller.

2.2.4 Electrical Components (wiring, conduit, connections, panels, etc.) shall all comply with the National Electrical Code (NEC) and shall be UL listed.

1. Conduit shall be rigid, ¾" diameter minimum with seal-tite flexible conduit at equipment connections.
2. All wiring shall be sized per NEC for the application.
3. Fire Pump Controller. Controller shall be UL/ULC/FM Fire Pump Controller, 12VDC/120VAC as manufactured by Tornatech, Firetrol or approved equal. Enclosure shall be NEMA 2 UL/FM rated.
4. Jockey Pump Controller. Controller shall be 5hp 460V/3Ph/60 Hz controller manufactured by Tornatech, Peerless or approved equal. Enclosure shall be NEMA 2 UL/FM rated.

2.2.5 Skid. Skid shall be constructed of properly sized mill standard size steel members either I-beam or channels with welded connections and painted with a two coat system. Skid shall be fitted with a minimum of four lifting lugs and two grounding lugs. Skid shall be dimensioned to encompass all the equipment to be located within it, providing code required (where applicable) and ample space to access, service and maintain all of the equipment housed therein.

2.2.6 Enclosure. Enclosure shall be modular wood framed construction, 3-1/2" wall thickness utilizing cam-lock type fasteners between the panels. Enclosure shall be designed for 110 mph winds and Seismic Zone D, live load 60 psf constructed per IBC with UL approved Class 1 fire rated insulation. Enclosure shall have the following features:

1. 8 foot minimum ceiling height.
2. Treated wood frame with urethane filling, R Value = 25.
3. Single slope, standing seam metal room insulated R Value = 38 with gutters and downspouts included.
4. 6 ft. x 7 ft. 1-3/4" double leaf, metal commercial door with mortise lock and weather hood.
5. Damper with AC motor operator sized per NFPA.
6. Exhaust fan with shutter.
7. Heater with thermostat for room sized per NFPA.
8. Exterior weather proof lights mounted above door with photocell activation.
9. Commercial grade interior lights.
10. Interior emergency battery powered light above doors.
11. Interior wall outlet.
12. Sprinkler system per NFPA 13.
13. Connection point for 460 V power.

Enclosure to be manufactured by KYSOR or approved equal.

3.0 EXECUTION

3.1 SKID MOUNTED BUILDING INSTALLATION

3.1.1 Skid mounted building to be unloaded by Contractor and inspected by Contractor and Engineer for any damage prior to permanent mounting on foundation.

3.1.2 Skid frame to be leveled on a grout bed and filled with clean sand to a depth which will allow the pouring of a minimum four-inch thick, welded wire fabric reinforced concrete slab on top with the slab surface set at the manufacturer's recommended floor surface level. This slab/fill system shall incorporate drains per the manufacturer's recommendations.

3.2 PACKAGED SYSTEM INSTALLATION

3.2.1 Contractor shall make all required connections (water, power, vents, exhaust) to the packaged fire pump system as shown on the plans and/or per the manufacturer's guidelines to provide a fully functioning unit.

3.2.2 Contractor shall make final connections within the skid mounted unit as necessary, installing assemblies and appurtenances as required to provide a fully functioning unit.

3.3 TESTING AND INSPECTION

3.3.1 Contractor shall have the packaged fire pump system manufacturer's representative inspect the final installation prior to operation and shall make any corrections or repairs resulting from said inspection at no cost to the Owner. Contractor shall provide for a manufacturer's start-up service.

3.3.2 System shall be operated on-site to prove that the stated design flow and pressure parameters are met. Contractor shall be responsible for providing all meters, etc. necessary to perform this testing.

*** END OF SECTION ***

SECTION 21 41 23

GROUND STORAGE TANKS FOR FIRE-SUPPRESSION WATER

1.0 GENERAL

1.1 The Work in this Section shall include furnishing all materials, equipment, and labor necessary for erection of a Factory Powder Coated Bolted Steel water storage tank as shown on the plans and specified herein.

The bolted steel tank shall conform to the requirements of NFPA 22, "Water Tanks for Private Fire Protection," for surface water-storage tanks for fire-suppression water supply.

1.2 RELATED SECTIONS

Section 00 72 00 General Conditions

1.3 MEASUREMENT AND PAYMENT

Payment for Work in this section shall be included in the unit price / lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials, and incidentals complete.

1.4 REFERENCES

The publications listed below form part of this specification. Each publication shall be the latest revision and addendum in effect on the date this specification is issued for construction unless noted otherwise. Except as modified by the requirements specified herein or the details of the drawings, Work included in this specification shall conform to the applicable provisions of these publications.

NFPA 22 Water Tanks for Private Fire Protection

1.5 SUBMITTALS

The following shall be submitted in accordance with the General Conditions, in sufficient detail to show full compliance with the specification:

SD-01 Shop Drawings: Submit shop drawings of the bolted steel reservoir and all accessories for review and approval by the engineer prior to beginning any related shop fabrication or erection. Include sufficient data to show that the reservoir and accessories conform to the requirements to these Specifications.

SD-02 Quality Control:

a. Design Data: Fabrication and erection drawings and details for the reservoir, foundation, and all accessories.
b. Test Reports: Certified mill tests on steel plate and structural members demonstrating that the physical and chemical requirements of this Specification have been met.

SD-07 Data Warranty.

1.6 QUALITY ASSURANCE

1.6.1 Qualifications

1.6.1.1 The tank manufacturer shall be a specialist in the design, fabrication, and erection of factory-powder coated bolted steel tanks. The manufacturer shall be quality certified, having an active API-Q1 Certification and ISO-9001 Registration. The tank manufacturer must have a minimum of five years of experience in the

manufacturing of bolted steel tanks and have in the last two years manufactured at least five tanks of similar size and use.

1.7 WARRANTY

1.7.1 The tank manufacturer shall warrant the tank against any defects in workmanship and materials for a period of one (1) year from the date of shipment. In the event any such defect should appear, it should be reported in writing to the manufacture during the warranty period.

2.0 PRODUCTS

2.1 GENERAL

2.1.1 The Manufacturer shall furnish, erect and test the tank, as required by NFPA 22. The Manufacturer shall be completely responsible for the construction and satisfactory performance of the tank during the guarantee period. The tank shall conform to NFPA 22, to the latest edition Building Code, and to the requirements of the plans and these Specifications. The supplier shall submit for approval complete and detailed plans for the tank and appurtenances.

2.1.2 The Factory Powder Coated, bolted steel tank shall have a cone roof, sloped to drain toward the shell. Provide the tank complete with all pipe connections, access openings, nozzles, taps, drains, ladders, vent, and other accessories as shown on the plans or required herein.

2.1.3 The materials, design, fabrication and erection of the bolted steel tank shall conform to AWWA D103-09/NFPA 22, to the Principles of Standard Specification 12B of the American Petroleum Institute. Components such as bottom sections, wall sections and roof sections shall conform to the dimensional standards for the Principles of Standard Specification 12B of the American Petroleum Institute. Walls are to be composed of standard side sheets having normal dimensions of 5 feet in width and 8 feet in height. Special heights or widths may be used with standard API joint details. Tank walls shall be properly designed to resist the maximum anticipated dead and live loads, both when the tank is empty and when filled with water, having a specific gravity of 1.0. Design live loads shall not be less than the wind, snow, earthquake and other live loads, for the area in which the tank is to be located as specified in AWWA D 103-09/ NFPA 22, latest revision. Bottoms and roofs are to be composed of API standard pie shaped sections. Anchor bolts, if required, are recommended to be set outside of the tank bottom with suitable lugs to be attached to the tank wall.

2.1.4 All bolted connections shall incorporate an EPDM prefabricated gasket minimum width 1 ¾". A single piece double-punched gasket shall be used at vertical seams which require two vertical rows of punching. Field caulking will be allowed when joining a discontinuous gasket section and at certain joint connections. Neoprene backed steel washers shall be provided at all bolts in contact with the stored liquid. No mastic sealant shall be used as the primary method of sealing the tank.

2.1.5 All tank wall-to-bottom and all wall-to-deck connections shall be flat panel, four corner joint connection type. Chime type connections will not be accepted.

2.2 DESIGN DATA

2.2.1 The following data and information are supplied as a basis for design and erection of the tank and appurtenances:

1. Tank Capacity & Dimensions – Refer to project plans.

2. Seismic Design Criteria

a.	Seismic Use Group	3
b.	Seismic Importance Factor, I_E	1.5
c.	Site Class	D
d.	S_s	13.30%
e.	S_1	6.4%

3. Design Wind Loading

a.	Design Wind Speed, V	107 mph
b.	Category	3
c.	Importance Factor, I	1.15
d.	Exposure Category	C

4. Roof Design Loading

a.	Roof Live Load	25 PSF
b.	Roof Snow Load	25 PSF
c.	Ground Snow Load	5 PSF

5. Liquid to be stored — Potable water

2.3 MATERIALS

2.3.1 Plates and Sheets. Plates and sheets shall conform to appropriate ASTM designation as set forth in NFPA 22 and shall have a minimum yield strength of 30,000 psi.

2.3.2 Structural Shapes. Structural shapes shall conform to the requirements and ASTM designations of NFPA 22

2.3.3 Bolts. Tank joint bolting shall be minimum ½" diameter, shall meet the requirements of NFPA 22 and have tensile strength of at least 120,000 pounds per square inch.

2.3.4 Gaskets and Sealant. All gaskets and sealants used on this tank shall conform to the requirements of NFPA 22.

2.4 ACCESSORIES

2.4.1 Shell Manhole: Provide a 24", minimum, hinged shell manhole located as shown on the drawings. The center of the manhole shall be located 30 inches above the bottom of the tank.

2.4.2 Pipe Connections:

2.4.2.1 Provide inlet nozzle, outlet nozzle with antivortex plate, overflow pipe, and drain outlets in the sizes and locations shown on the plans.

2.4.2.2 Provide two, 1-inch NPT tank connections as shown on the plans for sampling and sensing connections.

2.4.3 Overflow pipe: Provide steel internal or external overflow pipe with internal weir box located as shown on the plans with required supports. Overflow pipe assembly shall be powder epoxy lined and coated for corrosion protection.

2.4.4 Ladders:

2.4.4.1 Provide a galvanized steel welded OSHA compliant exterior ladder with back guard/safety cage. The ladder shall have a lockable closure at the bottom. Ladder to be fitted with a personal fall arrest system and safety gate at entrance (top).

2.4.4.2 Provide a galvanized steel welded interior ladder with a personal fall arrest system.

2.4.5 Roof Openings:

2.4.5.1 A 24 inch screened vent shall be provided on the roof. The vent shall be fabricated to provide removable screened openings between the vertical support members of the vent. The screened openings of the vent shall be sized by the manufacturer to allow venting of a 3,000 gpm pumping rate. An effective area of 75% of screen opening shall be assumed. The screen shall consist of one layer of Type 316 stainless steel: 16 x 16 x 0.018 wire mesh insect screen.

2.4.5.2 The tank roof shall have a curbed, upward opening 24-inches square, minimum hatch located near the ladder. The curb shall extend at least 4 inches above the tank. The hatch cover shall be hinged and shall have locking provisions. The hatch cover lip shall extend for a distance of 2-inches down on the outside of the curb.

2.4.5.3 Roof shall be fitted with a partial deck perimeter OSHA compliant guardrail assembly, 10 feet on each side of the ladder.

2.4.6 Provide a Liquid Level Indicator with Type 316 stainless steel internals and complete with float and target board assembly.

2.4.7 Gaskets and sealants shall meet or exceed NFPA 22 standards for water storage for fire protection.

2.4.8 Anchor bolts and stirrups to be furnished by the tank manufacturer.

3.0 EXECUTION

3.1 PROTECTIVE COATING

3.1.1 General: All metal plates, supports, members and miscellaneous parts, except bolts, shall be baked on factory powder coated in accordance with NFPA 22 and this Section. Field coating, other than touch-up, will not be permitted.

3.1.2 Surface Preparation:

3.1.2.1 All steel surfaces shall be shot blasted to equivalent of a SP 10 or better near white metal finish. The surface anchor pattern shall be no less than 1.5 mils.

3.1.2.2 Spray a final Deionized water rinse with Silica-Zirconium (Si-Zr) sealer to prevent rusting prior to the powder coating application and provide additional level of corrosion protection.

3.1.2.3 All steel surfaces shall drip dry for seven (7) minutes prior to entering the dry off oven for eight (8) minutes at 425 degrees F.

3.1.3 Coating:

3.1.3.1 All interior steel surfaces, support members and miscellaneous parts shall receive 5 mils minimum average dry film thickness baked on factory powder coating. Coating shall be NSF 61 approved. Coating shall be of the fusion bonded epoxy type.

3.1.3.2 All exterior steel surfaces, support members and miscellaneous parts shall receive minimum 2 mils average dry film thickness factory baked on fusion bonded epoxy primer under 4 mils minimum average dry film thickness factory baked on polyester powder coating, white color, for a total minimum coating thickness of 6 mils.

3.2 CONSTRUCTION

3.2.1 Field erection of Factory Powder Coated bolted steel tanks shall be in strict compliance with manufacturer's recommendations and performed by manufacturer's employees or certified erection crew to alleviate any potential disputes in coating quality or erection thereof. Particular care shall be exercised in handling and bolting of the tank plates, supports, and members to avoid abrasion or scratching the coating. Prior to placing water in the tank, a "holiday" inspection of the entire tank, corners included, will be provided and performed by the manufacturer in the presence of the owner. Touch-up coating shall be done per the manufacturer's recommendations where needed and as directed to achieve 100% holiday-free surface.

3.3 TESTING AND INSPECTION

3.3.1 General: Test storage tank after erection. Floor shall be clean and free from dirt, foreign substance and debris.

3.3.2 Bottom: Vacuum test seams in floor plates.

3.3.3 Shell: Test by filling with water to elevation of overflow. Completed storage tank shall show no leaks at end of 24 hour test period. No charge will be made for water required to fill tank.

*** END OF SECTION ***

SECTION 22 01 00 - PLUMBING GENERAL PROVISIONS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered.**

1.2 WORK INCLUDED

A. Provide all labor, materials, tools, and services for a complete installation of equipment and systems contained in contract documents.

B. Principal features of work included are:

1. Plumbing system.

1.3 RELATED WORK

A. Electrical power and interlock and control wiring and conduit.

1.4 GENERAL

A. The contract documents form a guide for a complete system. Provide all items necessary to provide a complete system but not specifically mentioned, such as hangers, transitions, offsets, and drains.

B. Layouts indicated on drawings are diagrammatical only. Coordinate exact location of equipment, ductwork, and piping to eliminate conflict with other divisions. Designer reserves right to make reasonable changes in location of equipment, ductwork, and piping prior to construction.

C. Should Contractor find during progress of work that in his judgment existing conditions make desirable a modification, report such item promptly to Designer for instructions. Do not make deviations from contract documents without review of Designer.

D. Supervise all work with a competent mechanic specifically qualified in mechanical discipline.

E. All products used for dispensing potable drinking water must be lead free and meet the requirements of NSF 61 and NSF 372 test standards via third party testing and certification.

1.5 PERMITS

A. Secure and pay for permits, licenses, and inspections for work under this Division, including water and sewage connections.

1.6 CODES

A. All products, materials, and equipment shall comply with the Buy American Act.

B. Comply with all pertinent local, state, and national codes.

1.7 STANDARDS

A. Comply with all pertinent standards. This list is provided as a convenience to Contractor and is not to be considered all inclusive.

1. American Gas Association (AGA).

2. CISPI Standard 301.

3. ASTM A 74.

1.8 SUBMITTALS

A. Submit for review complete brochures and shop drawings for materials and equipment proposed.

1. Brochures: Submit complete descriptions, illustrations and specification data for materials and equipment proposed. Clearly indicate proposed items when other items are shown on same sheet. Submit samples on request and/or set up for inspection. Samples will be returned to Contractor.

2. Submittals shall be submitted in line by line format. Each submittal shall be provided with a cover letter and supporting documentation indicating how the submittal meets each line of the referenced specification section. All discrepancies between the construction documents and the submitted product shall be clearly identified for engineer evaluation.

3. If a product other than the basis of design is rejected by the engineer for any reason, the Contractor shall provide the basis of design product at no additional cost to the Owner.

4. Shop Drawings:

   a. Complete equipment and piping systems in equipment rooms.

   b. Complete equipment and piping systems in entire building.

   c. Owner furnished equipment rough-in layouts.

   d. Firestop systems.

1.9 PROJECT MAINTENANCE MANUALS

A. Prior to final acceptance of project, provide Owner with bound maintenance manuals.

1.10 PROJECT TECHNICAL INSTRUCTION

A. Prior to final inspection of project, provide technical instruction to Owner as follows:

1. Field Instruction: Provide explanation of how systems and equipment are to operate during each season and during emergencies.

2. Field Demonstration: Demonstrate operation and routine maintenance for systems and equipment.

3. Videotape: Provide videotape or DVD of field instruction and demonstration to Owner at completion.

1.11 CONSTRUCTION RECORD DOCUMENTS

A. Provide construction record documents. Keep at the project one set of drawings and daily record changes at the time they are made. Give drawings to Owner at project completion.

1.12 EXISTING SERVICES

A. Maintain existing services in operation during construction. Coordinate and schedule all service interruptions with Owner.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. All products, materials, and equipment shall comply with the Buy American Act.

B. Provide materials and equipment of domestic manufacturer bearing the U.L. label when such label is available.

C. Cast Iron Soil Pipe and Fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute ® and listed by NSF® International.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate locations of equipment and piping to eliminate conflict with other divisions.

B. Carefully examine contract documents to be thoroughly familiar with items which require plumbing or mechanical connections and coordination.

C. Provide proper chases and openings. Place sleeves and supports prior to pouring concrete or installation of masonry.

3.2 CUTTING AND PATCHING

A. Repair or replace routine damage caused by cutting in performance of contract.

B. Correct unnecessary damage caused due to installation of plumbing work.

C. Perform repairs with materials that match existing in accordance with the appropriate section of these specifications.

3.3 FLASHING, COUNTERFLASHING, AND SEALING

A. Flash, counterflash, and seal piping at penetrations of roofs and outside walls.

3.4 TRENCHING, EXCAVATION AND BACKFILLING

A. Excavate to a depth at least 6" below bottom of pipe and a minimum of 36" above top of pipe. Fill below pipe, around pipe, and minimum of 12" above pipe with sand or Class "B" crushed stone tamped firm and even. Provide topsoil for final layer of dirt (12" minimum). Provide 6" spacing between pipes and between pipe and trench sides. Hand-grade with batterboards placed every 25'. Backfill by hand. Do not use rock or stone above sand or Class "B" crushed stone.

3.5 CONNECTION TO EQUIPMENT

A. Rough-in and connect to Owner furnished equipment and provide a shutoff valve and union at each connection. Operating valves and/or controls for this equipment will be provided as an integral part of the equipment. Do not rough-in until shop drawings showing rough-in locations have been reviewed by Designer.

3.6 FOUNDATIONS AND PADS

A. Provide foundations, pads, and bases required for equipment. Concrete to be in accordance with concrete division of specifications.

B. Coordinate proper sizes and locations of foundations, pads, bases, anchors, supports, and other items to be built into structure.

3.7 IDENTIFICATION

A. Identify exposed or accessible piping with stenciling contents indicating pipe contents and direction of flow on piping not more than 20 feet apart, at valves, at access panels, and at least once above each space.

B. Contractors option to identify exposed or accessible piping with snap-on or strap-on type markers. Color code markers in accordance with ANSI. Indicate pipe contents and direction of flow on marker. Install markers on piping not more than 20 feet apart, at valves, at access panels, and at least once above each space.

C. Sanitary waste, storm and buried lines need not be marked.

D. Identify all equipment with engraved brass, aluminum, or stainless steel nameplates or tags. Use equipment names and numbers appearing in schedules on drawings. Fasten nameplates to equipment using screws. Glue or adhesive is not acceptable. Fasten tags to equipment using brass, aluminum or stainless steel chains.

E. Identify each valve with engraved brass, aluminum, or stainless steel identification tag indicating valve service and sequential identification number. Attach tag to valve handle with brass, aluminum or stainless steel chain. Provide two bound manuals to Owner listing each valve sequentially and indicating valve manufacturer, style, size, service, normal position, and specific location for each valve.

3.8 CLEANING

A. Repair damaged factory finishes covering all bare places and scratches.

B. Cleaning Domestic Water System: Flush domestic water system progressively by opening building outlets and permitting flow to continue from each until water runs clear. Sterilize system in accordance with requirements of State Department of Public Health by the following method or other method acceptable to local authorities:

1. Introduce chlorine or a solution of calcium or sodium hypochlorite, filling lines slowly and applying sterilizing agent at a rate of 50 ppm of chlorine as determined by residual chlorine tests at ends of lines. Open and close all valves while the system is being chlorinated.

2. After sterilizing agent has been applied and left standing for 24 hours, test for residual chlorine at ends of lines. If less than 25 ppm is indicated, repeat sterilizing process.

3. After standing for 24 hours and tests show at least 25 ppm of residual chlorine, flush out system until all traces of chemical used are removed.

3.9 TESTING

A. Test all installed equipment and systems and demonstrate proper operation. Correct and retest work found defective when tested.

B. Thoroughly check piping system for leaks. Do not add any leak-stop compounds to the system. Make repairs to piping system with new materials. Peening, doping, or caulking of joints or holes is not acceptable.

C. Test hot and cold domestic water piping systems upon completion of rough-in and before connection to fixtures at a water pressure of 125 psig for two hours without leaks.

D. Test drainage and venting system with necessary openings plugged to permit system to be filled with water and subjected to a minimum water pressure of 10 feet head at top of system. System to hold water for two hours without a water level drop greater than 4" in a 4" standpipe and without visible leakage. Test system in sections if minimum head can be maintained in each section.

E. Conduct air or smoke test if in opinion of Designer reasonable cause exists to suspect leakage or low quality workmanship.

F. Test foundation drain system in sections of 100 foot lengths before and after backfilling. Pass plumbers tape or Roto-Rooter through drain sections to ensure there are no restrictions to water flow.

G. Test flush valves for proper operation.

END OF SECTION

SECTION 22 07 19 - PLUMBING INSULATION

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Contractor shall provide all necessary labor, materials, tools, and equipment to perform work required on the drawings and specified herein.

B. Certain equipment and/or systems to be factory insulated by manufacturer. Factory insulation materials to be as specified in applicable sections of the specifications.

C. All pipe fittings, valves and strainers in insulated pipe systems to be insulated.

D. Thermal resistance "R" values used herein are expressed in units of "Hour, Degrees F., Sq. Ft./BTU per Inch of Thickness" on a flat surface at a mean temperature of 75 degrees F.

E. Note that where electric cable wrap is called for, insulation is to be applied over cable.

F. "Contractor's Option" referred to in Materials below indicates optional materials which may be used as equals.

1.3 DEFINITIONS

A. "Exposed" equipment, and piping are areas which will be visible without removing ceilings or opening access panels.

B. Outdoors is considered exposed to the weather.

C. Underground is buried, whereas in a trench below grade is considered concealed.

1.4 CERTIFICATION/QUALITY ASSURANCE

A. Products shall meet applicable national, state, and local building codes and be U.L. (or other recognized testing lab) listed for intended service.

B. All insulations, jackets, adhesives, coatings, sealers, and tapes shall have a flame spread rating of 25 or less and smoke development rating of 50 or less when tested in accordance with ASTM E-84, NFPA 225, U.L. 723, and further must meet the requirements of NFPA 90-A and applicable building, and plumbing, codes.

C. All insulation materials shall be delivered and stored in manufacturers' containers and kept free from dirt, water, chemical, and mechanical damage.

D. Insulation shall be applied in a workmanlike manner by experienced, qualified tradesmen.

E. Insulation shall not be applied until all pressure testing has been completed, inspected, and released for insulation application.

F. Surfaces shall be clean and dry.

G. Insulation joints shall be butted firmly together and all jackets and tapes shall be smoothly and securely installed.

H. Insulation for duct, pipe, and equipment for above grade exposed to weather outside building shall be certified as being self-extinguishing for 1" thickness in less than 53 seconds when tested in accordance with ASTM D-1692.

1.5 APPLICABLE CODES AND STANDARDS

A. ASTM E-84.

B. U.L. 723.

C. State of Mississippi Energy Code.

PART 2 - PRODUCTS

2.1 MATERIALS FOR PIPE AND EQUIPMENT

A. Materials for Pipe and Equipment: Provide factory pre-molded or shop or site mitered segment type insulation for pipe, pipe fittings, and valves. Fitting insulation to be of same thickness and material as adjoining pipe insulation. All insulation and related materials such as tape and mastic to meet applicable building code requirements for fire and smoke development.

1. Flexible Tubular: Provide 25/50 rated, closed-cell, flexible tubular rubber type pipe insulation. Product to have continuous operational temperature limit of 200 degrees F. and a minimum "R" value of 3.6 per inch (K=0.28) at 100 degrees F mean temperature. Product to be Armstrong AP Armaflex or approved equal pipe insulation. Use flexible tubular for the following services:
   a. Horizontal runs of waste lines carrying cold condensate from air conditioning equipment: 1" thick.
   b. Domestic cold water piping 2" and under (contractor option): 1/2" thick.
   c. Domestic hot water supply without recirculating system (contractor option): 1-1/4" and under - 1" thick; 1-1/2" and greater – 1-1/2" thick.
   d. Domestic hot water supply and recirculating return piping (contractor option): All sizes – 1-1/2” thick.

2. Fiberglass: Provide factory-formed, factory-jacketed fiberglass piping insulation. Product to be Manville "Micro-Lok 650" with "Type AP-T" jacketing or equivalent product manufactured by CertainTeed, Knauf, or Owens-Corning. Product to have continuous operational temperature limit of 850 degrees F and a minimum "R" value of 3.6 per inch (K=0.28) at 100 degrees F mean temperature. Jacket to be fiberglass reinforced kraft paper with aluminum foil and pressure sensitive closure system. Vapor-barrier mastic for application to below ambient pipe insulation shall be fungus resistant per ASTM D 5590 with 0 growth rating; Water based; Permeance per ASTM E 96, Procedure B, 0.013 perm or less at 43-mil dry film thickness suitable for indoor and jacketed outdoor use. Products: Foster 30-80 AF. Color: White. A breather mastic for application to above ambient pipe insulation (fittings, tees, valves, etc.) shall be water based Foster 46-50 mastic or Childers CP-10 / CP-11. Use fiberglass piping insulation for the following services:
   a. Domestic hot water supply without recirculating system: 1-1/4" and under - 1" thick; 1-1/2" and greater – 1-1/2" thick.
   b. Domestic hot water supply and recirculating return piping: 1-1/4 and under – 1” thick, 1-1/2” and greater 1-1/2 thick.
   c. Domestic cold water piping: 1/2" thick.

2.2 MATERIALS FOR FITTINGS, VALVES, AND SPECIAL COVERINGS

A. Provide coverings and finishes for specific items hereinafter specified.

1. Use pre-molded insulation fabricated by the manufacturer of insulation material or shop or site mitered segment type insulation for all pipe fittings, elbows, tees, valves, and couplings.

2. PVC fitting covers over blanket fiberglass are NOT acceptable.

3. Contractor's option to provide factory pre-molded one-piece PVC insulated fitting covers, precut fiberglass insulation inserts, and necessary installation materials for all pipe fittings. Materials to be equal to Manville Zeston white, U.V. resistant, 25/50 rated, 20 mil thickness insulated PVC fitting covers and insulation inserts.

B. For any service, when below grade direct buried, cover straight pipe and fitting insulation with equivalent of Pittsburgh Corning "Pittwrap", Foster C.I. Wrap 50 mil or "Pittwrap SS11" jacketing. Valves in systems operating above 60 degrees F. and installed in valve boxes shall not be insulated; however, the valves shall be painted with a rust resistant product equivalent to Rustoleum.

C. For flexible tubular pipe and fitting insulation when exposed-to-view inside building or exposed to the weather, finish with two coats of paint, custom color blended to match surrounding surfaces.

D. When specifically approved by designer, when it is impossible to completely insulate pipe, fittings, or valves with specified insulation, Armstrong Armaflex insulation tape may be used to prevent condensate drip on small piping. Use of cork insulation tape is prohibited.

PART 3 - EXECUTION

3.1 GENERAL

A. No insulation shall be cut where a hanger is located. If hangers have been installed by pipefitter tradesmen which violates this strict requirement, notify Designer immediately.

B. Piping systems shall be tested and found free of all leaks prior to installation of insulation covering.

C. All surfaces shall be clean and dry when covering is applied. Covering to be dry when installed and during application of any finish, unless such finish specifically requires a wetted surface for application.

D. All adhesives, cements, and mastics shall be compatible with materials applied and shall not attack materials in either wet or dry state.

E. Install insulation using professional insulators who have adequate experience and ability.

F. Exposed-to-view insulation shall have a well tailored appearance.

G. Treat insulated pipe in equipment rooms and where exposed to normal view, so surfaces may be painted with water base latex paint. Use of mastics, adhesives, or jacketing which cause "bleeding" is prohibited.

3.2 INSTALLATION OF PIPE AND EQUIPMENT COVERING

A. Where fiberglass or flexible tubular insulation is used on piping sized 2" and larger, insert a section of foamglass insulation at hanger or support points between pipe and metal shield for full length of shield to prevent crushing of insulation. Insulation thickness to be same as adjoining insulation. Where insulation passes through pipe hangers and across trapeze supports, 12" long metal saddles shall be used. On cold pipe, vapor barrier should be carried through the hanger and sealed.

B. Apply flexible tubular insulation to pipe and fittings using the slip-on method with all joints tightly fitted and sealed with Armstrong 520 adhesive or approved equal. Seal butt joints, miter joints and torn or damaged insulation with adhesive.

C. Apply PVC insulated fitting covers and precut insulation inserts as follows:

1. Installation for hot systems:
   a. Place the precut fiberglass insert around the fitting, positioning the points of the insert on the inside radius of the elbow.
   b. Butt the ends of the fiberglass insert against the ends of the pipe covering. Tuck and fold the insulation so that it covers all bare surfaces. Keep the fiberglass fluffed up to the thickness of the adjacent pipe insulation to assure maximum thermal efficiency.
   c. Insert two stainless steel serrated tacks approximately 1/4" from one of the lap edges of the fitting cover. Then snap the cover in place over the fiberglass insulation.
   d. After the fitting cover is in position, push the tacks into the overlapping throat seam. Apply color-matched, pressure-sensitive tape to the butt joints.

2. Installation for cold systems:
   a. Position, tuck, and fold the fiberglass insulation insert as described above in steps (a) and (b) for hot systems.
   b. Apply a vapor barrier mastic around the edges of the adjoining pipe insulation. Apply the mastic along the inside of the fitting cover throat overlap seam.
   c. Place the fitting cover over the insulation, lapping the mastic-covered edge over the other side of the throat seam.
   d. Apply color-matched, pressure-sensitive tape over the circumferential joints. The tape should extend over the adjacent pipe insulation and overlap itself by at least 2" on the downward side of the lap.

END OF SECTION

SECTION 22 11 16 - DOMESTIC WATER PIPING AND VALVES

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 SYSTEM REQUIREMENTS

A. Submit pipe, valves, and fittings and have approved before starting installation. Pipe, valves, and fittings to be new, manufactured domestically, and marked clearly with manufacturers’ name, weight, and classification or working pressure.

B. Piping to run approximately as shown on drawings or as structural and architectural conditions permit.

C. All products used for dispensing potable drinking water must be lead free and meet the requirements of NSF 61 and NSF 372 test standards via third party testing and certification.

PART 2 - PRODUCTS

2.1 COPPER PIPES

A. Type "L" hard-drawn seamless copper tubing, ASTM B-88: Domestic hot and cold water 4" O.D. and smaller.

B. Type "K" hard-drawn seamless copper tubing:

1. Domestic water lines located under slab.

2. Exterior domestic water lines 2-1/2" and smaller underground.

C. Copper Pipe Fittings:

1. Provide sweat fittings, ASTM B-62, dimensions conforming to ANSI B16.22, wrought copper, with sweep patterns for copper tubing.

2. Dielectric connection: Provide Epco Sales, lead free dielectric couplers at junction of steel pipe and equipment with copper piping systems. Use of steel or cast iron fittings in copper piping systems prohibited. T-drill branch tee connections shall not be allowed for domestic water piping.

D. Unions to be brass ground joint, 250-pound working pressure.

E. Nipples used in conjunction with copper pipe to be brass.

2.2 VALVES

A. Valves are specified by Manufacturer and Model Numbers to establish quality levels unless otherwise noted. Crane, Milwaukee, Hammond, Nibco, Stockham, Centerline, Apollo, Kitz, or Watts are considered equal manufacturers. Provide clamp lock hand lever operators on valves less than 8 inches. Provide hand wheel and closed housing worm gear on valves 8 inches and larger unless indicated otherwise below. Provide chain operators for all equipment room and powerhouse valves 4 inch and larger which are located over 6 feet 6 inches above the finish floor. All valves shall meet NSF-61 requirements.

1. Gate Valves:

a. Gate valves for 2-1/2" and larger steel piping systems to be Class 125, cast iron body, bronze mounted, flanged ends, Nibco F-607-RW. Valves to have solid wedge disc, outside stem and yoke with rising stem, and bolted bonnet. Provide dielectric bolt protectors at all flanges when connecting dissimilar metals.

b. Gate valves for copper piping 2” and smaller systems to be Class 125, bronze body, solder ends, Nibco S-113 LF. Valve to have either solid or split wedge disc, inside screw, non-rising stem, and screwed bonnet.

2. Globe Valves:

   a. Globe valves 2-1/2" and larger to be Class 150, cast iron body, bronze mounted, flanged ends, Watts M6115-74 lead free. Valves to have renewable seat and disc, outside stem and yoke with rising stem, and bolted bonnet.

   b. Globe valves 2" and smaller to be Class 150, bronze body, screwed ends, Apollo 121T-LF. Valve to be plug type with renewable seat and disc, rising stem, and union bonnet.

3. Ball Valves:

   a. Ball valves for copper water piping systems 2" O.D. and smaller to be equal to Apollo "3" S-585-66LF, solder ends, and for 2-5/8" thru 3-1/8" O.D. to be equal to Nibco T T-585-66LF, threaded ends. Valves to have bronze body, chromium plated bronze ball, PTFE seats, stuffing box ring and seals, and quarter turn on-off. Provide memory stops for valves used for balancing service. Valves to be rated for 400-psi WOG at 200 degrees F. Install threaded end valves with lead free brass adapters.

4. Check Valves:

   a. Check valves for copper water piping systems to be swing type, Class 125, bronze body, screwed ends, Nibco T-413-Y-LF.

   b. Check valves for steel water piping systems to be Nibco-910 LF Silent Check Valve. Body to be iron with bronze disc plates. Stem to be 316 stainless steel, seat to be EPT. Valve to be suitable for 200 psi working pressure at 200 degrees F.

5. Flow balancing valves for domestic hot water service shall be Bell & Gossett lead free Circuit Setter Plus or approved equal. Valve shall provide flow balancing, flow measuring, and positive shutoff service. Provide valve with memory stop, capped differential pressure readout ports with internal check valves and preformed insulation. Valve construction to be bronze body and brass ball rated for 200 psig at 250 degrees F.

2.3 STRAINERS

A. Provide cleanable "Y" type strainers in pump suction lines. Strainers to have iron body with screwed bronze or bolted iron cap. Strainer baskets to be brass. Water strainers to be Monel 20 mesh screen. Strainers to be line size complete with blow-down hose bibbs. When Suction Diffusers are specified for end suction pumps, strainers are not required. Strainers to be as follows:

   1. Flanged 125# - Watts LFS 77F-D1-125.

   2. Solder joint 125# - Nibco S 413-Y-LF.

2.4 HANGERS

A. Insulated copper piping 1/2" O.D. thru 4" O.D., with no longitudinal movement to be Grinnell Figure 260, MSS SP-69 Type 1, adjustable clevis hanger with Figure 167, MSS SP-69 TYPE 40, galvanized steel insulation protection shield sized for maximum 10' span on 4 psi compressive strength insulation.

B. Non-insulated copper tubing 1/2" O.D. thru 4" O.D. with no longitudinal movement to be Grinnell Figure CT-99C, MSS SP-69 TYPE 9, plastic coated adjustable tubing ring hanger.

C. Insulated copper piping 1/2" O.D. thru 2-1/8" O.D. with longitudinal movement to be Grinnell Figure 171, MSS SP-69 TYPE 41, pipe roll complete with Figure 167, MSS SP-69 TYPE 40, galvanized steel insulation protection shield sized for maximum 10' span on 4 psi compressive strength insulation.

D. Support copper pipe risers by Grinnell Figure CT-121C, MSS SP-69 TYPE 8, plastic coated riser clamps at floor penetrations.

E. Support three or more parallel lines by trapeze hangers utilizing Unistrut channel or equal in bottom mounting arrangement with rod hanging support.

F. Adequately size hangers on insulated piping for insulation to pass continuously through hangers. Insulated piping to be supported outside insulation covering.

G. Provide concrete inserts, Grinnell Figure 282, MSS SP-69 TYPE 18, universal concrete insert, for attaching hangers to building structure. Inserts to be adequately sized and correctly positioned to support piping, valves, etc., when full of water and system is in operation.

H. Provide C-clamps with locknut, Grinnell Figure 86, MSS SP-69 TYPE 23, where piping is to be hung from steel beams. Welding hanger rods to steel members is not permitted. Provide malleable beam clamps, Grinnell Figure 218, MSS SP-69 TYPE 30, with extension piece, Grinnell Figure 157, where piping is hung from bar joist.

I. Support all piping by heavy steel, adjustable hangers, or brackets suitably fastened to structural portion of building. Place hangers in accordance with following tables.

COPPER TUBING SUPPORTS	
SIZE (IN.)	DISTANCE BETWEEN SUPPORTS (FT.)
5/8	6
7/8 - 1-1/8	8
1-3/8 - 2-1/8	10
2-5/8 - 5-1/8	12
6-1/8 - 8-1/8	14

J. Perforated metal, strap iron, or band iron hangers are not permitted. Offsets in hangers are not allowed. Pipe risers to be supported at regular intervals in pipe shafts within the limits of good practice.

K. See Insulation Section for requirements at pipe hangers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install piping not to interfere with opening of doors or other moving parts. Do not install piping near or directly over any portion of electrical equipment.

3.2 FIRE-RATED PARTITIONS

A. Provide permanent firestop system at all piping penetrations of fire-rated walls and floors. Review details on drawing as well as this specification for permissible firestop systems. The firestop system shall have been tested and approved in accordance with ASTM E119 and U.L. 1479 (ASTM E814) and classified for up to 2 hours fire rating. Firestop system shall be type detailed on drawings or intumescent type capable of expanding up to 8 times its original volume. Firestop system to be 3M, Hilti, Nelson, Johns Manville, or Specified Technologies. Firestop system shall be installed in strict accordance with published U.L. approved installation instructions. Piping to pass through the fire-rated partition insulated or non-insulated as specified and detailed. Submit U.L. approved installation drawing for each type of penetration prior to construction.

3.3 NON-RATED PARTITIONS

A. Piping to pass through the walls insulated or non-insulated as specified. Wall should be finished to fit neatly around the piping. Firestopping is not required at non-rated partitions.

3.4 PIPE SLEEVES

A. Pipe sleeves shall be provided at non-rated partitions and floor penetrations. Pipe sleeves to be Schedule 40 or 18 gage steel. Sleeves to extend 1-1/2" in excess of partition depth on each side. Sleeves penetrating floors in wet areas, including all mechanical rooms, shall extend a minimum of 1 inch above the floor.

1. Piping requiring sleeves: Copper pipes thru masonry walls

B. Provide chromium-plated escutcheon plates for exposed uninsulated pipes projecting through floors or walls in finished spaces. Mechanical rooms and janitor closets are not considered "finished" spaces.

C. Hang piping so equipment, flanges, and connections do not bear weight of piping.

D. Adequately support vertical lines at their bases or by a suitable hanger placed in horizontal line near riser or by a base fitting set on pedestal.

E. Pipes not to be hung or supported by pumps. No torque to be applied to pumps by connecting pipes. After final pipe adjustments and initial operation of the pumps, this Contractor to recheck alignment of pumps and realign as required.

F. Run piping in straight lines; riser lines to be plumb with such offsets only as indicated or necessary. No sagging of lines permitted.

G. Unless otherwise shown on drawings, lines to be installed to drain to sumps or sewer.

H. Ream pipe after cutting to full bore. Remove foreign matter from inside of pipe before installing. Keep installed piping free from dirt and scale and protect open ends from foreign matter. Use temporary plugs or other approved methods of open end closure.

I. Threads to be right-hand, pipe standard, clean cut, full depth, and tapered. Joints to be made tight without caulking. Approved pipe joint lubricant to be used, applied in thin layer to the male thread only.

J. Install copper fittings with suitable flux and 95/5 lead free solder. Type K copper pipe to be joined by means of suitable flux and silver or phos-copper.

K. Piping to have sufficient number of flanges or unions for convenient installation and removal of piping and equipment.

L. Remake or replace defective, leaking, or otherwise unsatisfactory joints or material. Peening, caulking, or doping of piping is not permitted.

M. Install piping to prevent stresses and strains to piping and hangers from expansion or contraction. Provision for proper loops, offsets, or expansion joints to be responsibility of Contractor. Make provision for servicing and removal of equipment without dismantling piping.

3.5 PIPING IN TRANSFORMER, ELECTRICAL, AND ELEVATOR EQUIPMENT ROOMS

A. Refer to drawings. No water piping permitted in transformer, electrical, or elevator equipment rooms.

3.6 VALVE ACCESS

A. Locate all shutoff and control valves for easy access and operation. Where valves must necessarily be located in enclosed spaces, they shall be provided with access panels of sufficient size for operation. Furnish these access panels to proper trades for installation.

END OF SECTION

SECTION 22 11 19 - DOMESTIC WATER BACKFLOW PREVENTERS, TRAP PRIMERS, AND SHOCK ABSORBERS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. This section includes requirements for:

1. Shock absorbers.

2. Trap primers.

3. Equipment connection backflow device.

4. Vacuum breakers.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Acceptable manufacturers are indicated in subsequent paragraphs.

B. All products used for dispensing potable drinking water must be lead free and meet the requirements of NSF 61 and NSF 372 test standards via third party testing and certification.

2.2 SHOCK ABSORBERS

A. Acceptable Manufacturers: Josam, Wade, J.R. Smith, Precision Products, Zurn, or Sioux Chief.

B. Refer to drawings for placement and size of shock absorbers.

C. Access Covers: Minimum size 12” x 12” located for access to shock absorbers.

2.3 TRAP PRIMERS

A. Acceptable Manufacturers: Josam, Zurn, Wade, J.R. Smith or Precision Plumbing Products.

B. Construct trap primer valve of all bronze, chrome plated with removable operating parts, integral vacuum breaker, and gasketed access cover.

C. Access Covers: Minimum size 12” x 12” located for access to trap primers.

2.4 EQUIPMENT CONNECTION BACKFLOW DEVICE

A. Acceptable manufactures: McCann Engineering ASSE 1022 Backflow Preventer.

B. Must meet ASSE 1022

C. Provide the above referenced backflow device if beverage equipment does not have integral backflow device.

2.5 VACUUM BREAKERS

A. Wilkins model 420

PART 3 - EXECUTION

3.1 INSTALLATION AND TESTING

A. Shock Absorbers:

1. Install shock absorbers above ceiling, outside wall so access and maintenance can be performed without disturbing walls and non-liftouts ceilings.

2. Install shock absorbers on all flush valves, solenoid valves and quick closing devices.

3. Test and certify shock absorbers by plumbing and drainage institute.

B. Trap Primers: Trap primers to have approval of plumbing and drainage institute.

C. Equipment Connection Backflow device: Provide on all water lines feeding coffee makers, ice machines and beverage dispensers.

D. Vacuum Breakers: Provide on water lines feeding equipment to protect against back siphonage of contaminated water.

END OF SECTION

SECTION 22 11 23 - DOMESTIC WATER PUMPS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

PART 2 - PRODUCTS

2.1 HOT WATER RECIRCULATING PUMP

A. Acceptable Manufacturers: Taco, Grundfos, Pentair Aurora, or Bell and Gossett.

B. Model number, capacity, and electrical characteristics as scheduled on drawings.

C. Provide in-line pump with all bronze construction, flange connections, hardened steel shaft, bronze impeller, and mechanical seal.

D. Provide flexible coupled motor with thermal overload protection Support motor from pump casing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify location and clearance requirements.

B. Install in accordance with manufacturers' published installation instructions.

3.2 START-UP AND TEST

A. Start-up pump, verify integrity of connection, electrical phasing.

B. Test pumps in operation under design load conditions.

END OF SECTION

SECTION 22 13 16 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Submit pipe and fittings and have approved before starting installation. Pipe and fittings to be new, manufactured domestically, and marked clearly with manufacturers’ name, weight, and classification or working pressure.

B. Piping to run approximately as shown on drawings or as structural and architectural conditions permit.

PART 2 - PRODUCTS

2.1 STEEL PIPES

A. Standard-weight galvanized steel pipe: Waste, vent, and drainage piping 1-1/2" and smaller.

2.2 STEEL PIPE FITTINGS

A. Flanges, fittings, unions and other products recognized as regularly available products to be marked in accordance with MSS SP-25. Markings on products of small size or shape may be omitted in the sequence allowed by MSS SP-25, except manufacturers' name or trademark.

B. Fittings to be factory-forged in USA and shall not have been machined, remarked, painted, or otherwise produced domestically from non-domestic forgings.

C. Fittings 1-1/2" and smaller to be threaded, Class 150, standard, malleable iron fittings, conforming to ANSI B16.3 and ASTM A-197.

D. Fittings for galvanized steel pipe to be same as above except have galvanized coating. Fittings for waste, vent, and drainage piping to be drainage pattern type.

E. Flanges to be factory forged in U.S.A.

F. Unions to be Class 150 malleable iron with bronze-to-iron ground joint conforming to ANSI B16.39, ANSI B1.20.1, and ASTM A-197.

G. Bolting materials to be semi-finished carbon steel bolts and hex nuts conforming to ASTM A-307. Threads and dimensions to be in accordance with ANSI B1.1 and B18.2.

H. Thread lubricant to be Crane "Formular 425" or equal. Approved Teflon tape may be used at Contractor's option.

I. Gaskets to be 1/8" thick "Sepco" or equal.

2.3 CAST IRON SOIL PIPE

A. Standard weight cast iron soil pipe with drainage fittings:

1. Waste, drainage, and vent lines 2" and larger located above slab. All pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute ® and listed by NSF® International.

2. Drain lines under concrete or other paving and under buildings, including to a distance of not less than 5'-0" from building. All pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute ® and listed by NSF® International.

3. Manufacturers: Charlotte Pipe and Foundry, Tyler Pipe, AB&I Foundry.

4. Joints in cast iron soil pipe may be hub and spigot with neoprene compression gaskets conforming to ASTM C564 or "No-hub". No-hub shall not be permitted on underground systems. No-hub couplings shall be standard CISPI 310 couplings manufactured with 300 series stainless steel and neoprene rubber sleeve.

2.4 PVC PIPE

A. Schedule 40 PVC DWV pipe, ASTM D-2665 solid wall Type 1, Grade 1. Schedule 40 DWV waste and drainage piping below grade ONLY.

B. Fittings to match piping system. Fittings to have manufacturer's trademark permanently identified in accordance with MSS-SP-25. Supplier to include with submittal data certification that fittings and flanges have met requirements.

C. Joints for piping to be made with tetrahydrofuron solvent cement. Joints to be in accordance with manufacturer's recommendations.

D. Pipe, fittings, and cement to all be supplied by single manufacturer for entire project.

E. All solvent cements shall be low emitting VOC at 510 g/L or less.

2.5 HANGERS

A. Non-insulated steel piping 1-1/2" and smaller with no longitudinal movement to be Grinnell Figure 260, MSS SP-69 Type 1, adjustable clevis hanger.

B. Non-insulated cast iron soil pipe thru 8" to be Grinnell Figure 104, MSS SP-69 TYPE 6, adjustable swivel ring, split ring type, and pipe 10" thru 15" Grinnell Figure 260, MSS SP-69 TYPE 1, adjustable clevis hanger.

C. Support steel pipe risers by Grinnell Figure 261, MSS SP-69 TYPE 8, riser clamps at floor slab penetrations.

D. Support three or more parallel lines by trapeze hangers utilizing Unistrut channel or equal in bottom mounting arrangement with rod hanging support.

E. Adequately size hangers on insulated piping for insulation to pass continuously through hangers. Insulated piping to be supported outside insulation covering.

F. Provide concrete inserts, Grinnell Figure 282, MSS SP-69 TYPE 18, universal concrete insert, for attaching hangers to building structure. Inserts to be adequately sized and correctly positioned to support piping, valves, etc., when full of water and system is in operation.

G. Provide C-clamps with locknut, Grinnell Figure 86, MSS SP-69 TYPE 23, where piping is to be hung from steel beams. Welding hanger rods to steel members is not permitted. Provide malleable beam clamps, Grinnell Figure 218, MSS SP-69 TYPE 30, with extension piece, Grinnell Figure 157, where piping is hung from bar joist.

H. Support all piping by heavy steel, adjustable hangers, or brackets suitably fastened to structural portion of building. Place hangers in accordance with following.

1. Steel Pipe Supports

a. Size (in.): 1-1/4, Distance Between Supports (ft.) 8.

b. Size (in.): 1-1/2 Distance Between Supports (ft.) 10.

2. Cast Iron Supports: Support each fitting, at intervals of not more than 5 feet, and at least at each joint.

I. Perforated metal, strap iron, or band iron hangers are not permitted. Offsets in hangers are not allowed. Pipe risers to be supported at regular intervals in pipe shafts within the limits of good practice.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install piping not to interfere with opening of doors or other moving parts. Do not install piping near or directly over any portion of electrical equipment.

3.2 FIRE-RATED PARTITIONS

A. Provide permanent firestop system at all piping penetrations of fire-rated walls and floors. Review details on drawing as well as this specification for permissible firestop systems. The firestop system shall have been tested and approved in accordance with ASTM E119 and U.L. 1479 (ASTM E814) and classified for up to 2 hours fire rating. Firestop system shall be type detailed on drawings or intumescent type capable of expanding up to 8 times its original volume. Firestop system to be 3M, Hilti, Nelson, Johns Manville, or Specified Technologies. Firestop system shall be installed in strict accordance with published U.L. approved installation instructions. Piping to pass through the fire-rated partition insulated or non-insulated as specified and detailed. Submit U.L. approved installation drawing for each type of penetration prior to construction.

3.3 NON-RATED PARTITIONS

A. Piping to pass through the walls insulated or non-insulated as specified. Wall should be finished to fit neatly around the piping. Firestopping is not required at non-rated partitions.

B. Provide chromium-plated escutcheon plates for exposed uninsulated pipes projecting through floors or walls in finished spaces. Mechanical rooms and janitor closets are not considered "finished" spaces.

C. Hang piping so equipment, flanges, and connections do not bear weight of piping.

D. Adequately support vertical lines at their bases or by a suitable hanger placed in horizontal line near riser or by a base fitting set on pedestal.

E. Pipes not to be hung or supported by pumps. No torque to be applied to pumps by connecting pipes. After final pipe adjustments and initial operation of the pumps, this Contractor to recheck alignment of pumps and realign as required.

F. Run piping in straight lines; riser lines to be plumb with such offsets only as indicated or necessary. No sagging of lines permitted.

G. Unless otherwise shown on drawings, lines to be installed to drain to sumps or sewer.

H. Ream pipe after cutting to full bore. Remove foreign matter from inside of pipe before installing. Keep installed piping free from dirt and scale and protect open ends from foreign matter. Use temporary plugs or other approved methods of open end closure.

I. Threads to be right-hand, pipe standard, clean cut, full depth, and tapered. Joints to be made tight without caulking. Approved pipe joint lubricant to be used, applied in thin layer to the male thread only.

J. Piping to have sufficient number of flanges or unions for convenient installation and removal of piping and equipment.

K. Remake or replace defective, leaking, or otherwise unsatisfactory joints or material. Peening, caulking, or doping of piping is not permitted.

L. Install piping to prevent stresses and strains to piping and hangers from expansion or contraction. Provision for proper loops, offsets, or expansion joints to be responsibility of Contractor. Make provision for servicing and removal of equipment without dismantling piping.

3.4 PIPING IN TRANSFORMER, ELECTRICAL, AND ELEVATOR EQUIPMENT ROOMS

A. Refer to drawings. No water piping permitted in transformer, electrical, or elevator equipment rooms.

3.5 GRADES AND ELEVATIONS

A. Uniformly grade sanitary drainage lines to elevations shown. If no elevations are given, pitch sewers not less than 1/8" per foot.

END OF SECTION

SECTION 22 13 19 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. This section includes requirements for:

1. Cleanouts.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Acceptable manufacturers are indicated in subsequent paragraphs.

2.2 CLEANOUTS

A. Acceptable Manufacturers: Josam, Wade, J.R. Smith, or Zurn. The following model numbers listed are Zurn.

B. Exterior: ZN-1402-BP-HD cast iron cutoff ferrule with round nickel bronze scoriated frame and cover, secured.

C. Finished Concrete Floor: ZN-1400-HD-BP inside caulk round nickel bronze scoriated frame and cover.

D. Resilient Tile Floor: ZN-1400-X-BP inside caulk round nickel bronze scoriated frame and cover, secured.

E. Carpet: ZN-1400-CM-BP inside caulk round nickel bronze scoriated frame and cover; provide carpet marker and permanent marker in ceiling above.

F. Wall: ZN-1441-BP cast iron cleanout with bronze plug and round stainless steel cover.

G. Access Covers: Minimum size 12" x 12" located for access to valves, shock absorbers, trap primers, wall cleanouts, etc.

H. Furnish cleanouts occurring in waterproof floors with clamping devices.

PART 3 - EXECUTION

3.1 INSTALLATION AND TESTING

A. Cleanouts:

1. Locate line size cleanouts, except 4" largest required, at base of all soil and waste stacks, at all changes in direction and in straight runs. Ensure spacing in straight runs does not exceed 50 feet inside building and 100 feet outside the building.

2. Extend inaccessible cleanouts up through floor and/or wall provided easy accessibility cannot be obtained otherwise.

END OF SECTION

SECTION 22 33 30 - RESIDENTIAL, STORAGE ELECTRIC DOMESTIC WATER HEATERS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 DESCRIPTION

A. Provide a factory packaged, electric storage type domestic water heater.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Unit manufactured by PVI, Hesco, Ruud, State Industries, Lochinvar, A.O. Smith, HTP, or Bradford White. Model number, input capacity, electrical characteristics, accessories scheduled on drawings as basis of design.

B. Storage tank to be carbon steel, glass lined as a minimum.

C. Electrical elements shall be 80 watts per sq. inch density and thermostatically controlled, UL listed and rated.

D. ASME temperature and pressure relief valve.

E. Fiberglass insulation with steel jacket to meet latest ASHRAE Standards.

F. Operating instructions and written warranties.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify location and clearance requirements.

B. Installation in accordance with manufacturers' recommendations and project drawings.

END OF SECTION

SECTION 22 33 35 - WATER HEATER, ELECTRIC INSTANTANEOUS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 DESCRIPTION

A. Provide a factory packaged, electric instantaneous type domestic water heater with digital microprocessing temperature control capable of maintaining outlet temperature +/- 1 degrees F accuracy.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Unit manufactured by Eemax, Stiebel Eltron, or approved equal. Model number, input capacity, electrical characteristics, accessories scheduled on drawings.

B. Unit shall have ABS-UL 94Vo rated cover. Heater body and element shall be glass reinforced Noryl.

C. Element shall be replaceable cartridge insert.

D. Unit shall have a replaceable filter in the inlet connector.

E. Element shall be iron free, nickel-chrome material.

F. Heater shall be fitted with ½" compression nuts and sleeves to eliminate need for soldering.

G. Maximum operating pressure of 150 PSI.

H. Factory set discharge temperature control to 110 degrees F.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify location and clearance requirements.

B. Installation in accordance with manufacturer's recommendations and project drawings.

C. Provide KW and voltage as scheduled on the drawings. Alternate must coordinate with Division 26 at no additional cost to Owner.

END OF SECTION

SECTION 22 42 13 - COMMERCIAL PLUMBING FIXTURES

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 MANUFACTURERS

A. Provide plumbing fixtures and drains as listed on drawings and described herein. Fixture numbers are Kohler products. Equal fixtures by Zurn, American Standard, Crane or Sloan will be considered equivalents.

B. All drainage products to be Josam, Zurn, J.R. Smith, MIFAB, Wade or Watts. All drains installed above slab to be complete with clamping device.

C. Stainless steel sinks shall be Just, Elkay, or Kohler.

D. Flush valves shall be Zurn-AV or Sloan Royal, no exceptions.

E. Pressure balancing shower valves shall be Symmons, Leonard (Pam II), or Powers Hydro Guard T/P 700 series.

F. Commercial or public faucets shall be Zurn, Chicago Faucets, Symmons, Kohler, American Standard, or Speakman.

G. Gooseneck faucets shall be Zurn, Chicago Faucet, T & S, Kohler, American Standard, or Speakman.

H. Fixture supplies, stops, and traps to be commercial grade McGuire, E.B.C., Zurn, or approval equal. Traps to be 17 gauge with wall flange. Supplies and stops to be heavy pattern with wheel handle unless noted otherwise.

I. Water closet seats shall be Bemis, Church, Kohler, Beneke, or Olsonite.

J. Thermostatic mixing valves shall be Symmons, Holby, Powers, or Leonard.

K. China or enamel fixtures to be white color, unless otherwise noted.

L. All wall-mounted lavatories shall be capable of supporting a minimum vertical load of 250 pounds. Install wall-mounted lavatories with floor-anchored carriers which fit in standard stud walls.

M. All products used for dispensing potable drinking water must be lead free and meet the requirements of NSF 61 and NSF 372 test standards via third party testing and certification.

PART 2 - PRODUCTS

2.1 FIXTURES

P-1 Water Closet - Public, Wall Mounted, Barrier-Free, 1.6 Gallon:
Sloan ST-2469
Sloan Bemis – 2155SSCT seat
Sloan CX 8158-1.6-GR hardwired sensor flush valve
Zurn Z1201-N_4-XH wall carrier
Install 17" from rim to finished floor

P-2 Water Closet - Public, Wall Mounted, Barrier-Free, 1.6 Gallon:
Sloan ST-2469
Sloan Bemis – 2155SSCT seat
Sloan CX 8158-1.6-GR hardwired sensor flush valve
Zurn Z1201-N_4 wall carrier
Install 17" from rim to finished floor

P-3 Urinal, Barrier-Free:
Sloan SU-7019
Sloan CX 8198-0.5-GR hardwired sensor flush valve
Zurn Z1222 wall carrier
Install 17" from rim to finished floor

P-4 Lavatory, Undermount, Barrier-Free, Public:
Bradley WB1-WB-ER1
Wilkins Model 38-ZW3870-XL-T mixing valve
Zurn Z8746 offset grid drain
Zurn ZH8822-XL-LR supplies
Zurn Z8700 p-trap

P-5 Lavatory, Wall Hung, Barrier-Free, Public:
Kohler K-2005
Zurn Z6915-XL-CWB hardwire sensor faucet
Wilkins Model 38-ZW3870-XL-T mixing valve
Zurn Z8746 offset grid drain
Zurn ZH8822-XL-LR supplies
Zurn Z8700 p-trap
Zurn Z8946-3 trap wrap kit

P-6 Electric Water Cooler (Split Level), Barrier-Free:
Haws H1011.8-1920
Zurn ZH8822 stop
Zurn Z8700 p-trap
Install with bubbler 36" above finished floor

P-7 Service Sink:
Stern-Williams SBC-1500 BP (24"x 24"x12") with stainless steel caps, two tiling flanges, back panels (corner mounted sink).
Zurn Z843M1-XL faucet with vacuum breaker
Provide in-line spring-loaded check stops

P-8 Single Compartment Sink, Kitchen Faucet:
Kohler Vault K-3894
Kohler Tone K-23766 touchless pull-down faucet
Wilkins Model 38-ZW3870-XL-T mixing valve
Zurn ZH8822-XL-LR supplies
Zurn Z8740 basket drain
Zurn Z8702 p-trap

P-9 Single Compartment Sink, Kitchen Faucet:
Kohler Strive K-5287
Kohler Tone K-23766 touchless pull-down faucet
Wilkins Model 38-ZW3870-XL-T mixing valve
Zurn ZH8822-XL-LR supplies
Zurn Z8740 basket drain
Zurn Z8702 p-trap

P-10 Washing Machine Connection:
Oatey 38957 with water hammer arrestors

P-11 Ice Machine Connection:
Oatey No. 39140 metal ice maker box with metal face plate
Box with valve and water hammer arrestor

P-12 Wall Hydrant, Exterior:
Zurn Z-1305, nickel bronze encased box with hinged lockable cover, non-freeze with vacuum breaker and stainless steel face
Install 18" above finished grade

P-13 Hose Reel System:
T&S Brass and Bronze Works B-7242-U01WS8BC, 50' epoxy coated open hose reel w/ stainless steel surface mounted control cabinet

P-14 Linear Drain:
Ebbe America E6100-50 tile over line drain

P-15 Floor Drain, Regular:
Zurn ZN-415-P-Y B strainer, nickel bronze top, trap primer, sediment bucket

P-16 Floor Drain, 9” Mechanical Room:
Zurn ZN-508-P-Y, nickel bronze top, sediment bucket, trap primer

PART 3 - EXECUTION

3.1 REQUIREMENTS

A. Water closets shall be installed complete with wall carriers, wax rings, bolt caps, and flush valves (or float valves).

B. Elevated vacuum breakers, where specified, shall be installed 7'-6" above the finished floor.

C. Countertop sinks shall be installed complete with required mounting rim or clips.

D. After installation, all fixtures shall be cleaned and labels removed. Where fixtures are in contact with walls, floors, or countertops, caulking shall be applied. Caulking shall be General Electric white silicon sanitary sealant.

E. Water closets identified on plans as barrier free fixtures shall have the flush valves installed per American Disabilities Act. Flush valves shall have the handle installed on the wide side of the stall. Coordinate with the architectural drawings.

F. Non pre-fabricated showers shall have chloraloy 240 brand non-plasticized chlorinated polyethylene concealed waterproofing membrane .040 inch thick. Installation shall be per manufacturers recommendations.

G. At each floor drain installed above slab on grade, install a 36" x 36" apron equal to chloraloy 240 brand non-plasticized chlorinated polyethylene concealed waterproofing membrane, .040 inch thick, waterproofing membrane to be installed per manufacturers recommendations.

END OF SECTION

SECTION 23 01 00 - GENERAL PROVISIONS OF HVAC SYSTEMS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Provide all labor, materials, tools, and services for a complete installation of equipment and systems contained in contract documents.

B. Principal features of work included are:

1. Heating, ventilating, and air-conditioning system.

2. Control system including line and low voltage control wiring and conduit.

1.3 RELATED WORK

A. Electrical power and interlock and control wiring and conduit.

B. Field painting of equipment, ductwork, and piping.

1.4 GENERAL

A. The contract documents form a guide for a complete system. Provide all items necessary to provide a complete system but not specifically mentioned, such as hangers, transitions, offsets, and drains.

B. Layouts indicated on drawings are diagrammatical only. Coordinate exact location of equipment, ductwork, and piping to eliminate conflict with other divisions. Designer reserves right to make reasonable changes in location of equipment, ductwork, and piping prior to construction. Coordination drawings shall be submitted prior to any equipment/systems being installed to ensure that installation conflicts between trades are minimized.

C. Should Contractor find during progress of work that in his judgment existing conditions make desirable a modification, report such item promptly to Designer for instructions. Do not make deviations from contract documents without review of Designer.

D. Supervise all work with a competent mechanic specifically qualified in mechanical discipline.

1.5 PERMITS

A. Secure and pay for permits, licenses, and inspections for work under this division.

1.6 CODES

A. All products, materials, and equipment shall comply with the Buy American Act.

B. Comply with all pertinent local, state, and national codes. Refer to Division 01.

1.7 STANDARDS

A. Comply with all pertinent standards. This list is provided as a convenience to Contractor and is not to be considered all inclusive.

1. Sheet Metal and Air-Conditioning Contractors National Association (SMACNA).

2. American Gas Association (AGA).

3. Air Moving and Conditioning Association (AMCA).

4. Air-Conditioning, Heating and Refrigeration Institute (AHRI).

5. American Society of Mechanical Engineers (ASME).

1.8 SUBMITTALS

A. Submit for review complete brochures and shop drawings for materials and equipment proposed in accordance with Division 01.

1. Brochures: Submit complete descriptions, illustrations and specification data for materials and equipment proposed. Clearly indicate proposed items when other items are shown on same sheet. Submit samples on request and/or set up for inspection. Samples will be returned to Contractor.

2. Submittals shall be submitted in line by line format. Each submittal shall be provided with a cover letter and supporting documentation indicating how the submittal meets each line of the referenced specification section. All discrepancies between the construction documents and the submitted product shall be clearly identified for engineer evaluation.

3. If a product other than the basis of design is rejected by the engineer for any reason, the Contractor shall provide the basis of design product at no additional cost to the Owner.

4. Shop Drawings:

    a. Control systems.
    b. Complete equipment, ductwork, and piping systems in equipment rooms.
    c. Complete equipment, ductwork, and piping systems in entire building.
    d. Underground chilled water system.
    e. Owner furnished equipment rough-in layouts.
    f. Firestop systems.

1.9 PROJECT MAINTENANCE MANUALS

A. Prior to final acceptance of project, provide Owner with bound maintenance manuals in accordance with Division 01.

1.10 PROJECT TECHNICAL INSTRUCTION

A. Prior to final inspection of project, provide technical instruction to Owner as follows:

1. Field Instruction: Provide explanation of how systems and equipment are to operate during each season and during emergencies.

2. Field Demonstration: Demonstrate operation and routine maintenance for systems and equipment.

3. Video: Provide digital video of all field instruction and demonstration to Owner at completion.

1.11 PROTECTION

A. Protect all materials and equipment in accordance with Division 01.

B. The contractor must take appropriate precautions, during construction, to prevent unnecessary dust and debris from getting into air and water handling systems by covering equipment, controls and open-ended ducts and pipes as the installation progresses.

1.12 CONSTRUCTION RECORD DOCUMENT

A. Provide construction record documents in accordance with Division 01. Keep at the project one set of drawings and daily record changes at the time they are made. Give drawings to Owner at project completion.

1.13 EXISTING SERVICES

A. Maintain existing services in operation during construction. Coordinate and schedule all service interruptions with Owner.

1.14 OWNER NOTIFICATION

A. Notify Owner two weeks prior to activation of central chilled water service to project.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. All products, materials, and equipment shall comply with the Buy American Act.

B. Provide materials and equipment of domestic manufacture bearing the U.L. label when such label is available.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate work in accordance with Division 01. Coordinate locations of equipment, ductwork, and piping to eliminate conflict with other divisions.

B. Carefully examine contract documents to be thoroughly familiar with items which require plumbing or mechanical connections and coordination.

C. Provide proper chases and openings. Place sleeves and supports prior to pouring concrete or installation of masonry.

3.2 CUTTING AND PATCHING

A. Repair or replace routine damage caused by cutting in performance of contract.

B. Correct unnecessary damage caused due to installation of mechanical work.

C. Perform repairs with materials that match existing in accordance with the appropriate section of these specifications.

3.3 FLASHING, COUNTERFLASHING, AND SEALING

A. Flash, counterflash, and seal ductwork and piping at penetrations of roofs and outside walls.

3.4 TRENCHING, EXCAVATION AND BACKFILLING

A. Provide trenching, excavation, and backfilling necessary for performance of mechanical work accordance with Division 31.

B. Trenching and excavation of rock to be as described in Division 31.

C. Excavate to a depth at least 6" below bottom of pipe and a minimum of 36" above top of pipe. Fill below pipe, around pipe, and minimum of 12" above pipe with sand or Class "B" crushed stone tamped firm and even. Provide topsoil for final layer of dirt (12" minimum). Provide 6" spacing between pipes and between pipe and trench sides. Hand-grade with batterboards placed every 25'. Backfill by hand. Do not use rock or stone above sand or Class "B" crushed stone.

3.5 CONNECTION TO EQUIPMENT

A. Rough-in and connect to Owner furnished equipment and provide a shutoff valve and union at each connection. Operating valves and/or controls for this equipment will be provided as an integral part of the equipment. Do not rough-in until shop drawings showing rough-in locations have been reviewed by Designer.

3.6 FOUNDATIONS AND PADS

A. Provide foundations, pads, and bases required for equipment. Concrete to be in accordance with concrete division of specifications.

B. Coordinate proper sizes and locations of foundations, pads, bases, anchors, supports, and other items to be built into structure.

3.7 IDENTIFICATION

A. Identify exposed or accessible piping with stenciling contents indicating pipe contents and direction of flow on piping not more than 20 feet apart, at valves, at access panels, and at least once above each space.

B. Contractors option to identify exposed or accessible piping with snap-on or strap-on type markers. Color code markers in accordance with ANSI. Indicate pipe contents and direction of flow on marker. Install markers on piping not more than 20 feet apart, at valves, at access panels, and at least once above each space.

C. Buried lines need not be marked.

D. Identify all mechanical equipment with engraved brass, aluminum, or stainless steel nameplates or tags. Use equipment names and numbers appearing in schedules on drawings. Fasten nameplates to equipment using screws. Glue or adhesive is not acceptable. Fasten tags to equipment using brass, aluminum or stainless steel chains.

E. Frame and mount control diagrams and sequences in each equipment room. Use non-fading black and white prints encased in aluminum frame with plexiglass cover.

3.8 CLEANING

A. Thoroughly clean ductwork and equipment casings before fans and filters are operated.

B. Repair damaged factory finishes covering all bare places and scratches.

C. Cleaning HVAC Systems Water Piping:

1. Clean all equipment and piping of iron cuttings and other foreign matter as they are installed.

2. Do not install devices in which foreign matter could become lodged, such as control valves, until cleaning and flushing are completed. Position valves to bypass chiller, boiler and heat exchanger. Connect supply and return runouts together at each coil location. Make connection of supply and return runouts with short lengths of high pressure rubber hose and brass fittings. One fitting shall be swivel type to eliminate turning fitting in hose.

3. Fill system at city water make-up connection with all air vents open. After filling, close vents.

4. Start main pump with pressure reducing valve makeup open. Check vents in sequence to bleed off any trapped air in order to assure circulation through all components of system. Verify pumps are properly aligned and bolted down before start-up to prevent damage to seals or couplings. Circulate water for at least two hours and then drain completely to flush out foreign matter.

5. Remove, clean, and replace all strainer baskets. Clean all dirt legs. If indications are found of excessive dirt, repeat the above flushing.

6. Fill the system with fresh water, adding precleaning chemicals designed to remove depositions such as pipe dope, oils, rust, mill scale, and other extraneous materials. Provide dosages of precleaner chemicals recommended by water treatment supplier. Alternate operation of primary and standby pumps, and circulate the cleaning solution for 24 hours. Then turn off the pump and completely drain the system.

7. Remove, clean, and replace all strainer baskets. Clean all dirt legs. Replace suction diffuser start-up strainer with conventional strainer. Refill the system with clean water, venting all high points and equipment of air and gases. Bring water systems to operating temperature. Recheck all vent points during this process and remove all air.

8. After the system has been completely cleaned, test system by litmus paper or other dependable method and leave system on slightly alkaline side (ph 7.5 to 8.5). If system is still on acid side (ph 7.0 or lower), add water conditioner.

3.9 TESTING

A. Test all installed equipment and systems and demonstrate proper operation. Correct and retest work found defective when tested.

B. Thoroughly check piping system for leaks. Do not add any leak-stop compounds to the system. Make repairs to piping system with new materials. Peening, doping, or caulking of joints or holes is not acceptable.

C. Conduct air or smoke test if in opinion of Designer reasonable cause exists to suspect leakage or low quality workmanship.

D. Test HVAC systems water piping at a water pressure of 125 psig for two hours without leaks.

E. Vibration Tests:

1. Test vibration isolation system in accordance with methods and procedures described in the Testing, Adjusting, and Balancing Chapter in the latest edition of ASHRAE Applications Handbook.

2. Verify all vibration isolation systems are free floating and not short circuited by any connection between equipment and building structure.

3. Operate mechanical systems and verify visually and audibly that there is no excessive vibration or noise generated by the system.

END OF SECTION

SECTION 23 05 13 - ELECTRIC MOTORS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Provide and install electric motors for mechanical and plumbing equipment.

1.3 SUBMITTALS

A. Submittal data is NOT required for products under this section as separate items. It is assumed they will be reviewed with appropriate equipment submittal.

PART 2 - PRODUCTS

2.1 MOTORS

A. Electric motors shall be new NEMA Standard, sized and designed to operate at full load and full speed continuously without causing noise, vibration, and temperature rise in excess of their rating.

B. Motors on belt driven equipment shall have slide rails with adjusting screws for belt tension adjustment. Motors exposed to the weather shall be weather protected.

C. High efficiency electric motors shall be provided for all motors 3 horsepower and greater. Any motor used with a variable speed motor controller shall be high efficiency type and VFD compatible.

D. High efficiency motors shall have efficiency and losses determined in accordance with the latest revisions of IEEE Standard 112. Polyphase squirrel-cage motors rated 1 through 125 horsepower shall be tested by dynamometer method B. The efficiency shall be determined using segregated losses in which stray load loss is obtained from a linear regression analysis to reduce the effect of random errors in the test measurements. Guaranteed minimum full load efficiency shall be as follows:

MINIMUM NOMINAL FULL-LOAD EFFICIENCY (%)		
	Open Motors	Enclosed Motors
Number of Poles	4	4
Synchronous Speed (RPM)	1750	1750
Motor Horsepower		
3	86.5	87.5
5	87.5	87.5
7.5	88.5	89.5
10	89.5	89.5
15	91.0	91.0
20	91.0	91.0
25	91.7	92.4
30	92.4	92.4
40 – 75	93.0	93.0
100 above	94.1	94.5
Refer to Latest Edition of ASHRAE 90.1 for other motor rpm and efficiencies.		

E. Motor sound power levels shall not be greater than recommended in NEMA M61-12.49.

F. Motors shall be provided with drive shafts long enough to extend completely through belt sheaves.

G. Motor characteristics shall be as follows:

1. 120V/1/60 Hz: Capacitor start, open drip-proof type, ball bearing, rated 40 degrees C. continuous rise.

2. 460V/3/60 Hz: NEMA Design B, normal starting torque, single speed, squirrel cage type, open drip-proof, rated 40 degrees C. continuous rise, with ball bearings rated for B-10 life of 100,000 hours and fitted with grease fittings and relief ports. Provide motors with aluminum end brackets with steel inserts in bearing cavities.

H. Motor horsepower 50 and greater to have part-winding start capabilities.

PART 3 - PRODUCTS

3.1 INSTALLATION

A. Arrange and set motors.

B. Line up motors on direct drive equipment using dial type gauges.

C. Electrical Contractor to make connections and test motor for proper rotation/phasing.

3.2 ADJUSTMENTS

A. All motors together with driven equipment shall be statically and dynamically balanced by equipment supplier, start-up representative, or this contractor using approved balancing equipment. Fan vibration should be limited to manufacturers' recommendations, but should not exceed 2 mils in any case.

END OF SECTION

SECTION 23 05 33 - ELECTRIC HEAT TRACING

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Furnish and install a complete U.L. listed system of heaters, components, and controls to prevent pipelines indicated on drawings from freezing.

PART 2 - PRODUCTS

2.1 EQUIPMENT REQUIREMENTS

A. Provide self-regulating type heat tracing consisting of two (2) 16 AWG nickel coated-copper bus wires embedded in parallel in a radiation-crosslinked polymer core that varies its power output to respond to temperature all along its length, allowing the heater to be crossed over itself without overheating, to be used directly on plastic pipe, and to be cut to length in the field. The heater shall be covered by a radiation cross-linked modified polyolefin dielectric jacket. The heater shall be equivalent to Raychem XL-Trace, Chromalox Rapid-Trace, or approved equal.

B. To prevent overheating, the heater shall have a self-regulating index of at least 90 percent. The self-regulation factor is defined as the percentage reduction, without thermostatic control, of the heater output going from 50 degree F. pipe temperature operation to 140 degree F. pipe temperature operation.

C. The heater shall operate on a line voltage of 277 volts without the use of transformers.

D. The heater shall be sized according to the following table. The required heater output rating is in watts per foot of pipe length at 40 degrees F.

Pipe Size	**Heater Minimum Watts Per Foot**
3 inch and less	5
4 to 6	8
8	10
10 to 16	16
18 and larger	20

E. Power connection, end seal, splice, and tee kit components shall be provided for installation in the field.

F. The system shall be controlled by a strap-on bulb-sensing thermostat set at 40 degrees F. either directly or through an appropriate contactor.

G. Ground fault circuit breaker shall be provided as required by Section 427-22 of the National Electric Code.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install heater in strict accordance with manufacturers' published installation instructions and Article 427 of the National Electric Code.

B. Apply the heater spirally on the pipe after piping has been successfully pressure tested. Secure the heater to piping with cable ties or fiberglass tape. Heat tracing shall be applied to pipe before applying insulation. See Section 23 07 10 for insulation requirements.

C. Apply "electric traced" signs to the outside of the thermal insulation at least once every 50 feet.

3.2 TESTS

A. After installation and before and after installing the thermal insulation, subject heater to testing using a 5000 VDC megger. Minimum insulation resistance should be 20 megohms regardless of length.

B. The installer shall test both heating cable bus wires to verify the connection of any splices or tees.

END OF SECTION

SECTION 23 05 48 - VIBRATION ISOLATION

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Isolate equipment as shown on drawings and specified herein with factory-fabricated vibration isolators in accordance with recommendations in the latest edition of ASHRAE Applications Handbook. Provide isolators of proper sizes and weight loading to meet the requirements.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Kinetics Noise Control, Mason Industries, Vibration Eliminator Co., or approved substitute. Provide isolators by a single manufacturer.

2.2 FIBERGLASS OR NEOPRENE PADS

A. Provide Kinetics Model KIP for:

1. Chillers.

2.3 SPRING AND RUBBER ISOLATION HANGERS

A. Provide Kinetics Model SFH or SRH for:

1. Suspended square in-line centrifugal fans (minimum 1.0" deflection).

2. Suspended ceiling cabinet centrifugal fans (minimum 1.0" deflection).

3. First three (3) piping hangers on each side of air handling units, pumps, and chillers (minimum 1.5" deflection).

2.4 FLEXIBLE PIPE CONNECTORS

A. Provide Metraflex or approved substitute twin-sphere flexible rubber pipe connectors with female unions or floating flanges on piping connections to equipment subject to vibration.

B. Provide connectors rated for 150 PSI working pressure.

C. Provide flexible pipe connectors for the following:

1. Water connections to chillers.

2. Water connections to pumps.

3. Water connections to air handling units.

2.5 OUTDOOR APPLICATIONS:

A. All isolators located outside exposed to weather shall be corrosion resistant construction with hot dip galvanizing or PVC coating.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install vibration isolation in accordance with the isolator and equipment manufacturer's published installation instructions.

B. Size vibration isolation in accordance with weight distribution, pull or the imposed torque of actual equipment provided.

C. Set anchor bolts when concrete is placed. Install in accordance with manufacturers' published installation instructions to provide an air and watertight seal.

END OF SECTION

SECTION 23 05 49 - BASIC MATERIALS AND METHODS FOR HVAC

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Work required under this section of the specifications consists of basic materials and methods applicable to work under Division 23.

PART 2 - PRODUCTS

2.1 FLEXIBLE PIPE CONNECTIONS

A. Provide double sphere, neoprene flexible pipe connectors with flanged or union connections as manufactured by Metraflex or approved substitute in the following locations:

1. Piping connections to pumps.

2. Piping connections to air handling units.

3. Piping connections to chillers.

2.2 V-BELT DRIVES

A. Provide all fan drives with V-belts rated for 150% of nameplate motor horsepower. Provide adjustable pitch motor sheaves for motor sizes through 20 hp. For motor sizes 25 hp and larger provide fixed pitch motor sheaves after balancing to within plus 5% of design air quantity. Select motor sheaves so centerline does not extend past end of motor shaft and such that motor bearing grease fitting and relief port is not obstructed.

B. Provide belt guards for all belt driven equipment. Provide expanded metal cover with access to driven shaft for tachometer.

2.3 FOUNDATIONS AND PADS

A. Provide foundations, pads, and bases required for equipment. Concrete to be in accordance with concrete division of specifications.

B. Coordinate proper sizes and locations of foundations, pads, bases, louvers, anchors, supports, and other items to be built into structure.

2.4 FASTENINGS TO STRUCTURES

A. Provide structural fastening devices for equipment, materials, piping and ductwork. Devices to be concrete inserts, expansion shields and lag bolts, and through bolts-washers-nuts. All bolted devices to use jamb nuts. Inserts to be continuous type as manufactured by Unistrut or approved substitute. Install per manufacturer's published installation instructions in lengths to suit specific application, complete with spring nuts, end caps, and plastic coated filler to prevent concrete seepage.

B. Use of power drive "shot-pins" is permitted only for ducts 20" in width and smaller and single pipes 1" and smaller.

2.5 ACCESS PANELS

A. Provide ceiling and wall access panels for installation by other Divisions whether shown on drawings or not. Coordinate locations so panels will provide proper access to equipment served. Notify Designer of proposed wall or ceiling access panel locations prior to installation of such panels. Minimum size: 24" x 24".

B. Panels shall be manufactured by Bilco or approved substitute. Provide panels with minimum 16 gauge steel construction with screwdriver operated locks and primer finish.

C. Provide fire-rated panels for installation in fire-rated partitions.

2.6 ROOF CURBS

A. Provide prefabricated metal roof curbs at all roof ductwork and piping penetrations and for support of all roof-mounted equipment, fans and ductwork. Construct curbs according to National Roof Contractor's Association guidelines. Prefabricated metal roof curbs shall be manufactured by ThyCurb, Custom Curb, or approved substitute.

B. Construct curbs with minimum 18 gauge galvanized steel (14 gauge for curbs with any side longer than 4'-0" and for all curbs supporting equipment) with fully mitered and welded corners, 3" integral cant, raised 3" integral cant for roof deck insulation, integral base plate, internal reinforcing with 1" x 1" x 1/8" steel angle for curbs with any side longer than 3'-0", factory installed 1-1/2" thick, 3-pound density fiberglass insulation and factory installed pressure treated wood nailer. Minimum height of curb shall be 12" above finished roof surface. (Consult architectural plans for roof type and thickness.) Curbs for kitchen hood exhaust fan shall be height necessary to provide 40" minimum height from finished roof surface to fan discharge. Construct curbs to match slope of roof and provide a level top surface for mounting of mechanical equipment.

C. Curb types shall be as follows:

1. Fan and duct penetration curbs with standard curb construction as described above - ThyCurb Model TC.

2. Equipment and ductwork support curbs with minimum 18 gauge galvanized steel shell, base plate and counterflashing, wood nailer, and internal bulkhead reinforcement - ThyCurb Model TEMS.

3. Pipe penetration curbs with standard curb construction as described above and insulated metal piping cover - ThyCurb Model TC with Model TP-2 piping cover.

D. Install curbs in strict accordance with manufacturer's published installation instructions and as detailed on the drawings. Coordinate proper curb size, construction, and base prior to fabrication.

PART 3 - EXECUTION - NOT APPLICABLE

END OF SECTION

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Perform test and balance work by a Test and Balance Agency which is engaged solely in full time test and balance work, is a member of the Associated Air Balance Council (AABC) or National Environmental Balancing Bureau (NEBB) and is selected and employed by the contractor.

B. Perform test and balance in accordance with AABC or NEBB Standards.

C. Contract to the Test and Balance Agency shall be issued by the contractor. Coordination with the agency at the job site shall be the responsibility of the contractor in order to ensure proper scheduling and operation of the systems. All correspondence (reports, letters and communications) between any parties shall have copies sent directly to the designer and contractor.

D. The TAB agency shall review construction plans and specifications. If any discrepancies are noted which would hinder balancing, notify the designer with copy to the contractor. Make inspections of the job during construction for proper installation of the system(s) and of balancing aids in the system(s). Any discrepancies noted shall be brought to the attention of the contractor and designer. The number of inspections vary with the size and complexity of the job and shall be adequate for the purpose intended. Report ALL job visits in writing - MANDATORY.

1.3 RESPONSIBILITIES OF PROJECT CONTRACTOR

A. The contractor shall:

1. Provide approved Test and Balance Agency with copy of plans and specifications upon issue of construction documents.

2. Have the building and HVAC systems in operational readiness for TAB work to begin.

3. Correct prompt deficiencies of materials and workmanship identified as delaying completion of TAB work.

4. Be responsible for any added costs to the owner resulting from his failure to have the building and HVAC systems ready or from his failure to correct deficiencies promptly.

B. Complete operational readiness of the building requires that construction status of the building shall permit closing of doors, windows, ceilings installed, etc., to obtain projected operating conditions.

C. Complete operational readiness of the air conditioning systems requires that the following be accomplished:

1. Air Distribution Systems:

a. Verify installation conforms to design. All supply, return and exhaust ducts terminated and pressure tested for leakage as required by specifications.

b. All volume, control, fire and smoke dampers properly located and functional. All dampers shall be fully open. MVD gradients and spin damper handles should be exposed through insulation. Dampers serving requirements of minimum and maximum outside, return and relief air shall provide tight closure and full opening, smooth and free operation.

c. All supply, return, exhaust and transfer grilles, registers, diffusers, terminal boxes and filters installed.

d. Air handling systems, units and associated apparatus, such as heating and cooling coils, filter sections, access doors, etc., shall be sealed to eliminate bypass or leakage of air.

e. All fans operating at full load and verified for freedom from vibration, proper fan rotation and belt tension; heater elements in motor starters to be of proper size and rating. Check motor amperage and verify that it is under nameplate rating.

2. Water Circulating Systems:

a. Check and verify pump alignment and rotation. Verify location of thermometers, gages, and PT test plugs.

b. Open all valves to full open position. Close bypass stop valves. Set mixing valves to full flow through system components. Remove and clean all strainers. Verify specified pipe cleaning has taken place. Repeat operation until circulating water is clean.

c. Record pump motor amperage on each phase and voltage after reaching rated speed. Readings shall not exceed nameplate rating. Verify heater elements in motor starters to be of proper size and rating.

d. All water circulating systems shall be full and free of air; expansion tanks set for proper water level; all air vents installed at high points of systems and operating freely. System static pressure to be set minimum 5 psig above highest system elevation.

e. Check and set operating temperatures of heat exchangers to design requirements.

f. Verify that piping to coils is complete and set for counter flow. Verify location of thermometers, gauges, PT test plugs, and flow balancing/measuring valves.

3. Automatic Controls:

a. Verify that all control components are installed and functional in accordance with project requirements, including all electrical interlocks, damper sequences, temperature resets, and safeties.

b. Verify that pressure controllers are calibrated and control variable speed motor controllers as required to maintain a stable pressure.

c. All controlling instruments calibrated and set for designed operating conditions.

4. Notification of System Readiness: After completion of the work above, the contractor shall notify the TAB firm and designer certifying that the work has been accomplished and that the building and HVAC systems are in readiness for testing, adjusting, and balancing.

D. As part of this project contract, the contractor shall make any changes in the sheaves, belts and dampers required for correct balance as required by the TAB firm.

E. The contractor shall provide and coordinate services of qualified, responsible contractors, suppliers and personnel as required to correct, repair, or replace any and all deficient items or conditions found during the testing, adjusting and balancing period.

F. In order that all systems may be properly tested, balanced, and adjusted, the contractor shall operate systems at his expense for the length of time necessary to properly verify their completion and readiness for TAB.

G. Project schedules shall provide sufficient time to permit the completion of TAB services prior to owner occupancy.

H. The plans and specifications have indicated valves, dampers and miscellaneous adjustment devices for the purpose of adjustment to obtain optimum operating conditions, and it will be the responsibility of the contractor to install these devices in a manner that will leave them accessible and readily adjustable. Should any such device not be readily accessible, the contractor shall provide access as requested by the TAB firm. Also, any malfunction encountered by TAB personnel shall be reported to the contractor and designer and corrected by the contractor immediately so the balancing work can proceed.

1.4 QUALIFICATIONS OF THE TAB CONTRACTOR

A. The firm shall submit six (6) completed projects of like size and scope. Provide references for each project.

B. The test and balance firm shall submit a resume for the individual proposed to directly supervise the project. The supervisory personnel for the test and balance firm shall be certified test and balance engineers. All project managers and technicians shall be permanent, full-time employees of the agency.

C. The test and balance firm shall submit a list of its calibrated instrumentation to perform the work.

1.5 DOCUMENTS

A. The contractor shall furnish to the TAB firm electronic copied (PDF) of the following:

1. Mechanical specifications.

2. Mechanical drawings.

3. All pertinent addenda and change orders.

4. Control submittal drawings.

5. Approved submittal data on equipment installed, and related changes as required to accomplish the TAB test procedures outlined below.

PART 2 - PRODUCTS – NOT APPLICABLE

PART 3 - EXECUTION

3.1 RESPONSIBILITIES OF THE TAB FIRM

A. The TAB personnel shall check, adjust, and balance the components of the HVAC system which will result in minimum noise, specified temperature, and air flow conditions in the conditioned spaces of the building while the equipment of the system is operating economically. This is intended to be accomplished after the system components are installed and operating as provided for in the contract documents.

3.2 LIAISON AND EARLY INSPECTION

A. The personnel on the job shall act as liaison between the owner, designer and contractor. They shall inspect the installation of piping systems, ductwork systems, control systems, and other component parts of the HVAC systems during the construction stage to verify proper arrangement and adequate provisions for the testing and balancing.

B. During the balancing process, as abnormalities and malfunctions of equipment or components are discovered by the TAB personnel, the contractor shall be advised in writing so that the condition can be corrected by the contractor. The TAB firm shall suggest solutions to noted problems. Data from malfunctioning equipment shall not be recorded in the final TAB report.

3.3 THE TAB REPORT

A. TAB activities shall culminate in a report to be provided in an electronic copy (PDF) to the designer. The intent of the final report is to provide a reference of actual operating conditions for the owner's operating personnel.

B. All measurements and recorded readings (of air, water, electricity, sound, etc.) that appear in the reports must be done on-site by permanently employed technicians or engineers of the firm.

C. All comment sheets (punch lists) shall be signed by the contractor to acknowledge receipt. Any outstanding items at the time of completion shall be included in the report.

D. The report shall be certified and approved by the firm's test and balance engineer. The report shall be recorded on standard forms.

3.4 ACTUAL TESTING AND BALANCING PROCEDURES

A. Airside:

1. Supply Air:

a. Fans checked for rotation, amperage, static pressure, etc.

b. Terminal boxes set to maximum and minimum cfm and supply outlets balanced to within 5% of design cfm.

c. Main supply duct pitot tube traverse and adjustment of fan speed to produce design cfm while maintaining minimum system static pressure for proper terminal box operation.

2. Return Air:

a. Fans checked for rotation, amperage, static pressure, etc.

b. With supply system in the maximum mode, traverse and adjust return fan to design cfm.

c. With supply system in the maximum mode, proportion return inlets to within 5% of design cfm.

3. Outside Air:

a. Fans checked for rotation, amperage, static pressure, etc.

b. With supply system in the maximum mode, traverse and adjust minimum outside air damper and/or fan to design cfm.

4. Exhaust Air:

a. Fans checked for rotation, amperage, static pressure, etc.

b. With supply system in the maximum mode, traverse and adjust exhaust fan to design cfm.

c. Proportion exhaust inlets to within 5% of design cfm.

5. Diffusers, Registers, and Grilles:

a. Balance each supply, return and exhaust air outlet within 5% of design cfm.

b. Check and/or adjust pressure relationships so that each positive pressure and each negative pressure area is at least 10% positive or negative as appropriate.

6. After completion, take total air-handling system static profile and record all final statics, amperages, rpm, cfm, etc.

B. Waterside:

1. Chilled Water:

a. Check system for cleanliness.

b. With all chilled water valves calling for full cooling, test, set and record each pump head and flow.

c. Test, set, and record pressure drop and flow through each chiller.

d. Test, set and record pressure drop and flow through each flow balancing station.

e. Test, set and record pressure drop and flow through each cooling coil.

f. Verify that piping system is vented.

g. Verify removal of pump start up strainer and replacement with operating strainer.

2. Domestic Hot Water Recirculation System:

a. Balance recirculation pumps ±5% of design gpm flow.

b. Set balancing valves to gpm settings as noted on plumbing drawings.

C. Controls:

1. AHU Controls:

a. Check temperature controls for proper calibration and setpoint.

b. Check economizer controls for proper damper operation and control calibration.

c. Check supply/return volumetric synchronization system under maximum and minimum conditions for proper operation.

d. Check static pressure control under maximum and minimum conditions for proper operation.

2. Chiller Controls:

a. Verify chiller controller is set at design chilled water temperature.

b. Verify central chiller control panel properly stages chillers.

3. Thermostats and Controllers:

a. Check for proper control of valves, dampers, terminal boxes, exhaust fans, etc.

b. Set at design set point.

D. Capacity and Performance Test:

1. Cooling Coils:

a. Test, set and record pressure drop and flow through each coil.

b. Measure entering and leaving dry and wet bulb air temperatures with glass stem, mercury thermometers accurate to 1/2 degrees F.

c. Measure entering and leaving water temperature with glass stem, mercury thermometer if thermometer wells are provided. If P.T. plugs are provided, use a bi-metal thermometer which reads in 1 degree F. increments and use the same thermometer for both supply and return water temperature measurements.

d. Record final temperatures, BTU/HR. and GPM.

e. Convert actual test conditions to design conditions to insure design coil capacities at design temperatures.

2. Chillers:

a. Record full load entering and leaving chilled water temperatures with glass stem, mercury thermometers accurate to 1/2 degree F.

b. Record GPM at time of test.

c. Record amperage and voltage.

d. Perform log-test for a minimum of one hour taking readings at least every ten minutes.

e. Average all readings and compute test capacity in BTU/HR. and in tons.

f. Average all readings and compute actual kw/ton of chiller.

3. Thermostat Calibration:

a. Measure and record dry and wet bulb temperatures at each thermostat.

b. Report any thermostat which is not controlling with +/-1-1/2 degree F.

4. Control Temperature Readouts:

a. Test actual temperature next to sensor (if possible) and compare to readout.

b. Report any sensor which is not within +/-1/1-2 degrees F.

3.5 REPORTS

A. Problems Encountered: Any items not installed, improperly installed or not functioning properly shall be reported to the contractor.

B. Final Report:

1. Any unresolved problems shall be reported in a general remarks section in front of the test and balance report.

2. Any unusual operations or pertinent remarks which may aid the maintenance personnel or ease the reading of the report shall be made in the general remarks section of the report.

3. All operating data and final tests shall be reported in the final report. This data shall include, but not necessarily be limited to the scope of work outlined above.

4. TAB contractor shall compile an Excel spreadsheet for all terminal boxes, listing each box by its unique identification number, the inlet flow area established by the box manufacturer, the manufacturer's gain factor for the box, final TAB calibrated gain factor for the box if field calibrated, and the ratio of the calibrated gain factor to the manufacturer's gain factor.

3.6 CALLBACK

A. Test and Balance Agency shall retest any unresolved problems noted in the final report. The revised results shall be forwarded after completion of test.

B. At the discretion of the designer before final acceptance of the TAB report, the report data shall be verified one time on the job site by selection of random check points in the presence of the designer. Representatives of the testing firm shall be present and provide the necessary equipment for test data verifications.

C. The firm shall be responsible for testing, adjusting, balancing, and reporting on the performance of all fans, dampers, air distribution devices, pumps and heat exchangers, the flow through all coils, pumps and heat exchangers, and the power consumption of all motors. The contractors and the suppliers of the equipment installed shall cooperate with the balancing agency to provide all necessary data on the design and proper application of the system components and shall furnish all labor and material required to eliminate any deficiency.

D. Make one (1) inspection within ninety (90) days after occupancy of the building to insure that satisfactory conditions are being maintained.

3.7 OPPOSED SEASON TESTING

A. This service allows for testing of equipment that, due to extreme weather conditions, cannot be accurately tested at the time of the initial balance. If a project is balanced during the summer, the opposed season testing is performed during the winter months and vice-versa.

B. During the opposed season testing, any necessary modifications to the initial adjustment required to produce optimum operation of the system components shall be made to produce the proper seasonal conditions in each conditioned space. At the time of opposite season testing, the designer and owner shall be given timely notification before any readings or adjustments are made so that he may participate.

END OF SECTION

SECTION 23 07 10 - INSULATION

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Contractor shall provide all necessary labor, materials, tools, and equipment to perform work required on the drawings and specified herein.

B. Certain equipment and/or systems to be factory insulated by manufacturer. Factory insulation materials to be as specified in applicable sections of the specifications.

C. All pipe fittings, valves, and strainers in insulated pipe systems to be insulated.

D. Thermal resistance "R" values used herein are expressed in units of "Hour, Degrees F., Sq. Ft./BTU per Inch of Thickness" on a flat surface at a mean temperature of 75 degrees F.

E. Note that where electric cable wrap is called for, insulation is to be applied over cable.

F. "Contractor's Option" referred to in Materials below indicates optional materials which may be used as equals.

1.3 DEFINITIONS

A. "Exposed" equipment, ducts, and piping are areas which will be visible without removing ceilings or opening access panels.

B. Outdoors is considered exposed to the weather.

C. Underground is buried, whereas in a trench below grade is considered concealed.

1.4 CERTIFICATION/QUALITY ASSURANCE

A. Products shall meet applicable national, state, and local building codes and be U.L. (or other recognized testing lab) listed for intended service.

B. All insulations, jackets, adhesives, coatings, sealers, and tapes shall have a flame spread rating of 25 or less and smoke development rating of 50 or less when tested in accordance with ASTM E-84, NFPA 225, U.L. 723, and further must meet the requirements of NFPA 90-A and applicable building, plumbing, and mechanical codes.

C. All insulation materials shall be delivered and stored in manufacturers' containers and kept free from dirt, water, chemical, and mechanical damage.

D. Insulation shall be applied in a workmanlike manner by experienced, qualified tradesmen.

E. Insulation shall not be applied until all pressure testing has been completed, inspected, and released for insulation application.

F. Surfaces shall be clean and dry.

G. Insulation joints shall be butted firmly together and all jackets and tapes shall be smoothly and securely installed.

H. Insulation for duct, pipe, and equipment for above grade exposed to weather outside building shall be certified as being self-extinguishing for 1" thickness in less than 53 seconds when tested in accordance with ASTM D-1692.

1.5 APPLICABLE CODES AND STANDARDS

A. ASTM E-84.

B. U.L. 723.

C. NFPA 90-A.

D. State of Mississippi Energy Code.

PART 2 - PRODUCTS

2.1 MATERIALS FOR PIPE AND EQUIPMENT

A. Materials for Pipe and Equipment: Provide factory pre-molded or shop or site mitered segment type insulation for pipe, pipe fittings, and valves. Fitting insulation to be of same thickness and material as adjoining pipe insulation. All insulation and related materials such as tape and mastic to meet applicable building code requirements for fire and smoke development.

1. Cellular Glass (Foamglass): Pittsburgh Corning "Foamglass." Product must be guaranteed by manufacturer to have a continuous operational temperature limit of 250 degrees F. and a minimum "R" value of 3.7 per inch (K=0.27) at 75 degrees F mean temperature. Vapor-barrier mastic for application to below ambient pipe insulation shall be fungus resistant per ASTM D 5590 with 0 growth rating; Water based; Permeance per ASTM E 96, Procedure B, 0.013 perm or less at 43-mil dry film thickness suitable for indoor and jacketed outdoor use. Products: Foster 30-80 AF. Color: White. For all butt joints, a pliable insulation joint sealant shall be used. Products: Foster 95-50 or Childers CP-76. Use foamglass for the following services:

   a. Chilled water piping: below 1-1/2” - 1-1/2" thick; 1-1/2" and greater - 2" thick. Exposed chilled water piping shall be foamglass only.

   b. With saddles instead of other piping insulation (fiberglass, flexible tubular) to prevent crushing of insulation at hangers.

2. Flexible Tubular: Provide 25/50 rated, closed-cell, flexible tubular rubber type pipe insulation. Product to have continuous operational temperature limit of 200 degrees F. and a minimum "R" value of 3.7 per inch (K=0.27) at 75 degrees F mean temperature. Product to be Armstrong AP Armaflex or approved equal pipe insulation. Use flexible tubular for the following services:

   a. Moisture condensate drains: 1" thick.

   b. Horizontal runs of waste lines carrying cold condensate from air conditioning equipment: 1" thick.

   c. Refrigerant suction lines for split systems: 1" thick.

   d. Concealed Chilled water piping 1-1/2" and under (contractor option): 1" thick.

   e. Provide multiple layers as required to obtain minimum thickness.

   f. All refrigerant lines for Variable Refrigerant Flow (VRF) systems: 1” thick.

3. Flexible Sheet: Provide 25/50 rated, closed-cell, flexible sheet rubber type insulation, having a minimum "R" value of 3.7 per inch (K=0.27) at 75 degrees F mean temperature and continuous operational temperature limit of 200 degrees F. Product to be Armstrong "Armaflex II" or approved equal. Use flexible sheet insulation for the following services:

a. Chiller cooler, suction piping, and any chilled water pipe connections, housings, and other portions of the chiller which might sweat: 1" thick.

b. Chilled water pump casings and flanges: 1" thick.

c. Chilled water piping valves, strainers, and hydronic specialties: 1" thick.

4. Fiberglass: Provide factory-formed, factory-jacketed fiberglass piping insulation. Product to be Manville "Micro-Lok 650" with "Type AP-T" jacketing or equivalent product manufactured by CertainTeed, Knauf, or Owens-Corning. Product to have continuous operational temperature limit of 850 degrees F and a minimum "R" value of 3.5 per inch thickness (K=0.28) at 75 degrees F mean temperature. Jacket to be fiberglass reinforced kraft paper with aluminum foil and pressure sensitive closure system. Vapor-barrier mastic for application to below ambient pipe insulation shall be fungus resistant per ASTM D 5590 with 0 growth rating; Water based; Permeance per ASTM E 96, Procedure B, 0.013 perm or less at 43-mil dry film thickness suitable for indoor and jacketed outdoor use. Products: Foster 30-80 AF. Color: White. A breather mastic for application to above ambient pipe insulation (fittings, tees, valves, etc) shall be water based Foster 46-50 mastic or Childers CP-10 / CP-11. Use fiberglass piping insulation for the following services:

a. Concealed Chilled water piping: below 1-1/2 - 1" thick; 1-1/2" and over - 1-1/2" thick.

2.2 MATERIALS FOR DUCTS

A. Blanket Type Duct Insulation: Provide minimum 3/4 pound per cubic foot density, flexible blanket fiberglass duct insulation with FSKL aluminum foil vapor barrier facing and 2" tab. Insulation shall have minimum ‘R’ value of 3.4 per inch (K=0.29) at 75 degrees F mean temperature. Product to be Manville "Microlite" or equivalent standard duct wrap by CertainTeed, Knauf, or Owens-Corning. Use blanket type duct insulation for the following:

1. Unlined heating and/or cooling supply and return air ductwork concealed from view: 2" thick.

2. Unlined outside air ductwork concealed from view: 2" thick.

3. Unlined heating and/or cooling supply and return air ductwork located in attic: 2-1/2" thick.

4. Lined heating and/or cooling supply and return air ductwork located in attic: 2" thick.

5. Unlined return air ductwork located in attic: 2-1/2" thick.

B. Board Type Duct Insulation: Provide minimum 3 pound per cubic foot density, semi-rigid fiberglass duct insulation with FSKL aluminum foil vapor barrier facing. Insulation shall have a minimum ‘R’ value of 3.8 per inch (K=0.26) at 75 degrees F mean temperature. Product to be Manville "800 series Spin-Glas" or equivalent by CertainTeed, Knauf, or Owens-Corning. Use board type duct insulation for the following services:

1. Unlined exposed heating and/or cooling supply air ducts: 1-1/2" thick.

2. Unlined exposed outside air ducts: 1-1/2" thick.

3. Unlined exposed return ducts: 1-1/2" thick.

4. Unlined air-handling plenums within equipment rooms: 1-1/2" thick.

5. Side access filter housings: 1-1/2" thick.

2.3 MATERIALS FOR FITTINGS, VALVES, AND SPECIAL COVERINGS

A. Provide coverings and finishes for specific items hereinafter specified.

1. Use pre-molded insulation fabricated by the manufacturer of insulation material or shop or site mitered segment type insulation for: All pipe fittings, elbows, tees, valves, and couplings.

2. PVC fitting covers over blanket fiberglass are NOT acceptable.

3. Contractor's option to provide factory pre-molded one-piece PVC insulated fitting covers, precut fiberglass insulation inserts, and necessary installation materials for all pipe fittings. Materials to be equal to Manville Zeston white, U.V. resistant, 25/50 rated, 20 mil thickness insulated PVC fitting covers and insulation inserts.

B. For heat exchangers, air separators, large pipes, etc., in systems operating over 60 degrees F., when exposed-to-view inside building or in equipment rooms, cover insulation with a smoothing coat of Keane Powerhouse cement, one layer of white colored glass mesh embedded and finished with Foster 46-50 mastic or Childers CP-10 / CP-11 mastic.

C. For pipe fittings, valves, strainers, air separators, and other irregular surfaces, in systems operating below 60 degrees F., when exposed to view inside building or in equipment rooms, cover insulation with white colored glass mesh embedded in white, fungus resistant vapor barrier coating Foster 30-80 AF. Coating shall meet ASTM D 5590 with 0 growth rating.

D. Fabricate and install readily removable insulation caps to facilitate service and maintenance accessibility to all strainers including suction diffusers in systems operating below 60 degrees F.

E. For any service when above grade exposed-to-the-weather outside building, cover straight pipe insulation with 0.016" thick aluminum jacket equivalent to ITW or RPR and cover valves and fittings with .024" thick aluminum factory formed covers equivalent to Childers Ell-Jacs.

F. For any service, when below grade direct buried, cover straight pipe and fitting insulation with equivalent of Pittsburgh Corning "Pittwrap", Foster C.I. Wrap 50 or "Pittwrap SS11" jacketing. Valves in systems operating above 60 degrees F. and installed in valve boxes shall not be insulated; however, the valves shall be painted with a rust resistant product equivalent to Rustoleum.

G. For flexible tubular pipe and fitting insulation when exposed-to-view inside building or exposed to the weather, finish with two coats of paint, custom color blended to match surrounding surfaces.

H. When specifically approved by designer, when it is impossible to completely insulate pipe, fittings, or valves with specified insulation, Armstrong Armaflex insulation tape may be used to prevent condensate drip on small piping. Use of cork insulation tape is prohibited.

PART 3 - EXECUTION

3.1 GENERAL

A. No insulation shall be cut where a hanger is located. If hangers have been installed by pipefitter tradesmen which violates this strict requirement, notify Designer immediately.

B. Piping and ductwork systems shall be tested and found free of all leaks prior to installation of insulation covering.

C. All surfaces shall be clean and dry when covering is applied. Covering to be dry when installed and during application of any finish, unless such finish specifically requires a wetted surface for application.

D. All adhesives, cements, and mastics shall be compatible with materials applied and shall not attack materials in either wet or dry state.

E. Install insulation using professional insulators who have adequate experience and ability.

F. Exposed-to-view insulation shall have a well tailored appearance.

G. See Section 23 21 13 for sleeves and insulation requirements.

H. Stop all duct coverings, including jacket and insulation, at fire and smoke dampered penetrations of partitions. "Fan-Out" or extend jacketed insulation at least 2" beyond angle frames of dampers and secure insulation to partition. Maintain vapor barrier. Where insulated duct access door is not used, install covering over damper access panel so as to be readily removable and identifiable.

I. Treat insulated pipe and duct surfaces in equipment rooms and where exposed to normal view, so surfaces may be painted with water base latex paint. Use of mastics, adhesives, or jacketing which cause "bleeding" is prohibited.

3.2 INSTALLATION OF DUCT COVERING

A. Apply jacketed blanket type fiberglass covering to ducts pulled snug but not so tight as to compress corners more than 1/4". Use insulation having 2" tab, or cut insulation long enough to allow for "peel off" of insulation from jacket to effect a minimum overlap of 2". Secure 2" jacket laps using equivalent of Foster 85-75 or CP-82 adhesive and staple lap with flare type staples on 2" centers. Cover standing seams, stiffeners, and braces with same insulation blanket, using 2" jacket lap and staple lap as hereinbefore outlined. Cover and seal all staples with Foster 30/80 AF, fire resistant vapor barrier coating reinforced with glass cloth.

B. For duct 24" or wider, mechanically fasten insulation to duct bottom, using weld pins or nylon "stick-clip" base plates having self-locking coated metal or nylon discs. Locate fasteners on not over 12" centers laterally and longitudinally. Seal pins as above.

C. For ducts more than 20” deep, mechanically fasten insulation to duct sides, using one row of pins, plates, or discs located on not over 12" centers longitudinally and equidistant laterally between duct top and bottom. For ducts over 24" deep, apply fasteners as before only using minimum of two rows.

D. Apply jacketed board type fiberglass covering to ducts using weld pins or nylon "stick-clip" base plates having self-locking coated metal or nylon discs. Locate fasteners on not over 12" centers laterally and longitudinally. If insulation is grooved to fit around corners, in order to eliminate as many joints as possible, pin as required to hold insulation tight to duct, especially on bottom of duct. Seal pins and joints with Foster 30-80 AF reinforced with glass mesh.

E. Cover all joints, rips, tears, punctures, disc heads, staples, or breaks in vapor barrier jacket with 4" wide woven glass fabric tape embedded in Foster 30-80 AF fire resistant vapor barrier coating. PRESSURE SENSITIVE TAPE NOT ALLOWED.

3.3 INSTALLATION OF PIPE AND EQUIPMENT COVERING

A. Where fiberglass or flexible tubular insulation is used on piping sized 2" and larger, insert a section of foamglass insulation at hanger or support points between pipe and metal shield for full length of shield to prevent crushing of insulation. Insulation thickness to be same as adjoining insulation. Where insulation passes through pipe hangers and across trapeze supports, 12" long metal saddles shall be used. On cold pipe, vapor barrier should be carried through the hanger and sealed.

B. Foamglass insulation shall be strictly applied as follows:

1. The inside full surface of the insulation and both the circumferential and longitudinal joints shall be buttered with fire-resistive pliable joint sealant. Voids and cracks shall be filled with sealant. Sealant shall be Foster 95-50, Childers CP-76 or equal. Insulation shall be secured with 1/2" wide aluminum bands on 12" centers.

2. The circumferential joints shall be staggered.

3. Block type insulation shall be adhered by stick-clips or bands, in addition to the sealant, as required to provide support for the insulation.

4. Finish in concealed locations shall be the bare insulation.

5. Finish in equipment rooms and elsewhere where exposed-to-view shall be white 8 oz. canvas and Foster 30-36 or Childers CP-50A MV1 lagging adhesive/coating, paintable jacket.

C. Apply flexible tubular insulation to pipe and fittings using the slip-on method with all joints tightly fitted and sealed with Armstrong 520, Foster 85-75, Childres CP-82 adhesive or approved equal. Seal butt joints, miter joints and torn or damaged insulation with adhesive.

D. Prior to application of flexible sheet insulation, thoroughly clean all metal surfaces, making sure that all dirt, scale, loose paint, plaster, and oil have been removed and that surfaces are dry. If surface has been primed, test a 2 square foot section using adhesive equivalent to Armstrong No. 520, Foster 85-75, Childers CP-82 in order to determine whether solvent in adhesive will loosen or lift the primer. If primer is loosened, then remove it. When testing proves acceptable, adhere insulation with smooth side out, using thin but adequate coating of same adhesive. Follow manufacturers' instructions. Coat all butt edges of each sheet. Stagger all joints. Insulate all standing seams or flanges with same thickness of insulation material as that used on main surface.

E. Apply PVC insulated fitting covers and precut insulation inserts as follows:

1. Installation for hot systems:

a. Place the precut fiberglass insert around the fitting, positioning the points of the insert on the inside radius of the elbow.

b. Butt the ends of the fiberglass insert against the ends of the pipe covering. Tuck and fold the insulation so that it covers all bare surfaces. Keep the fiberglass fluffed up to the thickness of the adjacent pipe insulation to assure maximum thermal efficiency.

c. Insert two stainless steel serrated tacks approximately 1/4" from one of the lap edges of the fitting cover. Then snap the cover in place over the fiberglass insulation.

d. After the fitting cover is in position, push the tacks into the overlapping throat seam. Apply color-matched, pressure-sensitive tape to the butt joints.

2. Installation for cold systems:

a. Position, tuck, and fold the fiberglass insulation insert as described above in steps (a) and (b) for hot systems.

b. Apply a vapor barrier mastic around the edges of the adjoining pipe insulation. Apply the mastic along the inside of the fitting cover throat overlap seam.

c. Place the fitting cover over the insulation, lapping the mastic-covered edge over the other side of the throat seam.

d. Apply color-matched, pressure-sensitive tape over the circumferential joints. The tape should extend over the adjacent pipe insulation and overlap itself by at least 2" on the downward side of the lap.

END OF SECTION

SECTION 23 09 23 - DIRECT DIGITAL CONTROL/BUILDING AUTOMATION SYSTEM (DDC/BAS)

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 DESCRIPTION

A. Direct Digital Control/Building Automation Systems (DDC/BAS) shall be Johnson Controls, Siemens, Trane, or approved equal.

B. The work specified under this section of the specifications includes furnishing, installing, programming, and placing into operation the DDC/BAS systems. Systems shall be furnished, installed, and warranted by the manufacturer.

C. The DDC/BAS systems shall be furnished and installed under this section of the specifications and shall consist of microprocessor based digital system controllers. The systems shall have the ability for extension to other buildings by web addressable server. The systems shall be complete in every respect, including all auxiliary and accessory items as required, and shall be thoroughly coordinated so as to provide a compatible and completely workable system.

D. Provide a complete control system including electrical interlocks, wiring, conduit, relays, switches, control transformers, and other devices as required to accomplish automatic control of the mechanical systems. Refer to drawings for details.

E. All systems shall be guaranteed against defects of any nature and to operate properly for a period of not less than 12 months after final acceptance of the job by the Owner. During this period, the BAS manufacturer shall service and adjust the systems as required for proper operation, replacing components as required.

F. Submit complete shop drawings, equipment and component brochures, list of control valve CV and pressure drops, list of control dampers, written sequences of operations, diagrams indicating panels, gauges, components, spring ranges, and setpoints, and complete composite wiring diagrams indicating all equipment interlocks for entire control system.

PART 2 - PRODUCTS

2.1 GENERAL PRODUCT DESCRIPTION

A. The building automation system shall consist of the following:

1. Stand-alone DDC panels.

2. Stand-alone application specific controllers (ASCs).

3. Personal computer operator workstation.

4. Web addressable server

B. The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, stand-alone DDC panels, and operator devices.

C. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution. Each DDC panel shall operate independently by performing its own specified control, alarm management, operator I/O, and historical data collection. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.

D. Stand-alone DDC panels shall be able to access any data from or send control commands and alarm reports directly to any other DDC panel or combination of panels on the network without dependence upon a central processing device. Stand-alone DDC panels shall also be able to send alarm reports to multiple operator workstations without dependence upon a central processing device.

2.2 NETWORKING/COMMUNICATIONS

A. The design of the BAS shall network operator workstations and stand-alone DDC panels.

B. Local Area Network:

1. Workstation/DDC Panel Support: Operator workstations and DDC panels shall directly reside on a local area network such that communications may be executed directly between controllers, directly between workstations, and between controllers and workstations on a peer-to-peer basis.

2. Dynamic Data Access: All operator devices shall have the ability to access all point status and application report data, or execute control functions for any and all other devices via the local area network.

3. General Network Design: Network design shall include the following provisions:

   a. High speed data transfer rates. The minimum transfer rate shall be 100 Mb (Mb/s).

   b. Commonly available, multiple source, networking components and protocols shall be used to allow the BAS to coexist with other networking applications. MAP, ETHERNET, IBM Token Ring and ARCNET are acceptable technologies.

   c. Use of an industry standard IEEE protocol.

   d. Synchronization of the realtime clocks in all DDC panels shall be provided.

   e. Permit at least four simultaneous users to access the system over the LAN, based on password level. Users shall have access to monitor parameters, change set points, set up trends, or start/stop controlled equipment. A remote user shall have this capability without having the system data base loaded on his/her remote computer.

   f. Paging/Email feature shall be provided with capability to telephone/email selected facility maintenance personnel to notify them of critical BAS alarms.

   g. Dial-Up Communications: The system shall allow interface into network through the use of auto-answer/auto-dial modems over telephone link as a secondary means of communication.

4. Connection to Facility's LAN: The BAS shall be connected to the facility's Ethernet LAN to the extent possible to avoid duplication of LAN wiring. Coordinate connection with owner.

2.3 STAND-ALONE DDC PANELS

A. General: Stand-alone DDC panels shall be microprocessor based, multi-tasking, multi-user, real-time digital control processors. Each stand-alone DDC panel shall consist of modular hardware with plug-in enclosed processors, communication controllers, power supplies, and input/output modules.

B. Memory: Each DDC panel shall have sufficient memory to support its own operating system and databases.

C. Point Types: Each DDC panel shall support the following types of point inputs and outputs:

1. Digital Inputs for status/alarm contacts

2. Digital Outputs for on/off equipment control

3. Analog Inputs for temperature, pressure, humidity, flow, and position measurements

4. Analog Outputs for valve and damper position control, and capacity control of primary equipment

5. Pulse Inputs for pulsed contact monitoring

D. Expandability: The system shall be modular in nature, and shall permit easy expansion through the addition of software applications, workstation hardware, field controllers, sensors, and actuators.

E. Serial Communication Ports: Stand-alone DDC panels shall provide at least two RS-232C serial data communication ports for simultaneous operation of multiple operator I/O devices such as industry standard printers, laptop workstations, PC workstations, and panel mounted or portable DDC panel operator's terminals. Stand-alone DDC panels shall allow temporary use of portable devices without interrupting the normal operation of permanently connected modems, printers, or network terminals.

F. Hardware Override Switches: The operator shall have the ability to manually override automatic or centrally executed commands at the DDC panel via local, point discrete, on-board hand/off/auto operator override switches for binary control points and gradual switches for analog control type points. These override switches shall be operable whether the panel is powered or not.

G. Hardware Override Monitoring: DDC panels shall monitor the status or position of all overrides and inform the operator that automatic control has been inhibited.

H. Local Status Indicator Lamps: The DDC panel shall provide local status indication for each binary input and output for constant, up-to-date verification of all point conditions without the need for an operator I/O device.

I. Integrated On-Line Diagnostics: Each DDC panel shall continuously perform self-diagnostics, communication diagnosis and diagnosis of all subsidiary equipment.

J. Surge and Transient Protection: Isolation shall be provided at all network terminations, as well as all field point terminations to suppress induced voltage transients consistent with IEEE Standard 587-1980. Isolation levels shall be sufficiently high as to allow all signal wiring to be run in the same conduit as high voltage wiring where acceptable by electrical code.

K. Powerfail Restart: In the event of the loss of normal power, there shall be an orderly shutdown of all stand-alone DDC panels to prevent the loss of database or operating system software. Non-volatile memory shall be incorporated for all critical controller configuration data, and battery back-up shall be provided to support the real-time clock and all volatile memory for a minimum of 72 hours. Upon restoration of normal power, the DDC panel shall automatically resume full operation without manual intervention.

L. Provide a battery backup (UPS) system to support DDC panel functions for a minimum of 15 minutes upon loss of power. The UPS system shall be provided regardless of connection to facility emergency power system.

2.4 SYSTEM SOFTWARE FEATURES

A. General:

1. All necessary software to form a complete operating system as described in this specification and on drawings shall be provided.

2. The software programs shall be provided as an integral part of the DDC panel and shall not be dependent upon any higher level computer for execution.

B. Control Software Description:

1. Pre-Tested Control Algorithms:

a. Two Position Control

b. Proportional Control

c. Proportional plus Integral Control

d. Proportional, Integral, plus Derivative Control

e. Automatic Control Loop Tuning

2. Equipment Cycling Protection.

3. Heavy Equipment Time Delays.

4. Powerfail Motor Restart.

C. Energy Management Applications: DDC panel shall have the ability to perform any or all of the following energy management routines:

1. Time of Day Scheduling

2. Calendar Based Scheduling

3. Holiday Scheduling

4. Temporary Schedule Overrides

5. Optimal Start/Stop

6. Night Setback/Setup Control

7. Economizer

8. Peak Demand Limiting

9. Temperature Reset

D. Custom Process Programming Capability: DDC panels shall be able to execute custom, job-specific processes defined by the user, to automatically perform calculations and special control routines.

E. Alarm Management: Alarm management shall be provided to monitor, buffer, and direct alarm reports to operator devices and memory files. Each DDC panel shall perform distributed, independent alarm analysis and filtering to minimize operator interruptions due to noncritical alarms, minimize network traffic, and prevent alarms from being lost. At no time shall the DDC panel's ability to report alarms be affected by either operator activity at a PC workstation or local I/O device, or communications with other panels on the network.

F. Historical Data and Trend Analysis: A variety of historical data collection utilities shall be provided to automatically sample, store, and display system data in all of the following ways:

1. Continuous Point Histories.

2. Control Loop Performance Trends.

3. Extended Sample Period Trends.

4. Data Storage and Archiving.

G. Runtime Totalization: Stand-alone DDC panels shall automatically accumulate and store runtime hours for binary input and output points.

H. Analog/Pulse Totalization: Stand-alone DDC panels shall automatically sample, calculate and store consumption totals on a daily, weekly, or monthly basis for user-selected analog and binary pulse input-type points.

I. Event Totalization: Stand-alone DDC panels shall have the ability to count events such as the number of times a pump or fan system is cycled on and off.

2.5 APPLICATION SPECIFIC CONTROLLERS - HVAC APPLICATIONS

A. Each stand-alone DDC controller shall be able to extend its performance and capacity through the use of remote Application Specific Controllers (ASCs).

B. Each ASC shall operate as a stand-alone controller capable of performing its specified control responsibilities independently of other controllers in the network. Each ASC shall be a microprocessor-based, multi-tasking, real-time digital control processor.

C. Each ASC shall have sufficient memory to support its own operating system and data bases.

D. The operator interface to any ASC point data or programs shall be through any network-resident PC workstation or portable operator's terminal connected to any DDC panel in the network.

E. Application specific controllers shall directly support the temporary use of a portable service terminal.

F. Powerfail Protection: All system setpoints, proportional bands, control algorithms, and any other programmable parameters shall be stored such that a power failure of any duration does not necessitate reprogramming the controller.

G. Battery Backup (UPS): UPS shall be provided to support ASC functions for a minimum of 15 minutes upon loss of power. The UPS system shall be provided regardless of connection to facility emergency power system.

H. The modes of operation supported by each ASC shall minimally include, but not be limited to, the following:

1. Daily/Weekly Schedules

2. Occupancy Mode

3. Economy Mode

4. Temporary override Mode

I. Continuous Zone Temperature Histories: Each ASC shall automatically and continuously maintain a history of the associated zone temperature to allow users to quickly analyze space comfort and equipment performance for the past 24 hours. A minimum of two samples per hour shall be stored.

J. Alarm Management: Each ASC shall perform its own limit and status monitoring and analysis to maximize network performance by reducing unnecessary communications.

K. Application Descriptions:

1. VAV Terminal Unit Controllers:

a. VAV terminal unit controllers shall support, but not be limited to, the control of the following configurations of VAV boxes to address current requirements as described in the Execution portion of this specification, and for future expansion.

1) Single Duct (Cooling Only or Cooling With Reheat)

b. VAV terminal unit controllers shall support the following types of point inputs and outputs:

1) Proportional Cooling Outputs

2) Heating Outputs (Proportional Analog or 1 to 3 Stages)

c. Each VAV terminal unit space temperature sensor shall include setpoint potentiometer, room temperature indication, and communication port for portable operators terminal.

2. Unitary Controllers:

a. Unitary controllers shall support, but not be limited to, the following types of systems to address specific applications indicated on the drawings:

1) Unit Ventilators (ASHRAE Cycle I, II, III, or W)

2) Heat Pumps (Air-to-Air, Water-to-Air)

3) Packaged Rooftops

4) Fan Coils (Two-Pipe, Four-Pipe)

b. Unitary controllers shall support the following types of point inputs and outputs:

1) Economizer Switchover Inputs

2) Drybulb

3) Outdoor Air Enthalpy

4) Differential Temperature

5) Differential Enthalpy

6) Binary Input from a separate controller

7) Economizer Outputs

8) Integrated Analog with minimum position

9) Binary output to enable self-contained economizer actuator

10) Heating and Cooling Outputs

11) 1 to 3 Stages

12) Analog Output with two-pipe logic

13) Reversing valve logic for Heat Pumps

14) Fan Output

15) On/Off Logic Control

3. AHU Controllers:

a. AHU controllers shall support all the necessary point inputs and outputs to perform the specified control sequences in a totally stand-alone fashion.

b. AHU controllers shall have a library of control routines and program logic to perform the sequence of operation.

2.6 OPERATOR INTERFACE

A. Command Entry/Menu Selection Process: Operator workstation interface software shall minimize operator training through the use of English language prompting, English language point identification, and industry standard PC application software.

B. The operator interface shall minimize the use of a typewriter style keyboard through the use of a mouse or similar pointing device, and "point and click" approach to menu selection. Users shall be able to start and stop equipment or change setpoints from graphical displays through the use of a mouse or similar pointing device.

C. Graphical and Text-Based Displays: At the option of the user, operator workstations shall provide consistent graphical or text-based displays of all system point and application data described in this specification. Point identification, engineering units, status indication, and application naming conventions shall be the same at all workstations.

D. Password Protection: Multiple-level password access protection shall be provided to allow the user/manager to limit workstation control, display and data base manipulation capabilities as he deems appropriate for each user, based upon an assigned password.

E. Operator Commands: The operator interface shall allow the operator to perform commands including, but not limited to, the following:

1. Start-up or shutdown selected equipment.
2. Adjust setpoints.
3. Add/Modify/Delete time programming.
4. Enable/Disable process execution.
5. Lock/Unlock alarm reporting for each point.
6. Enable/Disable Totalization for each point.
7. Enable/Disable Trending for each point.
8. Override PID Loop setpoints.
9. Enter temporary override schedules.
10. Define Holiday Schedules.
11. Change time/date.
12. Enter/Modify analog alarm limits.
13. Enter/Modify analog warning limits.
14. View limits.
15. Enable/Disable Demand Limiting for each meter.
16. Enable/Disable Duty Cycle for each load.

F. Logs and Summaries: Reports shall be generated automatically or manually, and directed to either CRT displays, printers, or disk files. Summaries shall be provided for specific points, for a logical point group, for a user-selected group of groups, or for the entire facility without restriction due to the hardware configuration of the building automation system. Under no conditions shall the operator need to specify the address of hardware controller to obtain system information.

G. Dynamic Color Graphic Displays: Color graphic floor plan displays, and system schematics for each piece of mechanical equipment shall be provided to optimize system performance analysis and speed alarm recognition.

2.7 PERSONAL COMPUTER OPERATOR WORKSTATION

A. General: Provide an operator's workstation to access the BAS network.

B. Provide PC Compatible computer system, Dell Inc. or approved equal with the following features:

1. 3.2 GHz Intel i7 equivalent processor.

2. 12 GB RAM memory minimum.

3. 500 GB hard drive.

4. Four USB ports built-in.

5. 48X CDRW/DVD combo drive.

6. 30" LCD color monitor.

7. USB Optical mouse.

8. USB keyboard.

9. Software: Windows 11.

C. Provide a color ink jet printer for printing of alarms, graphics and any other screen displays.

D. Network Connection: Graphical workstations shall allow for access to the BAS network through a pull-down menu approach using only a mouse. The keyboard shall be required only when entering text or for programming functions. The workstation shall be used as an interface to the BAS network and shall not be required to process any control or energy management algorithms nor manage any BAS network communications.

E. Provide context-sensitive help menus to provide instructions appropriate with operations and applications currently being performed.

F. Multiple user security levels shall be provided to allow for various degrees of system access and control. The system shall automatically generate a report of log-on/log-off time and system activity for each user. Provide automatic log-off capability to prevent unauthorized system use.

G. The workstation shall be provided with a key element display that records log-ons, log-offs, overrides, alarms and alarm acknowledgments.

2.8 ELECTRONIC, ELECTRIC AND PNEUMATIC CONTROL COMPONENTS

A. Electric Thermostats: Thermostats to be manufacturer's best commercial grade thermostat with adjustable setpoint, dials calibrated in degrees F, and digital temperature indication. Select thermostats with suitable range for service intended. Temperature measurement accuracy shall be +/- 0.5 degrees F. Thermostats located in public areas such as corridors shall be provided with programming lockout to prevent unauthorized adjustment. Thermostats located where subject to physical damage and/or where identified on drawings shall be provided with tamper resistant cover. Warmer – Cooler setpoint adjustment will not be acceptable.

B. Electronic Sensors/Transmitters: Sensors/transmitters to be 1000 Ohm platinum RTD type with high resistance change vs. temperature change, accurate to +/- 0.3 degrees F for temperature and provide 4 to 20 MA or 0 to 5 VDC output signal. Sensors/transmitters to be suitable for room, duct, or well mounting as required by application. Room type to have built-in setpoint potentiometer and digital room temperature indication. Select for temperature range of application. Provide appropriate mounting plate and hardware. Sensors shall have setpoint adjustment through BAS only. Sensors located where subject to physical damage and/or where identified on drawings shall be provided with protective cover.

C. Smoke Detectors: Install duct-mounted smoke detectors at locations indicated on drawings and in accordance with published smoke detector installation requirements. Smoke detectors to be furnished to Division 23 by Division 26.

D. Freezestats (Low Limit Binary Type): Provide single, custom length Freon-filled capillary tube type with sensing element actuated by temperature on any one foot portion. Sensor shall be a single element with length of one linear foot for every one square foot of coil face area. Freezestats to be UL approved, manual reset type.

E. Averaging Temperature Sensors (Mixed Air, Preheat, Etc.): Provide single, custom length Freon-filled capillary tube type sensing element. Accuracy shall be +/- 0.3 degrees F. Sensor shall be single element with length of one linear foot for every one square foot of coil face area.

F. Control Panels: Control panels to be constructed of unitized steel or aluminum cabinets. Provide cabinets with hinged, locking door opening to the front. Multiple panels mounted side-by-side to be hinged to the left or on opposite sides to open in the middle. Start-stop switches, hand-off-automatic switches, pilot lights, and temperature indicating devices to be flush-mounted in panel door. All other devices to be internally mounted within panel. Local panels exposed to weather to be weatherproof construction. Panel locations to be approved by Designer and be accessible for operation and maintenance. All devices specified to be mounted on control panel that require electrical connections to be prewired to a dual, numbered terminal strip located inside panel. Pneumatic piping inside panel may be poly properly supported in laced bundles or in panduit trays. All lines in panel shall have number I.D. bands. Gauges shall be installed on all pneumatic lines entering or leaving the panel. All devices inside the panel or mounted on panel face shall have an engraved laminated plastic nameplate. Wiring within panel to conform to National Electrical Code, and shall be neatly bundled and laced or enclosed in panduit trough.

G. Control Valves: Two-inch and smaller water service valves to be screw connected chrome plated brass ball type with characterized port to allow equal percentage throttling. Two-and-one-half inch and larger to be flange connected, brass-body ball-type with ductile iron flanges and stainless steel trim. Valve pressure rating to be in accordance with piping and fitting specifications Section 23 21 13. (Minimum 125 psi operating pressure.) Provide pilot positioning relays for pneumatic operated valves requiring sequencing except at terminal units. Valve actuators to be selected to close valves against pump shutoff head or maximum steam inlet pressure. Provide stainless steel stem with removable composition disc and self adjusting spring-loaded Teflon packing. Two position water valves to be line size or one line size smaller than connecting piping with maximum 1 psi water pressure drop. Modulating water valves to have equal percentage flow characteristics and be sized for maximum 4 psi water pressure drop. Zone type, tri-state, pulse type, or similar non-proportional control valves/actuators are not acceptable.

H. Automatic Control Dampers: Ultra low-leak automatic control dampers to be Arrow Pin Lock opposed-blade dampers for modulating control and parallel blades for 2-position control or approved equal. Frames and blades to be minimum 16 gauge extruded aluminum or galvanized steel construction with 4" to 6" deep frame and 8" maximum width blades. Pivot rods to be 1/2" diameter, extruded aluminum or plated steel. Bearings to be corrosion resistant. Install blade linkage hardware in angle or channel frame section out of airstream. All hardware to be corrosion resistant. Seals to be replaceable extruded vinyl or silicone rubber blade seals and flexible metal compression type jamb seals. Dampers to have maximum 4 cfm per square foot leakage at 1" water gauge static pressure and 8 cfm per square foot leakage at 4" water gauge static pressure, verified by independent testing laboratory.

I. Electronic Actuators: Actuators shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the rotation of the actuator. End switches to deactivate the actuator at the end of rotation or magnetic clutch is not acceptable. For power-failure/safety applications, a mechanical, spring return mechanism shall be used. Non-mechanical forms of fail-safe are not acceptable. All spring return actuators shall be capable of both clockwise or counterclockwise spring return operation by changing mounting orientation. Proportional actuators shall accept a 2 to 10 VDC or 4 to 20 mA and provide a 2 to 10 VDC position feedback signal. 24 VAC/DC actuators shall not require more than 15 VA for AC or 8 watts for DC applications. All non-spring return actuators shall have an external manual gear release to aid in installation and allow manual positioning when the actuator is not powered. All actuators shall have an external direction of rotation switch to aid in installation and provide proper control response. Actuators shall be provided with a factory-mounted 3-foot electrical cable and conduit fitting to provide easy hook-up to an electrical junction box. Provide cover mounted control transformer for 120-VAC power supply. The actuators shall be U.L. listed.

J. Volumetric Devices: Fan Inlet Air Flow Sensors and Indicating Transmitters

1. Fan Inlet Piezometer Air Flow Sensors shall be factory mounted in the air handling units. They shall be piezometer type average velocity sensors designed for installation inside the inlet ring of centrifugal fans accurate to +/- 1.5% measurement accuracy. There shall be no portions of device protruding into inlet cone.

2. Air flow transmitters shall be field installed by the controls sub-contractor. The airflow transmitter shall be an industrial quality, electronic solid state, ultra low span, ½ percent accuracy transmitter with integral square root, scaling, and output filter with indication. Each transducer shall be provided with a microprocessor digital readout meter, operating independent of all other control devices. This unit to provide a direct digital readout of the air volume as derived from the total and static input signals received from the respective air flow measuring element. The meter shall have a digital readout and 3 way zeroing valve for zero verification and calibration. Readout to be flush mounted on the enclosure door. The meter shall be calibrated to an accuracy of +/- 2% of span. Area factor input for respective inlet probes to be adjustable via a keypad. Provide individual airflow transmitters, especially selected for the required spans of each of the above primary processor shall to be Paragon Controls Inc. Model MT-1.

3. For Air Handling Units with 2 or more supply fans AND 2 or more return fans, the transmitter shall be Paragon Controls, Inc. FAATS-1000 fan array airflow totaling system. Output signal shall be 4-20mA and shall measure airflow for each individual fan within a fan array system as well as the total airflow rate of each array.

K. Water Flow Meters:

1. Water flow meters shall be installed in strict accordance with manufacturer's instruction and with minimum upstream and downstream straight length as required for specified measurement accuracy.

2. For chilled water and hot water applications in pipe sizes 3” to 72” the flow meter construction shall be 316 stainless steel wetted metal components with polypropylene sensing head, insertion type suitable for 400 psi pressure and 15 to 250 degree F temperature. Provide ball type isolation valve and all necessary installation hardware to enable insertion and removal of the meter without system shutdown. The flow meter shall be hand-insertable up to design pressure. Meter accuracy shall be within ± 1.0% of rate between flow velocities of 2 to 20 feet per second and +/- 0.02 ft/s at 0.25 ft/s to 2 ft/s. Meter flow range shall be 0.25 ft/s to 20 ft/s (80:1 turndown). Output signal shall be selectable: 4-20mA, 0-10 V or 0-5 V. Water flow meter shall be Onicon Model F-3500 Insertion Electromagnetic Flow Meter. McCrometer, Inc. Multi-Mag or Ultra-Mag selected for application shall be acceptable as an alternate.

L. Static Pressure Devices: Static pressure measuring stations with +/- 2% accuracy equal to Paragon Controls PE-5000 shall be provided. Industrial quality, electronic solid state, 1/2 percent accuracy static pressure transmitters equal to Paragon Controls Model DPT-4001 shall be provided. Transmitter span shall be matched to application.

M. Transformers: Provide all 24-volt control transformers necessary to convert 120-volt line voltage power to control voltage at control devices.

N. Relays, Hand-Off-Auto Switches, Pilot Lights: Provide all relays, hand-off-auto switches, and pilot lights necessary to accomplish automatic control of the mechanical systems. See electrical drawings for starters provided integral with hand-off-autos, pilot lights, and auxiliary contacts.

O. Pressure Switches: Pressure switches shall have contact action and pole configuration as required by application, U.L. listing, and adjustable setpoint.

P. Current Sensing Relays:

1. Acceptable Manufacturer: Hawkeye Model 908 or approved equivalent.

2. Current sensor shall be induce powered from the monitored load and shall have an adjustable operating range from 2.5 - 135 A. Visual indicators (LEDs) shall indicate output status and sensor power. Adjustable trip setpoint to +/- 1%. Current sensor output shall be N.O., solid state, 0.1A @ 30 VAC/DC.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Components:

1. Provide sensors, transmitters, controllers, actuators, valves, dampers, and related items, necessary to accomplish control sequence shown on drawings. Install all such devices except as noted herein to the contrary.

2. Deliver control valves to the job site to be installed by Mechanical Tradesman under supervision of Control Tradesman.

3. Deliver automatic dampers to the job site to be installed by Mechanical Tradesman under supervision of Control Tradesman.

4. Mechanical Tradesmen to install flow switches, immersion wells, pressure tapping, and all associated shut-off cocks required for control systems.

5. The control equipment and connecting piping shall be installed in a neat and workmanlike manner by trained mechanics in the direct employ of the control manufacturer.

6. All exposed tubing and conduit shall be run parallel to or at right angles to the building structure, and shall be concealed in all finished spaces. Tubing and conduit may be run exposed in mechanical rooms or areas where other piping is exposed.

7. Prepare coordinated composite wiring diagram showing all interlock wiring associated with starters, control panels, and controls.

8. Drawings and Layouts: The controls contractor shall provide to the mechanical contractor complete schematic drawings for the entire control system for submittal to the Designer for approval before work shall begin. Brochures describing each item of control equipment or component shall be included.

9. Provide sequence of operation written so that building engineer can read and understand control scheme.

10. As-built drawings to be framed under plexiglass and placed in each respective equipment room area.

B. Electrical:

1. Division 23 Mechanical Tradesman shall furnish and install low-voltage control wiring, including conduit, conductors, and terminations for same. Division 23 shall also furnish and install control components associated with the low-voltage control systems and shall wire and connect components in accordance with approved wiring diagrams.

2. Division 26 Electrical Tradesman shall furnish and install power wiring including conduit, conductors, and terminations to motors, safety switches, starters, relays, valve and damper actuators, and other components requiring power as indicated on the electrical drawings, by the specifications, and in accordance with approved wiring diagrams. Division 26 shall also furnish and install starters as scheduled on the electrical drawings.

3. Division 23 to furnish and install all local area network wiring, including conduit, conductors, and terminations for same. The local area network (LAN) shall be configurable as either a bus or a star, or a combination of the two. The LAN shall use twisted pair, coax, or fiber optic cable, or any combination of the three to meet noise immunity and/or distance requirements. The network design shall provide a high speed data transfer rate for alarm and report generation of no less than 100 Mb (Mb/s).

4. Division 23 to furnish all input and output control wiring, including conduit, conductors, and terminations for same. All input and output control wiring shall be #18 twisted and shielded cable. No input or output point shall be more than 250 feet from its respective panel. All shields to be grounded at the control panel. All shields at the sensors or transducers to be folded back and taped. All cable splices shall have joints soldered and taped including the shield. No mechanical connections will be acceptable. All connections within the panels must be made with connectors of appropriate size and design for the terminals being applied. All cables must be labeled and identified on corresponding termination drawings. A copy of the termination drawing shall be adequately protected and left in its respective panel.

5. Install all control wiring associated with DDC/BAS in minimum 1/2" size EMT. Provide all associated couplings, connectors, and fittings. No electrical wiring and polyethylene tubing may occupy the same conduit. Separate carriers are required.

6. All wiring shall be in accordance with local regulations and the National Electrical Code.

C. Room Devices:

1. Room devices shall be mounted so that the top of the device is 48" above the floor and aligned with the top of the light switch plates and 8" from the light switch if shown on the drawings adjacent to the light switch.

2. Room device locations shall be coordinated with door swings, light switches, and other wall-mounted items.

3.2 QUALITY CONTROL

A. Control system to be set up and checked out by factory-trained competent technician skilled in the setting and adjustment of temperature controls used in this project. This mechanic to be experienced in type systems associated with this control system.

B. At time of final observation, Control Contractor to demonstrate the entire sequence of operation for the systems to the Engineer. At this time, Engineer to observe function of entire control system, observe temperature control operations, damper positions, necessary to assure that temperature control system is operating as intended by mechanical design.

C. Final acceptance of system not to occur until sequence of operation check has taken place and certified by Engineer's representative.

D. The Control Tradesman to be responsible for returning to job during the opposite season to verify operation of control system. Engineer to be given notice of this return and to accompany Control Tradesman to observe the sequence of operation.

3.3 INSTRUCTION AND ADJUSTMENT

A. On completion of the job, the controls contractor shall have completely adjusted the entire control system. He shall arrange to instruct the Owner's representative on operation of the control system and supply him with three (3) copies of the control operating and instruction manuals.

B. The Controls Contractor shall obtain from the Owner's representative a signed receipt that he has received the instruction manuals and complete instruction on the operation of the system.

C. Contractor Adjustment: At the completion of the job, the controls contractor must submit to the Architect a letter stating that he has made final calibrations and adjustments to the system and that the Owner's operating personnel have been instructed in its use.

3.4 WARRANTY SERVICE

A. Warranty servicing shall be for a period not less than 12 months after final acceptance of the job by the owner and include the following provisions:

1. Emergency maintenance service on regular working hour basis during warranty.

2. Replacing defective parts and components as required.

3. Servicing by factory trained and employed service representatives of system manufacturer.

4. Maintaining of system programming.

END OF SECTION

SECTION 23 21 13 - HYDRONIC PIPING

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Submit pipe, valves, and fittings and have approved before starting installation. Pipe, valves, and fittings to be new, manufactured domestically, and marked clearly with manufacturers’ name, weight, and classification or working pressure.

B. Piping to run approximately as shown on drawings or as structural and architectural conditions permit.

PART 2 - PRODUCTS

2.1 STEEL PIPES

A. Butt welded, electric resistance welded, or seamless black steel pipe, ANSI B 36.10, ASTM A-53, Grade "B" or "A", Schedule 40 for piping 10" and smaller for the following services:

1. Chilled water supply and return piping 2-1/2" and larger.

2. Fuel oil piping.

3. Mill wrap all uninsulated underground steel pipe with Republic X-Tru-Coat or equal.

B. Standard-weight galvanized steel pipe: Air-conditioning unit moisture condensate drain piping.

2.2 STEEL PIPE FITTINGS

A. Flanges, fittings, unions and other products recognized as regularly available products to be marked in accordance with MSS SP-25. Markings on products of small size or shape may be omitted in the sequence allowed by MSS SP-25, except manufacturers' name or trademark.

B. Fittings 2-1/2" and larger to be standard weight, carbon steel, buttwelding fittings conforming to ASTM A-234 and ANSI B16.9.

C. Fittings to be factory-forged in USA and shall not have been machined, remarked, painted, or otherwise produced domestically from non-domestic forgings.

D. Branch connections from mains or headers 2-1/2" or larger to be welded tees. Stub-in welded piping is not acceptable. T-drill branch tee connections shall not be allowed for HVAC piping.

E. Fittings 2" and smaller to be threaded, Class 150, standard, malleable iron fittings, conforming to ANSI B16.3 and ASTM A-197.

F. Fittings for galvanized steel pipe to be same as above except have galvanized coating. Fittings for waste, vent, and drainage piping to be drainage pattern type.

G. Flanges to be 150 lb. carbon steel conforming to ASTM A-105, ASTM A-181, and ANSI B16.5.

H. Flanges to be factory forged in U.S.A.

I. Unions to be Class 150 malleable iron with bronze-to-iron ground joint conforming to ANSI B16.39, ANSI B1.20.1, and ASTM A-197.

J. Bolting materials to be semi-finished carbon steel bolts and hex nuts conforming to ASTM A-307. Threads and dimensions to be in accordance with ANSI B1.1 and B18.2.

K. Thread lubricant to be Crane "Formular 425" or equal. Approved Teflon tape may be used at Contractor's option.

L. Gaskets to be 1/8" thick "Sepco" or equal.

2.3 COPPER PIPES

A. Type "L" hard-drawn seamless copper tubing, ASTM B-88:

1. HVAC chilled water piping 2-1/8" O.D. and smaller. Piping dimensions on drawings for piping 2-1/8" and smaller is outside diameter (O.D.).

B. Type "K" hard-drawn seamless copper tubing:

1. HVAC water piping for lines 2-1/8" O.D. and smaller located under slab.

C. Type "DWV" hard-drawn seamless copper tubing: Contractor's option for above-ground moisture condensate drain piping.

D. Copper Pipe Fittings:

1. Provide sweat fittings, ASTM B-62, dimensions conforming to ANSI B16.22, wrought copper, with sweep patterns for copper tubing.

2. Dielectric connection: Provide Epco Sales, dielectric couplers at junction of steel pipe and equipment with copper piping systems. Use of steel or cast iron fittings in copper piping systems prohibited.

3. Fittings for drainage piping to be drainage pattern type.

E. Unions to be brass ground joint, 250-pound working pressure.

F. Nipples used in conjunction with copper pipe to be brass.

2.4 CAST IRON SOIL PIPE

A. Standard weight cast iron soil pipe with drainage fittings: Underground A/C unit condensate.

2.5 PVC PIPE

A. Schedule 40 PVC pipe, ASTM D-1785 Type 1, Grade 1, 200-psi test: A/C unit condensate drains above grade where exposed in equipment rooms only.

B. Fittings to match piping system. Fittings to have manufacturer's trademark permanently identified in accordance with MSS-SP-25. Supplier to include with submittal data certification that fittings and flanges have met requirements.

C. Joints for piping to be made with tetrahydrofuron solvent cement. Joints to be in accordance with manufacturer's recommendations.

D. Pipe, fittings, and cement to all be supplied by single manufacturer for entire project.

2.6 VALVES

A. Valves are specified by Stockham model numbers to establish quality levels unless otherwise noted. Crane, Milwaukee, Hammond, Nibco, Stockham, Centerline, Apollo, Kitz, or Watts are considered equal manufacturers. Provide clamp lock hand lever operators on valves less than 8 inches. Provide hand wheel and closed housing worm gear on valves 8 inches and larger unless indicated otherwise below. Provide chain operators for all equipment room and powerhouse valves 4 inch and larger which are located over 6 feet 6 inches above the finish floor.

B. Gate Valves:

1. Gate valves for 2-1/2" and larger steel piping systems to be Class 125, cast iron body, bronze mounted, flanged ends, Stockham Figure G623. Valves to have solid wedge disc, outside stem and yoke with rising stem, and bolted bonnet.

2. Gate valves for 2" and smaller steel piping systems to be Class 125, bronze body, screwed ends, Stockham Figure B105. Valve to have solid disc, rising stem, and union bonnet.

3. Gate valves for copper piping systems to be Class 125, bronze body, solder ends, Stockham Figure B109. Valve to have either solid or split wedge disc, inside screw, rising stem, and screwed bonnet.

C. Globe Valves:

1. Globe valves 2-1/2" and larger to be Class 125, cast iron body, bronze mounted, flanged ends, Stockham Figure G512. Valves to have renewable seat and disc, outside stem and yoke with rising stem, and bolted bonnet.

2. Globe valves 2" and smaller to be Class 150, bronze body, screwed ends, Stockham Figure B29. Valve to be plug type with renewable seat and disc, rising stem, and union bonnet.

D. Ball Valves:

1. Ball valves for copper water piping systems 2-1/8" O.D. and smaller to be equal to Apollo "3" Figure 82-200, solder ends, and for 2-5/8" thru 3-1/8" O.D. to be equal to Apollo Figure 70-100, threaded ends. Valves to have bronze body, chromium plated bronze ball, teflon seats, stuffing box ring and seals, and quarter turn on-off. Provide memory stops for valves used for balancing service. Valves to be rated for 400-psi WOG at 200 degrees F. Install threaded end valves with brass adapters.

E. Butterfly Valves: Butterfly valves for steel water piping systems to be Crane Monarch Figure 24N, Centerline Series LT, or approved equal industrial quality lug type with threaded holes. Valves to provide bubble-tight shut-off at 150 psi working pressure and 200 degrees F. Valves to have ductile iron body, "EPT" seats and stem seals, 316 stainless steel or bronze disc, 316 or 416 stainless steel stems. Valves 4" and larger to have weatherproofed sealed gear operator consisting of fully enclosed worm, worm gear, and worm shaft with handwheel to provide necessary torque for close-off and infinite throttling positions. Valves 3" and smaller to have 10 position lever lock handle suitable for on-off and manual throttling service. All operators to have valve position indicator and memory stop.

F. Check Valves:

1. Check valves for copper water piping systems to be swing type, Class 125, bronze body, screwed ends, Stockham Figure B309.

2. Check valves for steel water piping systems to be swing type, Class 125, cast iron body, bronze mounted, flanged ends, Stockham Figure G932B. Valve to have Buna-N disc and bolted cap.

2.7 STRAINERS

A. Provide cleanable "Y" type strainers in pump suction lines. Strainers to have ductile iron body with screwed bronze or coupled / bolted iron cap. Strainer baskets to be stainless steel or brass. Water strainers to be stainless steel or Monel 20 mesh screen. Strainers to be line size complete with blow-down hose bibbs. When Suction Diffusers are specified for end suction pumps, strainers are not required. Strainers to be as follows:

1. Screwed 125# - Crane 988-1/2.

2. Screwed 250# - Crane 990-1/2.

3. Flanged 125# - Crane 989-1/2.

4. Flanged 250# - Crane 991-1/2.

5. Solder joint 250# - Muessco 353-1/2.

2.8 HANGERS

A. Non-insulated steel piping 1/2" thru 24" with no longitudinal movement to be Grinnell Figure 260, MSS SP-69 Type 1, adjustable clevis hanger.

B. Insulated steel piping 1/2" thru 24", galvanized piping 1/2" thru 24", copper piping 1/2" O.D. thru 4" O.D., PVC pipe, with no longitudinal movement to be Grinnell Figure 260, MSS SP-69 Type 1, adjustable clevis hanger with Figure 167, MSS SP-69 TYPE 40, galvanized steel insulation protection shield sized for maximum 10' span on 4 psi compressive strength insulation.

C. Non-insulated cast iron soil pipe thru 8" to be Grinnell Figure 104, MSS SP-69 TYPE 6, adjustable swivel ring, split ring type, and pipe 10" thru 15" Grinnell Figure 260, MSS SP-69 TYPE 1, adjustable clevis hanger.

D. Non-insulated copper tubing and PVC pipe 1/2" O.D. thru 4" O.D. with no longitudinal movement to be Grinnell Figure CT-99C, MSS SP-69 TYPE 9, plastic coated adjustable tubing ring hanger.

E. Insulated steel piping 1" thru 30" with longitudinal movement to be Grinnell Figure 171, MSS SP-69 TYPE 41, pipe roll complete with Figure 160, MSS SP-69 TYPE 39A or 39B, pipe insulation protection saddle sized for proper pipe size and insulation thickness.

F. Insulated copper piping 1/2" O.D. thru 2-1/8" O.D. with longitudinal movement to be Grinnell Figure 171, MSS SP-69 TYPE 41, pipe roll complete with Figure 167, MSS SP-69 TYPE 40, galvanized steel insulation protection shield sized for maximum 10' span on 4 psi compressive strength insulation.

G. Support copper pipe risers by Grinnell Figure CT-121C, MSS SP-69 TYPE 8, plastic coated riser clamps at floor penetrations.

H. Support steel pipe risers by Grinnell Figure 261, MSS SP-69 TYPE 8, riser clamps at floor slab penetrations.

I. Support three or more parallel lines by trapeze hangers utilizing Unistrut channel or equal in bottom mounting arrangement with rod hanging support.

J. Adequately size hangers on insulated piping for insulation to pass continuously through hangers. Insulated piping to be supported outside insulation covering.

K. Provide concrete inserts, Grinnell Figure 282, MSS SP-69 TYPE 18, universal concrete insert, for attaching hangers to building structure. Inserts to be adequately sized and correctly positioned to support piping, valves, etc., when full of water and system is in operation.

L. Provide C-clamps with locknut, Grinnell Figure 86, MSS SP-69 TYPE 23, where piping is to be hung from steel beams. Welding hanger rods to steel members is not permitted. Provide malleable beam clamps, Grinnell Figure 218, MSS SP-69 TYPE 30, with extension piece, Grinnell Figure 157, where piping is hung from bar joist.

M. Attention is called to pipe spring isolation specified to be furnished by this Contractor.

N. Support all piping by heavy steel, adjustable hangers, or brackets suitably fastened to structural portion of building. Place hangers in accordance with following tables:

STEEL PIPE SUPPORTS	
SIZE (IN.)	DISTANCE BETWEEN SUPPORTS (FT.)
3/4 - 1-1/4	8
1-1/2 - 2-1/2	10
3	12
4 - 6	14
8 - 12	16
14 - 24	20

COPPER TUBING SUPPORTS	
SIZE (IN.)	DISTANCE BETWEEN SUPPORTS (FT.)
5/8	6
7/8 - 1-1/8	8
1-3/8 - 2-1/8	10
2-5/8 - 5-1/8	12
6-1/8 - 8-1/8	14

PVC AND CAST IRON SUPPORTS
Support each fitting, at intervals of not more than 5 feet, and at least at each joint.

O. Perforated metal, strap iron, or band iron hangers are not permitted. Offsets in hangers are not allowed. Pipe risers to be supported at regular intervals in pipe shafts within the limits of good practice.

P. See Insulation Section for requirements at pipe hangers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install piping not to interfere with opening of doors or other moving parts. Do not install piping near or directly over any portion of electrical equipment.

B. Provide chromium-plated escutcheon plates for exposed uninsulated pipes projecting through floors or walls in finished spaces. Mechanical rooms and janitor closets are not considered "finished" spaces.

C. Hang piping so equipment, flanges, and connections do not bear weight of piping.

D. Adequately support vertical lines at their bases or by a suitable hanger placed in horizontal line near riser or by a base fitting set on pedestal.

E. Pipes not to be hung or supported by pumps. No torque to be applied to pumps by connecting pipes. After final pipe adjustments and initial operation of the pumps, this Contractor to recheck alignment of pumps and realign as required.

F. Run piping in straight lines; riser lines to be plumb with such offsets only as indicated or necessary. No sagging of lines permitted.

G. Unless otherwise shown on drawings, lines to be installed to drain to sumps or sewer.

H. Ream pipe after cutting to full bore. Remove foreign matter from inside of pipe before installing. Keep installed piping free from dirt and scale and protect open ends from foreign matter. Use temporary plugs or other approved methods of open end closure.

I. Threads to be right-hand, pipe standard, clean cut, full depth, and tapered. Joints to be made tight without caulking. Approved pipe joint lubricant to be used, applied in thin layer to the male thread only.

J. Install copper fittings with suitable flux and 95/5 solder. Type K copper pipe to be joined by means of suitable flux and silver or phos-copper.

K. Piping to have sufficient number of flanges or unions for convenient installation and removal of piping and equipment.

L. Remake or replace defective, leaking, or otherwise unsatisfactory joints or material. Peening, caulking, or doping of piping is not permitted.

M. Install piping to prevent stresses and strains to piping and hangers from expansion or contraction. Provision for proper loops, offsets, or expansion joints to be responsibility of Contractor. Make provision for servicing and removal of equipment without dismantling piping.

3.2 FIRE-RATED PARTITIONS

A. Provide permanent firestop system at all piping penetrations of fire-rated walls and floors. Review details on drawing as well as this specification for permissible firestop systems. The firestop system shall have been tested and approved in accordance with ASTM E119 and U.L. 1479 (ASTM E814) and classified for up to 2 hours fire rating. Firestop system shall be type detailed on drawings or intumescent type capable of expanding up to 8 times its original volume. Firestop system to be 3M, Hilti, Nelson, Johns Manville, or Specified Technologies. Firestop system shall be installed in strict accordance with published U.L. approved installation instructions. Piping to pass through the fire-rated partition insulated or non-insulated as specified and detailed. Submit U.L. approved installation drawing for each type of penetration prior to construction.

3.3 NON-RATED PARTITIONS

A. Piping to pass through the walls insulated or non-insulated as specified. Wall should be finished to fit neatly around the piping. Firestopping is not required at non-rated partitions.

3.4 PIPE SLEEVES

A. Pipe sleeves shall be provided at non-rated partitions and floor penetrations. Pipe sleeves to be Schedule 40 or 18 gage steel. Sleeves to extend 1-1/2" in excess of partition depth on each side. Sleeves penetrating floors in wet areas, including all mechanical rooms, shall extend a minimum of 1 inch above the floor.

1. Piping requiring sleeves:

a. Chilled water

b. Copper pipes thru masonry walls

3.5 PIPING IN TRANSFORMER, ELECTRICAL, AND ELEVATOR EQUIPMENT ROOMS

A. Refer to drawings. No water piping permitted in transformer, electrical, or elevator equipment rooms.

3.6 VALVE ACCESS

A. Locate all shutoff and control valves for easy access and operation. Where valves must necessarily be located in enclosed spaces, they shall be provided with access panels of sufficient size for operation. Furnish these access panels to proper trades for installation.

3.7 AIR VENTING

A. Provide manual air vents at high points of vertical risers and at each water coil to eliminate air from HVAC water systems.

3.8 WATER DRAINING

A. Provide 3/4" hose end gate valves at low points and bottom of each riser to drain HVAC water systems.

3.9 CONTROL SYSTEM CONNECTORS

A. Weld 1" steel half coupling Crane No. 386 or equal, or provide 1" female pipe thread connection at points shown on drawings and at necessary points for installation of thermometers and automatic controls.

END OF SECTION

SECTION 23 21 20 - HYDRONIC SPECIALTIES

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Expansion tank.

B. Tangential air separator.

C. P.T. test plugs.

D. Pressure gauges.

E. Thermometer test wells.

F. Hydronic Pressure Reducing Valves.

G. Relief valves.

H. Flow measuring station.

I. Flow balancing valve.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Bell and Gossett ITT, Flow Design, Gerand, Mueller, Peterson Engineering, Taco, Thrush, John Wood Industrial Products, Weiss Instruments, Inc.

2.2 EQUIPMENT

A. Diaphragm Tank:

1. Tanks to be pre-charged, vertical, diaphragm type constructed of carbon steel in accordance with ASME Boiler and Pressure Vessel Code.

2. Tank to be constructed and ASME stamped for 125 psi working pressure at 240 degrees F.

3. Unit shall be stamped with ASME "U" symbol.

4. Diaphragm to be replaceable heavy-duty butyl rubber.

5. Tank to have system connection, drain connection, and charging valve connection.

6. Provide tanks with mounting saddles for horizontal installations and floor mounting base for vertical installations.

B. Tangential Air Separator:

1. Provide an external air separation unit consisting of a steel tank and collector tube.

2. Unit to have flanged tangential inlet and outlet connections.

3. Design internal perforated stainless air collector tube to direct released air into compression tank.

4. Construct unit in accordance with ASME Boiler and Pressure Vessel Code and stamp for 125 psig working pressure at 350 degrees F.

5. Unit shall be stamped with ASME "U" symbol.

6. Provide blowdown connection on bottom of unit to facilitate routine cleaning of unit.

7. Unit to prevent accumulation of air in hydraulic heating and/or cooling system and prevent noises caused by entrained air in piping.

8. Separator to be Bell & Gossett ITT Rolairtrol, or approved equal.

C. P.T. Test Plugs:

1. Provide 1/4 inch solid brass pressure/temperature test plugs at locations shown on drawings.

2. Nordel self-closing valve to be rated for 275 degrees F. service.

3. Plugs to be manufactured by Flow Design, Peterson Engineering, SISCO, or approved equal.

D. Pressure Gauges:

1. Provide 3-1/2 inch dial, liquid filled pressure gauges at locations shown on drawings.

2. Gauges to be equal to Trerice Model No. 800LFB with glycerin liquid fill, nylon, steel, or aluminum case, acrylic plastic window, brass movement, phosphor bronze bourdon tube, and brass socket.

3. Accuracy to be guaranteed within one percent in powerhouse and mechanical rooms.

4. Select scale range of gauges to indicate design pressure near midpoint of scale.

5. Provide each gauge with 1/4 inch size, brass construction needle valve equal to Trerice Model No. 735-2.

6. Provide each gauge with impulse dampener equal to Trerice Model No. 870.

E. Thermometer Wells:

1. Provide Trerice or equal stainless steel thermometer wells for water temperature sensors and at other locations shown on drawings.

2. Test wells to be stainless steel with 2-1/2 inch extension neck and screw plug cap with chain and shall be filled with light clear oil.

F. Hydronic System Pressure Reducing Valves:

1. Provide pressure reducing valves for each hydronic system as shown on drawings.

2. Each valve to be equipped with antisyphon check valve and removable strainer.

3. Valve body to be brass or bronze construction.

4. Select valve for operation at midpoint of adjustment range.

5. Factory set valve for design pressure and provide adjustable range for final system operating pressure adjustment at job site.

G. Relief Valves:

1. Provide relief valves for each hydronic system as shown on drawings.

2. Valve to be constructed to ASME code requirements, tested by National Board, and labeled with ASME symbol.

3. Valve body to be bronze construction.

4. Valves to be diaphragm type operating with slow opening and closing feature.

5. Valve to seat against face of EPDM rubber.

6. Set differential between opening and closing pressure to prevent water flash and water hammer.

7. Valve to include manual lever for testing valve.

H. Flow Measuring Station:

1. Venturi type with provisions for connecting a portable differential pressure meter for flow measurement.

2. Venturi to be provided with metal tag showing size, gpm, and required meter reading for specified gpm.

3. Sizes 1/2 inch thru 2 inch to be brass threads; 2-1/2 and above for butt welding.

4. Meter connections to have built-in check valves.

5. Venturi to be suitable for maximum working pressure of 125 psig at 250 degrees F.

6. Venturi to be Gerand Venturi, Flow Design Flowset Venturi, or approved equal.

I. Flow Balancing Valve:

1. Balancing/shut-off valve to be ball type with bronze/brass body, chromium plated bronze ball, Teflon seats, blowout proof stem with Teflon packing and nut, and full size quarter turn handle with grip and memory stop.

2. The flow measuring element shall be a low loss/high signal Venturi type of one to ten rangeability equipped with dual Schrader type pressure test ports and caps for connection to a portable differential pressure meter.

3. Meter connections to have built-in check valves.

4. Valves to provide for leak tight shutoff service at full rated working pressure.

5. Sizes 1/2" through 2" to be threaded ends with brass adapters; sizes 2-1/2" and larger to be flanged.

6. Valves and Venturis to be rated for 125 psig working pressure at 250 degrees F.

7. Combination flow measuring, balancing, and shutoff valves to be Bell & Gossett Circuit Setter Plus or approved equal Ball valve up to 3” or Globe valve 4” to 12” Venturi type.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install hydronic specialties in strict accordance with manufacturers' published installation instructions.

B. Provide 1/2" manual air vents at top of pipe risers and other locations where air can be trapped or collected.

C. Provide 3/4" hose end gate valve drains at bottom of pipe risers and other locations to drain water systems.

D. Pipe relief valve outlets from hydronic systems to nearest floor drain.

E. Support pump inlet and strainer fittings with floor mounted pipe and flange supports.

F. Locate thermometers and pressure gauges no higher than 7 feet above finished floor elevation.

END OF SECTION

SECTION 23 25 15 - WATER TREATMENT FOR CLOSED HYDRONIC SYSTEMS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Provide a complete water treatment system for the closed chilled water systems as specified herein. Systems to be manufactured by Mogul or approved equal. Provide water treatment system start-up and adjustment.

B. Provide one year supply of water treatment chemicals and systems pre-cleaning chemicals.

C. Submit complete water treatment systems for approval.

D. All chilled water piping and related equipment shall be thoroughly flushed out with pre-cleaning chemicals designed to remove deposition such as pipe dope, oils, loose rust, mill scale and other extraneous materials. Recommended dosages of pre-cleaner chemical products shall be furnished by water treatment supplier and added and circulated throughout the water systems. The water systems shall then be drained, refilled and flushed thoroughly until no foreign matter is observed and total alkalinity of the rinse water is equal to that of the make-up water.

PART 2 - PRODUCTS

2.1 CLOSED CHILLED WATER TREATMENT SYSTEMS

A. Provide a one-shot chemical feeder of 5-gallon capacity and minimum 125 PSI working pressure for each closed water system. Feeder to be complete with funnel with fill valve, and inlet, outlet and drain connections.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install and place complete water treatment systems in proper operating condition in accordance with drawings, specifications, and manufacturer's published installation instructions. Provide communication link between water treatment microprocessor and Building Automation System PC.

B. Water treatment equipment manufacturers' representative to supervise systems pre-cleaning, water treatment systems installation and start-up, and train owners' representatives a minimum of 8 hours concerning proper feeding and control techniques. Provide two copies of water treatment systems operating and maintenance manuals to Designer.

END OF SECTION

SECTION 23 29 23 - VARIABLE FREQUENCY MOTOR CONTROLLER

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Furnish complete variable frequency motor controllers (VSMC) as specified herein for the fans and pumps designated. All standard and optional features shall be included within the VSMC enclosure unless otherwise specified.

B. Provide VSMCs in accordance with this section. All VSMCs provided to be of same manufacturer.

1.3 QUALITY ASSURANCE

A. To ensure quality and minimize infantile failures at the job site, the VSMC shall be burned in at an ambient of 40 degrees Celsius minimum for at least 120 hours. The VSMC shall be operating a dynamometer and the load and speed shall be cycled during the test. All optional and special features shall be functionally tested at the factory for proper operation.

1.4 WARRANTY

A. The VSMC shall be warranted by the manufacturer for a period of 36 months from date of start-up. The warranty shall include parts, labor, travel costs, and living expenses incurred by the manufacturer to provide factory authorized on-site service.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. VSMC to be as manufactured by ABB, Danfoss-Graham, York/Toshiba, or approved equal.

B. The VSMC shall convert 3-phase, 60-Hz utility power to adjustable voltage and frequency, 3-phase, AC power for stepless motor speed control from 5% to 100% of the motor's Hz speed. Input voltage shall be as indicated on the equipment schedules on drawings.

C. Convertor Section: Full wave diode bridge rectifier.

D. Invertor Section: Transistorized sine coded pulse width modulated (PWM) type for stepless motor speed control.

E. Silicon-controlled rectifiers (SCRS) or GTOs shall not be used in the circuitry.

F. The VSMC maximum output current rating shall be 110 percent of the motor nameplate full load current.

G. The VSMC and options shall be tested to ANSI/UL Standard 508. The complete drive including all options shall be listed by a nationally recognized testing agency such as U.L. or ETL.

H. The VSMC and options shall comply with the applicable requirements of the latest standards of ANSI, IEEE, and the National Electrical Code. The VSMCs full load amp rating shall meet or exceed NEC Table 430-150.

I. Power line noise shall be limited to a voltage distortion of 3 percent and line notch depth of 10 percent or 16,400 volt microseconds whichever is less as defined in IEEE Standard 519, Guide for Harmonic Control and Reactive Compensation of Static Power Converters. Provide line reactors sized to limit line notching to 10 percent or 16,400 volt microseconds whichever is less.

J. The VSMC shall not emit either conducted or radiated RFI in excess of the limitations set forth in the FCC Rules and Regulations, Part 15, Subpart J, for class A computing devices. The VFD shall have an FCC compliance label. Provide RFI filters if required.

K. The increase in audible motor noise with the VSMC operating shall not exceed 3 decibels.

2.2 BASIC FEATURES

A. The VSMC shall include the following basic features:

1. The VSMC shall be housed in a NEMA 1 enclosure for indoor installations and a NEMA 3R enclosure for outdoor installations.

2. The following operator controls shall be located on the front of the enclosure:

   a. Hand/Off/Auto selector switch to start and stop the motor. In the auto position, the drive will start/stop from a remote contact closure.

   b. Auto/Manual selector switch. In the auto position, motor speed is determined by the follower signal. In the manual position, motor speed is determined by the manual speed potentiometer.

   c. Manual speed potentiometer.

   d. Power on pilot light to indicate that the AFC is being supplied by the power line.

   e. Fault pilot light to indicate that the AFC has tripped on a fault condition.

   f. Digital meter to indicate percent speed and percent load.

3. Two sets of form C, dry contacts to indicate when the VSMC is in the run mode.

4. One set of form C, dry contacts to indicate when the VSMC is in the fault mode.

5. When input power returns to normal following a fault trip for under-voltage, over-voltage, or phase loss, the VSMC shall automatically restart. The VSMC shall not automatically restart following fault trips due to overload or over-current.

6. The VSMC shall include a door interlocked, padlockable, input power disconnect switch.

7. Speed Control: The output frequency may be adjusted in proportion to any one of the following:

   a. 0-10 VDC Analog Signal.

   b. 0-5 VDC Analog Signal.

   c. 4-20 MA DC Analog Signal.

   d. 3-15 psig Pneumatic Signal.

8. Coordinate with controls supplier for exact input signal and type to provide proper input follower (i.e., grounded or floating).

9. Provide open protocol BACnet MS-TP, LONtalk, Johnson N2, etc. interface card to connect to Building Automation System. Coordinate with controls system provider for preferred interface language.

2.3 PROTECTIVE FEATURES

A. The VSMC shall include the following protective features:

1. Current limiting semiconductor fuses for the power input.

2. Separate overload relay for each motor controlled.

3. Protection against input power under-voltage, over-voltage, and phase loss.

4. Protection against output current overload and over-current.

5. Protection against over-temperature within the VSMC enclosure.

6. Protection against over-voltage on the DC bus.

7. In the event of a power loss, shutdown without component failure. Upon return of power, automatically return drive to normal operation, if the start is in the "ON" condition, being able to restart into a rotating motor regaining positive speed control without shutdown or component failure.

8. In the event of a phase-to-phase short circuit, shutdown safely without component failure.

9. In the event that an input or output power contactor is opened or closed while the drive is activated, no damage to the VSMC shall result.

10. Any disconnect switches between the VSMC and the motor shall include an auxiliary contact interlocked to the VSMC fault trip circuit. In the event that a disconnect switch is opened while the drive is running, the drive shall shut down.

11. DC bus discharge circuit for protection of service personnel.

12. Insensitive to incoming power phase sequence.

2.4 ADJUSTMENTS

A. The VSMC shall include the following adjustments available via potentiometers inside the enclosure:

1. Maximum speed, adjustable 50-100% base speed.

2. Minimum speed, adjustable 0-50% base speed.

3. Acceleration time, adjustable 2-60 seconds.

4. Deceleration time, adjustable 2-60 seconds with override circuit to prevent nuisance trips if deceleration time is set too short.

5. Current limit, adjustable 0-110%.

2.5 SERVICE CONDITIONS

A. The VSMC shall be designed to operate within the following service conditions:

1. Ambient temperature, 0-40 degrees C.

2. 0-95% relative humidity, non-condensing.

3. Elevation to 3300 feet without derating.

4. AC line voltage variation, -5% to 10% of nominal.

2.6 SPECIAL FEATURES

A. The following special features shall be included in the VSMC enclosure. The unit shall maintain its U.L. or ETL listing.

1. A motor starter shall be included in the bypass circuitry for constant speed motor control when the VSMC is taken out of service. Manual bypass shall provide all the circuitry necessary to transfer the motor from the VSMC to the power line, or from the line to the controller while the motor is at zero speed. The bypass circuitry shall be mounted in a separate section of the VSMC enclosure. Two motor contactors, electrically interlocked, shall be utilized. One contactor is to be between the controller and the motor. The other contactor is to be between the bypass power line and the motor providing across-the-line starting for motors 50 hp and less, and part-winding or “soft start” starting for motors greater that 50 hp. Motor overload protection is to be provided in both the controller mode and the bypass mode. The bypass section door shall include a "drive/line" switch, "on/off-reset" switch, and a "load transferred to line" pilot light.

2. The VSMC shall include a main fused disconnect switch or circuit breaker to provide a means of disconnecting all power to both the bypass circuitry and the controller. The disconnect switch or circuit breaker shall be door interlocked and padlockable. The fuses or circuit breaker shall be sized to provide short circuit protection for the motor when in the bypass mode per the NEC.

3. A second disconnect switch, circuit breaker, or contactors shall be provided to disconnect input power to the controller but not the bypass circuitry. This disconnect will allow troubleshooting and testing of the VSMC, both energized and de-energized while operating in the bypass mode.

4. Plug-in test meter shall provide a quick means for monitoring the different signals within the VSMC for start-up and troubleshooting. Where the meter is capable of operating with different horsepower VSMCs, only one meter needs to be supplied.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The manufacturer of the VSMC equipment shall provide a competent, factory trained service technician to supervise the installation, start-up and testing of the VSMC.

B. Install VSMCs in locations shown on the drawings in strict accordance with the manufacturer's published installation instructions.

C. Contractor shall provide such materials and assistance as required by the manufacturer's representative.

D. Division 26 shall provide necessary electrical connections.

E. Contractor shall provide coordination of the necessary controls not provided by the VSMC manufacturer.

3.2 START-UP, TESTING, DEMONSTRATION

A. The manufacturer's factory-trained service technician, assisted by contractor, shall verify correct installation, start-up equipment, and test it as a unit and a part of the system it serves. Verify by adjustments, tests, etc., that the equipment is functioning as specified. Provide three copies of test data to the Owner. As a minimum, check the following items:

1. Motor voltage and frequency.

2. Control input and automatic start/stop.

3. Calibration and adjustment for minimum and maximum speed setpoints and acceleration and deceleration rates.

4. Wire terminations.

B. VSMC manufacturer shall provide a minimum of 4 hours instruction to Owner to demonstrate the operation of the system. Provide three copies of operation and maintenance manual to Owner at completion of instructions.

END OF SECTION

SECTION 23 31 10 - SHEET METAL DUCTWORK - LOW PRESSURE

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Low pressure ductwork refers to systems operating at 2.00" w.g. total static pressure with velocities up to 2000 FPM. It is the intent of this specification to provide an installed duct system which will supply the air quantities indicated by the plans and have the lowest possible friction loss with the least possible leakage loss. Friction loss for each system shall not exceed that which is indicated in the A.C. unit schedule as external static pressure or in the fan schedule as static pressure and shall include the losses of all accessories. Friction losses shall be minimized by reduction in the number of offsets and elbows by pre-planning the duct system installation and coordination with other trades to prevent interferences. Access to all accessories requiring maintenance, service and inspection shall be maintained. Radius elbows are preferred for all turns to minimize friction, noise and vibration; and, especially, for sections having large volume or higher velocities and sections which may have turbulences.

B. The contractor shall provide and/or construct all materials, ductwork, joints, transitions, splitters, dampers, access doors, etc., as set forth in these specifications necessary to install the Low Pressure Sheet Metal Ductwork required by the Mechanical Drawings.

C. Low pressure ductwork shall be constructed to meet the following pressure class:

1. Supply ductwork downstream of terminal units: 1.0" pressure class.

2. Supply and return duct connections to fan coil units or single zone air systems (ESP ≤1.0"): 1.0" pressure class.

3. Supply and return duct connections to fan coil units or single zone air systems (ESP >1.0", ≤2.0"): 2.0" pressure class.

4. Exhaust and return ductwork (Fan ESP ≤2.0"): 2.0" pressure class.

1.3 QUALITY CONTROL AND REGULATORY STANDARDS

A. SMACNA Manual: Sheet Metal Tradesman is to have access on the construction site to the Latest Edition of SMACNA "HVAC Duct Construction Standards", (Metal and Flexible). The Manual is referred to in specifications for required construction methods and details. Contractor shall comply with provisions of the SMACNA Manual and more stringent requirements of this specification.

B. Quality control involves not only the general performance requirements for all air ducts, but also quality workmanship which includes layout preplanning so that offsets, rises, falls, elbows, fittings, etc., are minimized or eliminated. General performance requirements for all ducts include:

1. Dimensional stability (shape deformation and strength).

2. Containment of the air being conveyed (leakage control).

3. Vibration (fatigue and appearance).

4. Noise (generation, transmission or attenuation).

5. Exposure (to damage, weather, temperature extremes, flexure cycles, wind, corrosive atmospheres, biological contamination, flow interruption or reversal, underground or other encasement conditions, combustion, or other in-service conditions).

6. Support (alignment and position retention).

7. Thermal conductivity (heat gain or loss and condensation control).

C. Provide galvanized duct materials which meet applicable requirements of SMACNA manual and local and state codes, whichever is the most stringent.

D. Support ductwork in accordance with applicable requirements of SMACNA manual, local and state codes, and details on plans, whichever is the most stringent.

E. Emboss fittings with material gauge, manufacturer, and type material.

F. Ductwork shall be installed to comply with the roof ceiling assembly for this project shown on Architectural Drawings, in accordance with the UL Fire Resistance Index Catalog.

G. Materials used as sealers, liners, pre-insulated jackets and flexible ducts shall comply with a flame spread rating of 25 or less and a smoke developed rating of not over 50.

H. Joint sealer shall meet the requirements of UL181A or UL181B as applicable.

I. Duct sealant classification: Seal all transverse joints, longitudinal joints and duct wall penetrations in accordance with SMACNA Class A.

1.4 SUBMITTALS AND SHOP DRAWINGS

A. Submit material/product data to designer for approval ONLY when it deviates from products specified in Part 2 herein.

B. Shop Drawings: Contractor to submit to owner for approval complete sheet metal shop drawings of all ductwork, including equipment rooms, shafts, and especially congested areas and areas with possible conflicts. No installation shall proceed without owner stamped approval of shop drawings. Submittal to reflect space requirements coordinated with other trades such as Electrical, Plumbing, Mechanical and Structural. Prior to submission to owner, shop drawings to have stamped approval of all major trades which occupy ceiling space (HVAC, plumbing, piping, sprinkler, and electrical), to substantiate adequate coordination as to space, accessibility and to ensure no conflict exists between contractors.

C. The General Contractor shall be responsible for coordination between trades and shall stamp and sign the duct drawings to substantiate that the coordination has been accomplished. Non-critical piping and conduit shall give way to ducts.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Sheet Metal, Angles, Bar Slips, Hangers, and Straps: Galvanized steel.

B. Screws: Cadmium plated.

C. Joint Sealer: Manufactured by Hardcast, Inc., Two-Stage Sealant Process.

1. Stage 1: Apply fiber DT tape.

2. Stage 2: Brush on RTA-50 sealant over fiber tape.

2.2 FABRICATION

A. Provide a rectangular or round duct where required on drawings of prime quality galvanized steel sheets, thickness and reinforcement as required by the following schedule, SMACNA, or local and state codes, whichever is more stringent. When fabricating low pressure ductwork, largest duct dimension governs the entire duct and complete joint.

DUCTWORK GAUGE AND REINFORCEMENT SCHEDULE				
MAXIMUM DUCT DIMENSION (IN.)	DUCT GAUGE	SLIP GAUGE	STANDINGS	REINFORCEMENT
Up thru 18	24	24	- -	- -
19 - 30	24	24	1 x 24 ga.	No
31 - 42	22	22	1 x 24 ga.	No
43 - 54	22	22	1-1/2 x 20 ga.	1-3/8 x 1/8 Band Iron
55 - 60	20	20	1-1/2 x 20 ga.	1-3/8 x 1/8 Band Iron
61 - 84	20	20	1-1/2 x 18 ga.	1-1/2 x 1-1/2 x 1/8 Angle
85 - 96	18	20	1-1/2 x 18 ga.	1-1/2 x 1-1/2 x 3/16 Angle
Over 96	18	20	2 x 18 ga.	2 x 2 x 1/4 Angle

B. Duct dimensions shown on drawings indicate inside clear dimensions. Make allowances in sheet metal size for duct requiring internal duct liner to provide "inside clear" dimensions.

C. In addition to the requirements above, add supplemental bracing as necessary to prevent sagging, drumming, and vibration.

D. Round prefabricated 26 gauge slip joint duct may be used on exhaust and return duct 12" and smaller and for runout duct to boxes, diffusers, registers, and grilles.

1. Secure duct sections and fittings with sheet metal screws.

2. Make connections of round duct to rectangular duct using "spin-in" collars with manual volume damper.

3. Transverse and longitudinal slip joints shall be sealed with approved sealer.

E. Provide transverse joints of "s" and drive construction at least every eight feet on duct whose larger side is less than 18". Seal all transverse joints with joint sealant material.

F. Provide transverse joints, or equivalent supplemental angle reinforcing on 4 foot centers on duct whose larger side is greater than 18". At the contractor's option, duct mate or equal joint system may be substituted for "s" and drive construction. Seal all transverse joints with joint sealant material.

G. Longitudinal seams shall be Pittsburg Lock or grooved seams closed tightly and evenly. Button punch snap lock longitudinal seam construction shall not be allowed. Seal longitudinal joints which prove to leak with joint sealant material.

H. Cross break ductwork over 10" dimension, either side.

I. Do not exceed 20 degree angle of slope for increase-in-area transitions.

J. Do not exceed 20 degree angle of slope for decrease-in-area transitions.

K. Do not exceed 30 degrees on the entering side or 45 degrees on the leaving side for angle of transitions at connections to equipment without the use of approved vanes. 20 degree angle is preferred and should be used space permitting.

L. Provide Ells fabricated to one of the following specifications in order of preference (SMACNA Figures 4-2 through 4-4 and Figure 4-9 and Chart 4-1):

1. Unvaned elbow with the throat radius equal to 3/4 of the width of the duct and with a full heel radius.

2. Six inch throat radius with full radius, single thickness vanes and full heel radius. Maximum unsupported length of vanes shall be 36". Vanes shall be securely fastened to runners. All vanes shall be secure and stable in installed operating position. Construct vane edges to project tangents parallel to duct sides.

3. Square elbows with single thickness turning vanes. Maximum unsupported length of vanes shall be 36". Vanes shall be securely fastened to runners. All vanes shall be secure and stable in installed operating position. Construct vane edges to project tangents parallel to duct sides.

4. Radius elbows are the preferred fitting. Square elbows are to be used only when available space prevents the use of radius elbows.

M. Provide offsets as necessary in accordance with SMACNA Figure 4-7.

N. Make branch connections and tees in one of the following manners:

1. Converging radius elbow with MVD. (SMACNA Figure 4-5).

2. 45-degree entry with MVD. (SMACNA Figure 4-6).

3. Round spin-in fitting with MVD.

O. Space duct joints to avoid cutting them for branch take offs and outlet collars.

2.3 INTERNAL DUCT LINER

A. Liner: 1" thick (unless otherwise indicated on drawings), UL listed, neoprene coated, mat faced, flexible fiberglass of one pound per cubic foot density.

B. Provide liner that complies with UL 181 Erosion Test and has a flame spread rating of 25 or less and a smoke developed rating of 50 or less.

C. Adhere liner to the duct with a continuous coating of approved adhesive and with adhesive clips or welded studs on 16" centers.

D. Provide coating of CP30 low odor on air entering side and seal other joints with metal or fiberglass cloth so that liner will be smooth to air flow.

E. Interrupt liner 18" upstream and 30" downstream at each duct mounted electric heater. Apply 1" thick rigid board type duct insulation externally on this section of duct, overlapping lined sections at least 6".

PART 3 - EXECUTION

3.1 INSTALLATION, APPLICATION, ERECTION

A. Support ductwork on each side of the duct with suitable sheared strips of galvanized metal or 1" x 1/8" galvanized steel band iron hangers.

B. Attach hangers to the ductwork using sheet metal screws.

C. Secure hangers to concrete structure with approved anchor shields and to steel structure by means of C-clamps.

D. Space hangers approximately eight feet along the duct except as noted below.

E. For ducts 60" and larger and heavy sections, such as welded duct and sound absorbers, space hangers at approximately four foot intervals.

F. Obstructions shall not be located within ducts.

G. Do not exceed 45 degrees for easement transition angle.

H. Seal all transverse joints with approved sealer in accordance with manufacturers' directions. Also, seal longitudinal joints which prove to leak.

I. Insulation: Where drawings and insulating specifications indicate that ducts are to be insulated make provisions for neat insulation finish around damper operating quadrants, splitter adjusting clamps, access doors, and similar operating devices. Metal collar equivalent in depth to insulation thickness and of suitable size to which insulation may be finished to be mounted on duct.

J. Counterflashing: Counterflash all ducts where they pierce the roof.

K. Pitot Ports: Pitot ports for measuring airflow to be located in each main duct at the downstream end of the straightest run of the main and before the first branch take-off. Pitot ports to be formed by drilling 7/16" holes in the duct, lined up perpendicular to airflow on maximum 8" centers and at least three to a duct, evenly spaced. Holes to be plugged with plastic plugs. Provide access to these for future rebalancing.

3.2 CLEANING

A. Clean ductwork thoroughly to assure all foreign matter, dirt, etc. is removed.

END OF SECTION

SECTION 23 31 11 SHEET METAL DUCTWORK - MEDIUM PRESSURE

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. The contractor shall provide and/or construct all materials, ductwork, joints, transformations, fittings, access doors, etc., as set forth in these specifications necessary to install the medium pressure sheet metal ductwork required by the drawings.

B. Medium pressure - sheet metal ductwork with air velocity greater than 2000 feet per minute and static pressure 6" or less, but greater than 2".

C. It is the intent of this specification to provide an installed duct system which will supply the air quantities indicated by the plans and have the lowest possible friction loss with the least possible leakage loss. Leakage shall not exceed one percent of the respective system capacity. Friction loss for each system shall not exceed that which is indicated in the A.C. unit schedule as external static pressure or in the fan schedule as static pressure and shall include the losses of all accessories. Friction losses shall be minimized by reduction in the number of offsets and elbows by pre-planning the duct system installation and coordination with other trades to prevent interferences. Access to all accessories requiring maintenance, service, and inspection shall be maintained. Radius elbows are preferred for all turns to minimize friction, noise and vibration; and, especially, for sections having large volume or higher velocities, and sections which may have turbulences.

D. Medium pressure ductwork is required from the outlet of AHU to each variable volume terminal box and shall be constructed to meet a 4.0" pressure class minimum or higher as required to meet air handling unit design external static pressure.

1.3 QUALITY CONTROL AND REGULATORY STANDARDS

A. SMACNA Manual: Sheet metal tradesman to have access, on the construction site, to "HVAC Duct Construction Standards, Metal and Flexible, Second Edition, 1995". The Manual is referred to in the specifications for required construction methods and details. The Contractor shall comply with applicable provisions of the SMACNA Manual and the more stringent requirements of this specification.

B. Quality control involves not only the general performance requirements for all air ducts; but also, quality workmanship, which includes layout preplanning so that offsets, rises, falls, elbows, fittings, etc., are minimized or eliminated. General performance requirements for all ducts include:

1. Dimensional stability (shape deformation and strength).

2. Containment of the air being conveyed (leakage control). (See Part 3 of this specification for leakage testing.)

3. Vibration (fatigue and appearance).

4. Noise (generation, transmission or attenuation).

5. Exposure (to damage, weather, temperature extremes, flexure cycles, wind, corrosive atmospheres, biological contamination, flow interruption or reversal, underground or other encasement conditions, combustion, or other in-service conditions).

6. Support (alignment and position retention).

7. Thermal conductivity (heat gain or loss and condensation control).

C. Provide galvanized duct materials which meet requirements of SMACNA manual and local and state codes, whichever is the most stringent.

D. Support duct in accordance with SMACNA manual, local and state codes, and details on plans, whichever is the most stringent.

E. Emboss fittings and duct sections with material gauge, manufacturer, and type material.

F. Materials used as sealers, liners, pre-insulated jackets and flexible ducts shall comply with a flame spread rating of 25 or less and a smoke developed rating of 50 or less.

G. Joint sealer shall meet the requirements of UL181A or UL181B as applicable.

H. Duct sealant classification: Seal all transverse joints, longitudinal joints and duct wall penetrations in accordance with SMACNA Class A.

1.4 SUBMITTALS AND SHOP DRAWINGS

A. Submit material/product data to owner for approval.

B. Shop Drawings: The Contractor is to submit to Owner for approval complete sheet metal shop drawings of all ductwork, including equipment rooms, shafts, and especially, congested areas and areas with possible conflicts. No installation shall proceed without owner stamped approval of shop drawings. Submittal to reflect space requirements coordinated with other trades such as Electrical, Plumbing, Mechanical, and Structural. Prior to submission to Owner, shop drawings to have stamped approval of major trades which occupy ceiling space (HVAC, plumbing, piping, sprinkler, and electrical), to substantiate adequate coordination as to space and accessibility and to ensure no conflict exists between contractors.

C. The General Contractor shall be responsible for coordination between trades and shall stamp and sign the duct drawings to substantiate that the coordination has been accomplished. Noncritical piping, low pressure ducts, and conduit shall give way to medium pressure ducts.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Sheet Metal, Angles, Bar Slips, Hangers and Straps: Galvanized steel.

B. Screws: Cadmium plated.

C. Joint Sealer: Manufactured by Hardcast, Inc., Two-Stage Sealant Process.

1. Stage 1: Apply fiber DT tape.

2. Stage 2: Brush on RTA-50 sealant over fiber tape.

2.2 GENERAL FABRICATION REQUIREMENTS

A. Medium-pressure duct and fittings to be manufactured by a company who has had as its principal business the manufacture of spiral duct and welded fittings for at least five years.

B. Medium-pressure fittings to be manufactured by same manufacturer of ductwork to assure tight fit of all ductwork and components.

C. Supplier of medium-pressure ductwork to provide to Designer certified copies of test data made by independent United States laboratory covering all duct and fittings as manufactured by supplier.

D. Duct test data to cover leakage rate, bursting strength, collapsing strength, seam strength, and friction loss. Friction loss test data to cover both duct and assembled coupling joints. Fitting test data to cover friction loss tests of all fittings shown on drawings.

E. Installation manuals to be included by the Contractor with submittals. Manuals to provide detailed instructions on assembly, joint sealing, erection, reinforcement of flat-oval duct, and system pressure testing for leaks.

2.3 SPECIFIC FABRICATION REQUIREMENTS

A. Round Duct and Fittings:

1. Round duct to be manufactured using galvanized steel meeting ASTM A-525. Construction shall be in accordance with SMACNA manual and manufacturer's standards.

2. Round duct is to have appropriate seams made to eliminate leakage based on pressures for which the system has been designed. Longitudinal seam duct to have fusion welded butt seam.

3. Fittings and couplings shall have the minimum gauges specified by SMACNA Manual. Fittings to have continuous welds along all seams.

4. Divided flow fittings (90 degree and 45 degree branches, wyes, crosses, etc.) to be manufactured as a separate fitting, not as a tap collar or saddle tap welded into spiral duct sections. Entrances to be free of weld buildup, burrs, or irregularities.

5. Elbows in diameters 3" thru 8" to be stamped elbows. Other elbows to be gored construction with all seams continuously welded. Elbows to be fabricated to center line radius of 1.5 times the cross-sectional diameter. Two-piece mitered elbows shall not be used unless specifically shown on plans.

6. Spun bellmouth connections to be used at each round take-off from medium pressure plenum.

7. Galvanized areas damaged by welding to be coated with corrosion resistant aluminum paint.

2.4 COUPLINGS FOR ROUND MEDIUM-PRESSURE DUCT

A. Diameters up to 60":

1. Duct-to-Duct joints to be sleeve couplings, reinforced by rolled beads.

2. Duct-to-fitting joints to be slip-fit of projecting collar fitting into duct.

3. Insertion length of sleeve coupling and fitting collar to be 2" minimum.

B. Diameters 61" and up:

1. Duct-to-Duct and duct-to-fitting connections to be made by angle ring flanges. Flange on pipe to be a 2" x 2" x 3/16" angle attached to duct with continuous weld.

2. Fittings to have loose ring "Van Stone" flange.

3. Provide 5/8" flange to act as gasketing surface for sealing with the angle ring. Angle ring to be rolled, welded ring 2" x 2" x 3/16".

4. Bolt hole spacing for angle rings to be on 6" centers.

5. If longitudinal seam duct greater than 60" diameter is supplied in lengths greater than 5', one angle ring must be welded to duct on 5' centers. Welding can be an intermittent weld of 1" in 12".

C. Flat-Oval Duct and Fittings:

1. Provide flat-oval duct and fittings where indicated on drawings by symbol accompanying minor and major axis dimensions.

2. Provide spiral-seam, flat-oval duct manufactured from galvanized steel in the following U.S. Standard gauges:

FLAT OVAL DUCT CONSTRUCTION, SPIRAL SEAM	
MAXIMUM WIDTH (IN.)	**GAUGE**
0 - 24	24
25 - 48	22
49 - 70	20
70 and up	18

3. Provide reinforcement and bracing in accordance with SMACNA manual and published details of spiral flat-oval duct manufacturer for size and pressure conditions applicable.

4. Matching flat-oval fittings to be manufactured from galvanized steel with continuous weld seams in the following U.S. Standard gauges:

FLAT OVAL FITTING CONSTRUCTION	
MAXIMUM WIDTH (IN.)	**GAUGE**
0 - 36	20
37 - 60	18
61 and up	16

5. Construct flat-oval duct for sizes not available in spiral construction to the following minimum gauges:

FLAT OVAL DUCT CONSTRUCTION, LONGITUDINAL SEAM	
MAXIMUM WIDTH (IN.)	**GAUGE**
0 - 36	20
37 - 60	18
61 and up	16

6. Flat-oval duct not of spiral construction to be adequately braced on 4' centers by reinforced couplings or angle ring flanges to limit amplitude of wall vibration to plus or minus 0.008" and maximum wall deflection to 0.52" at 6" static pressure. Provide angle flanges when maximum width exceeds 41" or when maximum height exceeds 26".

7. Spun bellmouth connection shall be used at each flat oval duct connection to medium pressure plenum.

D. Rectangular Ductwork:

1. Reinforce rectangular duct with angles, i.e., no internal tie rods will be allowed for reinforcing. Joints to be double "S" slip up to 60" in width and companion angle flanged joint above 60" in width. Sheet metal gauges for medium pressure duct shall be as required by SMACNA manual.

2. Fabricate elbows using one of the following methods:

   a. Six inch throat radius with full radius, single thickness vanes and full heel radius. Maximum unsupported length of vanes shall be 36". Vanes shall be secure and stable in installed operating position. Construct vane edges to project tangents parallel to duct sides.

   b. Unvaned elbow with the throat radius equal to 3/4 of the width of the duct and a full heel radius.

   c. Square elbows with H-E-P: High Efficiency Profile turning vanes as manufactured by Aero/Dyne Company. Turning vanes shall be double thickness airfoil design with smoothly-rounded entry nose and extended trailing edge. Turning vane assemblies shall be fabricated with side rails and installed on design centers across the full diagonal dimension of the elbow. Vanes are to be installed in strict accordance with manufacturers' recommendations.

   d. Radius elbows are the preferred fitting. Square elbows are to be used only when available space prevents the use of radius elbows.

3. Contractor may request round or oval duct be substituted for any rectangular duct shown. Size substitutions to be based on equivalent airflow resistance.

E. Internally Insulated Double Wall Duct and Fittings:

1. Construction to be comprised of airtight outer pressure shell, 1" insulation layer, and perforated metal inner liner completely covering insulation.

2. Provide outer pressure shell manufactured from galvanized steel meeting ASTM A-525. Duct and fitting construction to be as specified for single wall round and flat oval duct.

3. Provide inner liner manufactured from galvanized steel meeting ASTM A-525 in the following minimum gauges:

	Diameter or Minor Axis, Inches		
	0”-34	35”-59	60+
Duct, Perforated Inner Liner	28	26	22
Fitting, Perforated Inner Liner	22	22	22

4. Perforations not to exceed 3/32" diameters. Percentage of open area to equal 13 percent.

5. Support inner liners of both duct and fittings with metal spacers welded in position to maintain spacing and concentricity.

6. Provide inner couplings to align inner lining to maintain airflow conditions equivalent to standard single wall medium-pressure duct joints. Butt joints are not acceptable for inner liner. Accomplish alignment by extending liner of fitting for slip joint into duct or by use of double, concentric coupling with two couplings held by spacers for rigidity and wall spacing. Provide insulation end fitting where internally insulated duct connects to uninsulated duct or fitting, fire damper, or flex to bring outer pressure shell down to nominal size.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Support round ducts from building structure with galvanized steel hangers as recommended in SMACNA manual. Secure hangers to masonry portion of building by means of inserts or other acceptable anchors. Secure hangers to steel structure members by means of C-clamps. Vertical risers and other duct runs where methods of support specified above are not applicable, to be supported by angle brackets as shown in SMACNA manual.

B. Support rectangular and flat oval ducts by 1" x 1/8" galvanized band iron or 3/8" galvanized rod hangers attached to reinforcing angles and spaced same as reinforcing angles. Secure hangers to concrete beam or slab by inserts, anchor shield and bolt, toggle bolt, or expansion bolt.

C. Attach hangers to ductwork using sheet metal screws.

D. Space hangers approximately 8' along the duct for ducts under 60". For ducts 60" and larger and heavier sections, such as welded duct, space hangers at approximately 4' intervals.

E. Hangers and bracing used with ductwork to be galvanized.

F. Obstructions shall not be located within ducts.

G. Provide smooth insulation finish around dampers, access doors, and similar operating devices. Provide metal collar equivalent in depth to insulation thickness.

H. Provide pitot ports for measuring airflows in each main supply duct downstream of straightest run of main and before first branch takeoff. Form pitot ports by drilling 7/16" holes in the duct, lined up perpendicular to airflow on maximum of 8" centers. Provide minimum of 3 per duct evenly spaced. Plug holes with plastic plugs. Provide access to pitot ports for future re-balancing.

I. Seal duct joints as follows:

1. Apply sealer to male end of couplings and fittings. After joint is slipped together, place sheet metal screws 3" on center, 1/2" from joint bead. Apply sealer to the outside of the joint extending 1" on each side of the joint bead and covering screw heads. Apply tape immediately over wet sealer.

2. Duct sealer to be specifically formulated for the sealing of high-pressure duct systems. Sealer to be compatible with tape to ensure cure and bond. Submit samples of sealer and tape along with specifications of each for approval. Flame spread rating of sealer to be less than 25, smoke development rating of sealer to be less than 50. Sealer to be mineral impregnated woven fiber tape and plastic type activator/adhesive as manufactured by Hardcast Inc., or approved equal. Apply joint material in strict accordance with manufacturers' published installation instructions.

3. Flanged joints to be sealed with neoprene rubber gaskets.

3.2 LEAKAGE TESTING OF INSTALLED SYSTEMS

A. Test medium pressure ductwork as follows:

1. Follow procedure published by United Sheet Metal Division of United McGill Corporation entitled "System Pressure Testing for Leaks" using prescribed test kit containing test blower, two U-tube manometer, and calibrated orifice tube.

2. Installed medium-pressure duct system to be pressurized to 6" w.g. maximum. Air leakage at test pressure to be measured by a calibrated orifice type flow meter. Total allowable leakage of system shall not exceed 1/2 of 1% of system air handling capacity. If system is tested in sections, leakage rates to be added to give performance of whole system.

3. Leakage concentrated at one point may result in objectionable noise even if system passes leakage rate criteria; correct to satisfaction of Designer.

4. Orifice flow measurement device to be individually calibrated against a primary standard and calibrated curve permanently attached to orifice tube assembly.

END OF SECTION

SECTION 23 33 10 - SHEET METAL SPECIALTIES

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Specialties to be submitted and approved before starting installation.

B. Items to be installed approximately as shown on drawings taking into account differences in mechanical equipment submitted and that shown on contract documents. Each item to be installed so that it is readily accessible for maintenance, repair, and/or setting and balancing.

C. Diffusers, registers, and grilles to have ratings certified by Air Diffusion Council and tested per ADC Equipment Test Code 1062R2 and ASHRAE Standard 36B-63.

D. Refer to drawings for diffuser, register, and grille sizes and number of airflow directions.

PART 2 - PRODUCTS

2.1 FIRE DAMPERS

A. Fire dampers to be U.L. listed in accordance with UL-555. Fire dampers to be held in an open position with a 165 degree F fusible link and arranged to lock in position on closure.

B. Fire dampers for rectangular duct to be type "B" (Blades out of air stream) and for round duct to be Type "C" (Blades and frame out of air stream). Fire dampers located behind sidewall registers and grilles and others specifically indicated on drawings to be Type "A" (Frame and Blades in air stream). Fire dampers to be multi-leaf type with spring closing for horizontal mounting and weighted-gravity closing for vertical mounting. Dampers to be steel construction with rust resistant finish and provided with a factory-installed mounting sleeve suitable for structure. Mount per manufacturer's published U.L. approved installation instructions. Manufacturer models which provide square to round or round oval transitions are acceptable.

C. See Architectural drawings for hour-rating of walls and/or floors. Dampers to be compatible with hour ratings.

D. Fire dampers to be Ruskin Model IBD2 Curtain Type Static Fire Dampers.

2.2 SMOKE DAMPERS

A. Smoke dampers to be U.L. listed in accordance with UL-555S as Minimum Leakage Category II and Elevated Temperature Category B (350 degrees F).

B. Dampers to be steel construction with rust resistant finish and provided with factory installed mounting sleeve suitable for structure. Mount damper per manufacturer's published U.L. approved installation instructions.

C. Smoke detectors to be furnished by Division 26; coordinate wiring hook-ups. Damper operator to be electric type compatible with electrical characteristics used for smoke detection and/or fire alarm system.

D. Dampers to be Ruskin Model SD60 with crimped type blades for low-pressure duct systems and Ruskin Model SD60 with airfoil blades for medium- and high-pressure duct systems.

2.3 CEILING FIRE DAMPERS

A. Each ceiling fire damper to be UL 555c classified radiation damper and include 165 degree F fusible link.

B. For rated lay in ceilings, provide the following:

1. Ceiling fire dampers for duct to be Ruskin Model CFD-2, 3, or 4, or equivalent model by Greenheck, United Enertech, or approved equal.

2. Ceiling fire dampers for ceiling registers to be Ruskin Model CFD-2, 3, 4, 5 or 8 or equivalent model by Greenheck, United Enertech, or approved equal.

3. Ceiling fire dampers for diffusers in lay-in ceilings to be Ruskin Model CFD or equivalent model by Greenheck, United Enertech, or approved equal, with thermal insulation blanket and extended frame for flex duct connection.

C. For wood frame construction, provide the following:

1. Ceiling fire dampers for duct to be Ruskin Model CFD 7 or equivalent model by Greenheck, United Enertech, or approved equal.

2. Ceiling fire dampers for ceiling registers to be Ruskin Model CFD-7 or equivalent model by Greenheck, United Enertech, or approved equal.

3. Ceiling fire dampers for diffusers in lay-in-ceilings to be Ruskin Model CFD-7 or equivalent model by Greenheck, United Enertech, or approved equal.

D. Ceiling fire dampers for diffusers in "hard" ceilings to be Ruskin Model CFD-R5 or approved equal with thermal insulation blanket, extended frame for flex duct connection, and fusible volume adjustment.

E. Omit local dampers at diffusers and registers requiring ceiling fire dampers. Balance airflow using manual volume dampers at duct branch connections to main.

F. Coordinate requirement for square or round neck types.

G. Entire installation to be in strict accordance with manufacturers' published UL approved installation instructions.

H. All diffusers, registers, and grilles in rated ceilings must be all steel construction.

I. Contractors option to use factory assembled U.L. classified fire-rated diffusers, registers, and grilles in lieu of separate field assembled diffusers/registers/grilles and ceiling fire dampers. Factory assembled units to match all features specified herein.

2.4 DAMPERS

A. Automatic Control Dampers: All automatic control dampers to be furnished by Control Subcontractor and installed by this Contractor (except unit mounted dampers).

B. Manual Volume Dampers (MVD): Manual volume dampers to be hand-operated type dampers constructed of galvanized steel, minimum 22-gauge for duct widths 18" and less, minimum 16-gauge for duct widths greater than 18". Dampers for ducts to 12" height and 12" diameter to be single blade carried on a 3/8" round steel rod mounted inside of duct without frame and fitted with locking type quadrant and brass end bearing plate accurately drilled and secured to duct. Dampers for ducts greater than 12" height to be multi-blade type, 12" maximum blade width up to 30" blade length and 10" maximum blade width over 30" blade length. Blades to be mounted on frame with brass sleeve bearings interconnected for operation from one locking type hand quadrant. Round pivot rods to have section faced flat to receive locking setscrew in locking quadrant. Refer to SMACNA manual Figures 2-14 and 2-15.

1. For manual damper locations above a rigid or non-accessible ceiling or where damper access is limited, a remote damper operator shall be used. Damper operator to be self-locking worm gear designed for 3/8” damper shaft. Shaft extension to be 3/8” square rod with coupler. Remote operator to be provided with wrench operated shaft adjustment, position indication and lock nut. Where straight shaft extension cannot be used due to accessibility, a flexible cable operator with compatible damper operator and regulator may be utilized. Damper operator, shaft and regulator shall be designed for minimum 35 in-lb torque. Remote operator to be ceiling mounted with removable cover plate or mounted above access door. Where multiple operators are routed to single or multiple access locations, provide markings to identify the associated air device for future use. The damper operator, shaft extension and ceiling termination/regulator shall be manufactured by Young Regulator, Inc. or approved equal.

C. Backdraft Dampers (BDD): Backdraft dampers to be Ruskin Model BD2-A2 or approved equal low-leak backdraft dampers. Dampers to be heavy-duty type suitable for air velocities to 2500 fpm with all extruded aluminum construction, minimum 0.81" thick frame, and minimum .050" thick blades on maximum 4" centers. Provide blades with vinyl edge seals. Provide dampers with aluminum linkage and corrosion resistant type bearings.

2.5 SQUARE CEILING DIFFUSERS

A. Provide Titus TDC or approved equal round or square neck, louvered face ceiling diffusers at all locations designated by schedule on drawings. Diffusers to be all aluminum construction. Frame to be flush mount for diffusers in "hard" ceilings and lay-in T-bar mount for diffusers in lay-in ceilings. Finish to be baked-on, off-white enamel.

2.6 SIDEWALL SUPPLY REGISTERS

A. Provide Titus 1707 or approved equal at all locations designated by "SAR". Registers to be all aluminum construction complete with removable and rotating fixed horizontal blade core, and attached rear set of individually adjustable vertical blades. Finish to be baked-on, off-white enamel. Border to be curved, Titus Type C.

2.7 SIDEWALL RETURN REGISTERS

A. Provide Titus 1700 or approved equal at all locations designated by "RAR". Registers to be all aluminum construction complete with removable and rotating fixed horizontal blade core. Finish to be baked-on, off-white enamel. Border to be curved, Titus Type "C".

2.8 CEILING RETURN & EXHAUST REGISTERS

A. Provide Titus Model 50-F or approved equal at locations designated by schedule on drawings. Registers to be complete with 1/2" cube egg-crate aluminum grid. Finish to be baked-on, off-white enamel. Border to be flush mounted frame style.

2.9 AIR LOUVERS

A. Air louvers shall be Florida Building Code Approved and Miami-Dade Qualified, with stationary horizontal, wind driven rain, extruded aluminum blades equal to Greenheck model EHH-601D. The louvers shall be tested and have passed the following: AMCA 500L Air Pressure, Water Penetration and Wind Driven Rain and AMCA 540 Test Method for Louvers Impacted by Wind Borne Debris (Missile Level D and Missile Level E), TAS 201 (Large Missile Impact), TAS 202 (Uniform Static Air Pressure) and TAS 203 (Cyclic Wind Loading). Louvers to be have minimum 0.081” thick aluminum frame and blades. Louver depth to be 6” with blades on approximate 2” spacing. Blade construction to be horizontal rain resistant style. Finish shall be Kynar color selected by Architect. Manufacturer will submit metal color chip to Architect as part of the submittal approval. Louver shall be rated at: the beginning point of water penetration (0.01 oz. of water (penetration) per sq. ft. of louver free area is above 1,250 fpm, minimum 46% free area, 0.21” S.P. resistance at 1,000 fpm. Provided 1/2” mesh expanded aluminum screen with removable frame mounted on inside face of louver. Provide minimum 10 year finish warranty.

2.10 FLEXIBLE CONNECTORS

A. Install UL listed flexible duct connectors between duct and fan/equipment connections. Flexible duct connectors to be made of 28-ounce, heavy glass fabric double coated with neoprene.

2.11 FLEXIBLE DUCT

A. Flexmaster Type 1M Acoustical Attenuating or Approved equal. Submit acoustical performance of any alternate product for prior approval.

1. Characteristics of flexible duct:

a. Approved as UL-181 Class 1 air duct.
b. Flame spread rating less than 25 and smoke developed rating less than 50.
c. Rated for 6" w.g. positive pressure, 4" w.g. negative pressure, and 5000 fpm air velocity.
d. Tear and puncture resistant reinforced CPE inner liner mechanically locked together with a corrosive resistant galvanized steel helix.
e. Insulated with minimum 1/2" thick fiberglass insulation with vapor barrier jacket.

B. Seal off the insulation jacket at its ends and at joints with mastic, Hardcast, or similar material. Replace flexible duct if jacket is punctured.

C. Flexible duct is NOT to be used for runouts where it must pass through walls or through smoke or fire partitions. Flexible duct is not to be used in exposed application. Flexible duct lengths shall not exceed 6 feet at each connection.

D. No bends shall be made in flexible duct with the center line radius less than one and one-half duct diameter and only one bend may occur per 6 foot length of duct material.

2.12 DUCT ACCESS DOORS

A. Duct access doors to be provided for access to all coils, fire, fire/smoke, and smoke dampers, automatic and backdraft dampers, duct smoke detectors, static pressure and air volume sensing devices, and other equipment installed in ducts and at other points indicated on drawings.

B. Access door construction and airtightness must be suitable for the duct pressure class used (low, medium, or high).

C. Access doors to be double-panel, galvanized steel construction with minimum 1" rigid insulation between panels. Access doors in exhaust duct and unlined return duct may be uninsulated single panel, galvanized steel construction. Doors to mount in rigid frame constructed of formed galvanized steel. Angle iron bracing to be used as required to provide rigid assembly. Doors to hinge on one side with door latch on opposite side.

D. Access doors in ductwork shall fully comply with Figure 7-2, 7-3 and 7-2M of SMACNA manual. Casing access doors shall fully comply with Figure 9-15 and 9-16 of SMACNA manual. Minimum size shall be 12” x 12” per NFPA 80.

E. Doors to close against gasket seal.

F. Access doors for fire dampers, fire/smoke dampers, and smoke dampers shall be permanently identified on the exterior by a label having letters not less than 0.5 inches in height reading: “Fire Damper” “Fire/Smoke Damper” or “Smoke Damper” as required by 2012 International Mechanical Code.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation to be in accordance with manufacturers’ published installation instructions as well as applicable sections of SMACNA manual.

B. Provide all screws, bolts, nuts, and inserts required for attaching sheet metal specialty items to ducts, walls, floors and ceilings.

END OF SECTION

SECTION 23 34 20 CENTRIFUGAL EXHAUST FANS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 QUALITY ASSURANCE

A. Certify fan performance in accordance with AMCA Certified Air and Sound Rating Criteria.

B. Fans shall be UL or ETL listed.

1.3 REQUIREMENTS

A. Select fans such that fan BHP does not exceed motor nameplate horsepower at scheduled conditions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Greenheck, Acme, Cook, or approved substitute.

2.2 EQUIPMENT

A. Non-overloading, backward inclined, aluminum centrifugal fan wheel.

B. Variable pitch V-belt drive or direct drive as scheduled.

C. Roof or wall mounting as scheduled.

D. Removable heavy gauge aluminum fan housing enclosing motor outside airstream.

E. Permanently lubricated, ball bearing fan motor.

F. Isolate fan motor, wheel, and drive from base with rubber vibration isolators.

G. Electrical junction box.

2.3 ACCESSORIES

A. Gravity backdraft damper.

B. Birdscreen around fan discharge.

C. Disconnect switch on single-phase fans.

D. Prefabricated, 1" thick fiberglass insulated, minimum 18-gauge aluminum or galvanized steel construction, minimum 12" high roof curb. Coordinate required curb base type with roof construction, pitch, and flashing requirements. See architectural drawings.

E. Upblast housing when scheduled on drawings.

F. Solid state variable speed controller when scheduled on drawings.

G. See fan schedule on drawings for other required accessories.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fans in accordance with manufacturers' published instructions.

B. Secure fans to curbs with stainless steel screws.

C. Connect ducts to fans to allow for straight and smooth airflow.

D. Provide flexible connections between fans and ducts.

E. Install fans level.

F. Check fan alignment and balance. Correct improperly aligned or vibrating fans.

G. Final installation to be free of leaks.

H. Ensure fans are interlocked with appropriate systems and/or controls.

END OF SECTION

SECTION 23 34 25 PROPELLER FANS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 QUALITY ASSURANCE

A. Certify fan performance in accordance with AMCA Certified Air and Sound Rating Criteria.

B. Fans shall be UL or ETL listed.

1.3 REQUIREMENTS

A. Select fans such that fan BHP does not exceed motor nameplate horsepower at scheduled conditions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Greenheck, Acme, Cook, or approved substitute.

2.2 EQUIPMENT

A. Bolted, welded, and reinforced heavy gauge steel or aluminum axial flow propeller fan.

B. Variable pitch V-belt drive or direct drive as scheduled.

C. Roof or wall mounting as scheduled.

D. Permanently lubricated, ball bearing fan motor.

E. Corrosion resistant paint finish on steel parts. Aluminum and galvanized steel parts require no additional finish.

F. Protect fan blades and drive with screen guards.

2.3 ACCESSORIES

A. Provide wall-mounted fans with screen guards to protect personnel from fan blades and drive and wall mounting housing for mounting fan and damper to wall.

B. Provide roof-mounted fans with galvanized steel or aluminum housing, birdscreen, and prefabricated, 1" thick fiberglass insulated, minimum 18-gauge aluminum or galvanized steel construction, minimum 12" high roof curb. Coordinate required curb base type with roof construction, pitch, and flashing requirements. See architectural drawings.

C. Heavy-duty gravity backdraft damper when scheduled on drawings.

D. Arrange fan for supply duty when scheduled on drawings. Otherwise, fan is for exhaust duty. Provide 1" or 2" thick permanent aluminum washable filters for roof-mounted supply fans.

E. Solid-state variable speed controller when scheduled on drawings.

F. Disconnect switch on single phase fans.

G. See fan schedule on drawings for other required accessories.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fans in accordance with manufacturers' published instructions.

B. Secure fans with stainless steel screws.

C. Connect ducts to fans to allow for straight and smooth airflow.

D. Provide flexible connections between roof-mounted fans and ducts.

E. Install fans level.

F. Check fan alignment and balance. Correct improperly aligned or vibrating fans.

G. Final installation to be free of leaks.

H. Ensure fans are interlocked with appropriate systems and/or controls.

END OF SECTION

SECTION 23 34 30 - CEILING CABINET EXHAUST FANS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 QUALITY ASSURANCE

A. Certify fan performance in accordance with AMCA Certified Air and Sound Rating Criteria.

B. Fans shall be UL or ETL listed.

1.3 REQUIREMENTS

A. Select fans such that fan BHP does not exceed motor nameplate horsepower at scheduled conditions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Greenheck, Acme, Cook, or approved substitute.

2.2 EQUIPMENT

A. Direct drive forward curved centrifugal fan.

B. Acoustically lined galvanized steel fan housing with mounting brackets.

C. Integral backdraft damper at fan outlet.

D. Permanently lubricated, thermally protected, PSC ball bearing fan motor mounted on rubber vibration isolators.

E. Electrical junction box and plug-in type disconnect.

2.3 ACCESSORIES

A. Off-white finish aluminum construction eggcrate ceiling exhaust grille.

B. In-line duct connection when scheduled on drawings.

C. Solid-state variable speed controller when scheduled on drawings.

D. Roof discharge cap with integral birdscreen when scheduled on drawings.

E. Wall discharge cap with integral birdscreen when scheduled on drawings.

F. See fan schedule on drawings for other required accessories.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fans in accordance with manufacturers' published instructions.

B. Connect ducts to fans to allow for straight and smooth airflow.

C. Provide flexible connections between fans and ducts.

D. Install fans level.

E. Check fan alignment and balance. Correct improperly aligned or vibrating fans.

F. Final installation to be free of leaks.

G. Ensure fans are interlocked with appropriate systems and/or controls.

END OF SECTION

SECTION 23 34 50 - SQUARE CENTRIFUGAL IN-LINE FANS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 QUALITY ASSURANCE

A. Certify fan performance in accordance with AMCA Certified Air and Sound Rating Criteria.

B. Fans shall be UL or ETL listed.

1.3 REQUIREMENTS

A. Select fans such that fan BHP does not exceed motor nameplate horsepower at scheduled conditions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Greenheck, Acme, Cook, or approved substitute.

2.2 EQUIPMENT

A. Non-overloading, backward inclined, aluminum centrifugal fan wheel.

B. Variable pitch V-belt drive or direct drive as scheduled.

C. Heavy gauge aluminum or galvanized steel housing with duct connection at fan inlet and outlet and removable access panels to access all interior components without removing ductwork or wiring.

D. Permanently lubricated, ball bearing fan motor.

E. Electrical junction box.

2.3 ACCESSORIES

A. Gravity backdraft damper.

B. Disconnect switch on single-phase fans.

C. Belt guard/motor cover.

D. Solid state variable speed controller when scheduled on drawings.

E. Vibration isolators.

F. See fan schedule on drawings for other required accessories.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fans in accordance with manufacturers' published instructions.

B. Connect ducts to fans to allow for straight and smooth airflow.

C. Provide flexible connections between fans and ducts.

D. Install fans level.

E. Check fan alignment and balance. Correct improperly aligned or vibrating fans.

F. Final installation to be free of leaks.

G. Ensure fans are interlocked with appropriate systems and/or controls.

END OF SECTION

SECTION 23 64 20 - PACKAGED AIR COOLED CHILLER SCROLL

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Contractor shall provide and install a packaged air cooled chiller as specified herein and scheduled on the drawings. Rate chiller performance according to requirements in AHRI 550/590.

B. Factory Run Test: Chiller shall be pressure-tested, evacuated and fully charged with refrigerant and oil, and shall be factory operational run tested with water flowing through the vessel.

1.3 WARRANTY

A. Unit Warranty: Manufacturer shall include parts and labor warranty on all equipment and material of its manufacture against defects in workmanship and material for a period of twelve (12) months from date of substantial completion.

B. Compressor Warranty: Manufacturer shall warrant all compressors against defects in workmanship and material for a period of sixty-six (66) months from date of shipment

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Acceptable Manufacturers: Trane, York, Daikin, or approved equal.

2.2 EQUIPMENT REQUIREMENTS

A. Chiller Materials And Components

1. General: Install and commission, as shown on the schedules and plans, factory assembled, charged, and tested air cooled scroll compressor chiller(s) as specified herein.

2. Chiller shall be designed, selected, and constructed using a refrigerant with Flammability rating of "1", as defined by ANSI/ASHRAE STANDARD 34 Number Designation and Safety Classification of Refrigerants.

3. Chillers above 30 ton capacity shall include not less than two refrigerant circuits, scroll compressors, direct-expansion type evaporator, air-cooled or water-cooled condenser, refrigerant, lubrication system, interconnecting wiring, safety and operating controls including capacity controller, control center, motor starting components and special features as specified herein or required for safe, automatic operation.

4. Cabinet: For equipment installed outside, external structural members shall be constructed of heavy gauge, galvanized steel coated with baked on powder paint which, when subject to ASTM B117, 1000 hour, 5% salt spray test, yields minimum ASTM 1654 rating of "6".

5. Operating Characteristics: Provide low and high ambient temperature control options as required to ensure unit is capable of operation from 0°F to 125°F ambient temperature.

6. Service Isolation valves: Discharge (ball type) isolation valves factory installed per refrigerant circuit. Includes a system high-pressure relief valve in compliance with ASHRAE15.

7. Pressure Transducers and Readout Capability

8. Discharge Pressure Transducers: Permits unit to sense and display discharge pressure.

9. Suction Pressure Transducers: Permits unit to sense and display suction pressure.

10. High Ambient Control: Allows units to operate when the ambient temperature is above 115°F.

11. Low Ambient Control: Allows units to operate when the ambient temperature is below 30°F.

B. Compressors: Shall be hermetic, scroll-type, including:

1. Compliant design for axial and radial sealing.
2. Refrigerant flow through the compressor with 100% suction cooled motor.
3. Large suction side free volume and oil sump to provide liquid handling capability.
4. Compressor crankcase heaters to provide extra liquid migration protection.
5. Annular discharge check valve and reverse vent assembly to provide low-pressure drop, silent shutdown and reverse rotation protection.
6. Initial oil charge.
7. Oil level sight glass.
8. Vibration isolator mounts for compressors.
9. Brazed-type connections for fully hermetic refrigerant circuits.
10. Compressor Motor overloads capable of monitoring compressor motor current. Provides extra protection against compressor reverse rotation, phase-loss and phase-imbalance.

C. Refrigerant Circuit Components: Each refrigerant circuit shall include: a discharge service ball type isolation valve, high side pressure relief, liquid line shutoff valve with charging port, low side pressure relief device, filter-drier, solenoid valve, sight glass with moisture indicator, thermostatic expansion valves, and flexible, closed-cell foam insulated suction line and suction pressure transducer.

D. Heat Exchangers

1. Evaporator:
    a. Evaporator shall be stainless steel construction capable of refrigerant working pressure of 650 psig and liquid side pressure of 150 psig.
    b. Heat exchangers shall be UL listed.
    c. Water nozzles shall be provided with grooves for field provided ANSI/AWWA C-606 mechanical couplings.
    d. Evaporator shall include vent and drain fittings and thermostatically controlled heaters to protect to -20°F ambient in off-cycle.
    e. A 20-mesh, serviceable wye-strainer and mechanical couplings shall be provided for field installation on evaporator inlet prior to startup.
    f. Liquid connection from evaporator shall be at edge of unit. Thermal dispersion type flow switch shall be factory installed in the evaporator outlet pipe extension and wired to the unit control panel. Insulation and heat trace on piping shall be responsibility of installing contractor. Nozzle connections shall be ANSI/AWWA C-606 (grooved).

g. Where specified, the evaporator shall be freeze-resistant design for cold water production below 40˚F without additives.

2. Air-cooled Condenser:

a. Coils: Condenser coils shall resist galvanic corrosion due to dissimilar metals. Sub cooling is included. Coils shall be designed for a design working pressure of 650 PSIG (45 bar). Condenser coil shall be washable with potable water under 100 psi (7 bar) pressure.

b. Low Sound Fans with Variable Speed Drives: All fans shall be powered by VSDs. Fans shall provide vertical air discharge. Fans shall be corrosion resistant. Fan impeller shall be dynamically balanced for vibration-free operation. Fan guards of heavy gauge, PVC (polyvinyl chloride) coated or galvanized steel.

c. Fan Motors: High efficiency, direct drive, 6 pole, 3 phase, insulation class “F”, current protected, Totally Enclosed Air-Over (TEAO) , rigid mounted, with double sealed, permanently lubricated, ball bearings.

E. Insulation

1. Material: Closed-cell, flexible, UV protected, thermal insulation complying with ASTM C 534 Type 2 (Sheet) for preformed flexible elastomeric cellular thermal insulation in sheet and tubular form.

2. Thickness: minimum 1-1/2” (38mm) and in accordance with applicable energy code.

3. Thermal conductivity: 0.26 (BTU/HR-Ft2-°F/in) maximum at 75°F mean temperature.

4. Factory-applied insulation over cold surfaces of liquid chiller components including evaporator shell, water boxes, and suction line. Liquid nozzles shall be insulated by Contractor after pipe installation.

5. Adhesive: As recommended by insulation manufacturer and applied to 100 percent of insulation contact surface including all seams and joints.

F. Acoustical Data

1. Provide acoustical sound power or sound pressure level data in decibels (dB) at the scheduled eight (8) octave band center frequencies. A-weighted sound data alone is not acceptable.

2. Provide all sound power or sound pressure level data at 100%, 75%, 50%, and 25% load.

3. Supplied equipment shall not exceed scheduled sound power or sound pressure level data at any load point. The mechanical Contractor shall be responsible for any additional costs associated with equipment deviation.

4. Acoustical performance ratings shall be in accordance with AHRI Standard 370.

G. Controls

1. General: Automatic start, stop, operating, and protection sequences across the range of scheduled conditions and transients.

2. Power/Control Enclosure: Rain and dust tight NEMA 3R powder painted steel cabinet with hinged, latched, and gasket sealed door.

3. Microprocessor Control Center:

   a. Automatic control of compressor start/stop, anti-coincidence and anti-recycle timers, automatic pump down at system shutdown, condenser fans, evaporator pump, evaporator heater, unit alarm contacts, and chiller operation from 0°F to 125°F ambient. Automatic reset to normal chiller operation after power failure.

   b. Software stored in non-volatile memory, with programmed set points retained in lithium battery backed real-time-clock (RTC) memory for minimum 5 years.

   c. Forty character liquid crystal display viewable in direct sunlight and LED backlit for nighttime viewing, descriptions in English (or Spanish), numeric data in English (or Metric) units. Sealed keypad with sections for Set points, Display/Print, Entry, Unit Options & clock, and On/Off Switch.

   d. Programmable Set points: display language; chilled liquid temperature set point and range, remote reset temperature range, daily schedule/holiday for start/stop, manual override for servicing, low and high ambient cutouts, low liquid temperature cutout, low suction pressure cutout, high discharge pressure cutout, anti-recycle timer (compressor start cycle time), and anti-coincident timer (delay compressor starts).

   e. Display Data: Return and leaving liquid temperatures, low leaving liquid temperature cutout setting, low ambient temperature cutout setting, outdoor air temperature, English or metric data, suction pressure cutout setting, each system suction pressure, liquid temperature reset via a 4-20milliamp or 0-10 VDC input, anti-recycle timer status for each compressor, anti-coincident system start timer condition, compressor run status, no cooling load condition, day, date and time, daily start/stop times, holiday status, automatic or manual system lead/lag control, lead system definition, compressor starts/operating hours (each), status of hot gas valves, evaporator heater and fan operation, run permissive status, number of compressors running, liquid solenoid valve status, load & unload timer status, water pump status.

   f. System Safeties: Shall cause individual compressor systems to perform auto shut down; manual reset required after the third trip in 90 minutes. System Safeties include: high discharge pressure, low suction pressure, high pressure switch, and motor protector. Compressor motor protector shall protect against damage due to high input current or thermal overload of windings.

g. Unit Safeties: Shall be automatic reset and cause compressors to shut down if low ambient, low leaving chilled liquid temperature, under voltage, and flow switch operation.

h. Alarm Contacts: Low ambient, low leaving chilled liquid temperature, low voltage, low battery, and (per compressor circuit): high discharge pressure, and low suction pressure.

i. BAS Communications: BACnet MS/TP

j. Remote Monitoring: All on-board control points shall be discoverable on the BAS for remote monitoring, trending, and alarms.

4. Manufacturer shall provide any controls not listed above necessary for automatic chiller operation. Mechanical Contractor shall provide field control wiring necessary to interface sensors to the chiller control system.

H. Power Connection and Distribution

1. Power Panels:

a. NEMA 3R rain/dust tight, powder painted steel cabinets with hinged, latched, and gasket sealed outer doors. Provide main power connection(s), control power connections, compressor and fan motor start contactors, current overloads, and factory wiring.

b. Power supply shall enter unit at a single location in bottom of panel, be 3 phase of scheduled voltage, and connect to individual terminal blocks per compressor.

c. Single Point Circuit Breaker: Single point Terminal Block with Circuit Breaker and lockable external handle (in compliance with Article 440-14 of N.E.C.) to be supplied to isolate power voltage for servicing. Incoming power wiring must comply with the National Electric Code and/or local codes.

2. Compressor, control and fan motor power wiring shall be located in an enclosed panel or routed through liquid tight conduit.

I. Accessories and Options

1. Control Power Transformer: Converts unit power voltage to 120-1-60 (500 VA capacity). Factory-mounting includes primary and secondary wiring between the transformer and the control panel.

2. Condenser Coil Environmental Protection (if installed outside within 60 miles of coastal environment): Post-Coated Dipped: Dipped-cured coating on condenser coils for seashore and other corrosive applications (with the exception of strong alkalis, oxidizers, and wet bromine, chlorine and fluorine in concentrations greater than 100 ppm).

3. Protective Chiller Panels (Factory Mounted): Louvered Panels (full unit): Painted steel as per remainder of unit cabinet, to protect condenser coils from incidental damage, visually screen internal components, and prevent unauthorized access to internal components.

4. Thermal Dispersion Flow Switch (Factory installed and wired in piping extension kit): Normally open, 30bar pressure rating, stainless steel 316L construction, IP67, -4°F to 158°F ambient rating.

5. Sound Reduction (Factory installed): Compressor Acoustic Sound Blankets

6. Vibration Isolation (Field installed): Elastomeric Isolators.

7. Pump Package: Dual high head pumps with variable speed drives, buffer tank, and expansion tank.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Rig and Install in full accordance with Manufacturer's requirements, Project drawings, and Contract documents.

B. Location: Locate chiller as indicated on drawings, including cleaning and service maintenance clearance per Manufacturer instructions. Adjust and level chiller on support structure.

C. Components: Installing Contractor shall provide and install all auxiliary devices and accessories for fully operational chiller.

D. Electrical: Coordinate electrical requirements and connections for all power feeds with Electrical Contractor (Division 26).

E. Controls: Coordinate all control requirements and connections with Controls Contractor.

F. Finish: Installing Contractor shall paint damaged and abraded factory finish with touch-up paint matching factory finish.

END OF SECTION

SECTION 23 73 13 AIR HANDLING UNIT - MEDIUM OR LOW PRESSURE

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 DESCRIPTION

A. Provide air-handling units of the single-zone draw-thru, double wall central station type and size as scheduled on drawings.

1.3 PERFORMANCE

A. Certify unit components in accordance with AHRI Standard 430 as applicable.

B. Certify coils in accordance with AHRI Standard 410. Substantiate performance by AHRI computer-generated output.

C. Furnish coils with minimum rows and fins as scheduled even though performance can be achieved with fewer rows or fins.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Trane, Daikin, York, Carrier, or approved equal.

B. Manufacturers both listed above and proposed alternates to review the allowable space for the units considering supply and return airflow, service and maintenance access, coil pull clearance, and piping connections to insure adequate clearance exists for their units prior to submitting bid. Contractor shall not be allowed extra payment should the low bidder prove to have unacceptable clearance.

2.2 UNIT CONSTRUCTION

A. Unit sections shall be double wall construction. Exterior wall shall be minimum 18-gage solid galvanized steel. Interior wall shall be minimum 20-gage solid galvanized steel. Unit to be completely insulated with 1" thick, 1-1/2 pound density fiberglass insulation. Insulation shall meet NFPA-90A standards. All connecting channels shall be insulated to prevent sweating.

2.3 FAN SECTION

A. Provide DWDI fan with galvanized or phosphatized painted steel scroll housing. RPM selection shall not exceed 90% of maximum RPM capacity of unit.

B. Provide direct drive plenum fan with centrifugal fan wheel. Dynamically balance fan before and after installation in the cabinet section.

C. Provide steel fan shaft keyed, set screwed or clamped to the wheel per the manufacturers standard design to meet the specified performance. Maximum fan rpm to be well below the first critical speed.

D. Provide units with internally or externally mounted fan motors. Mount motors on slide rail base complete with adjustment nuts. See Specification Section 23 05 13.

E. Provide fan section with full sized, hinged, latched, double wall access doors for access to fan, motor, and bearings. Fans with externally mounted motors and bearings may provide removable access panels.

F. Provide self-aligning, grease-lubricated fan bearings of the ball, roller, or pillow block type. Provide extended lubrication lines from fan bearing to unit casing. Connect lubrication lines to a Zerk fitting mounted on the casing. Select bearings for an average life of 200,000 hours at design operating conditions.

G. Mount fan and motor assembly on minimum 2" deflection spring isolators. Fan assembly to be completely isolated from unit bulkhead with flexible neoprene connections.

2.4 COIL SECTION

A. Coil Section:

1. Provide insulated, double wall, galvanized construction drain pan extending under the coil and fan sections. Pan shall be sloped to provide positive drainage of condensate. Drain connection(s) are to be provided on the water piping connection side of unit. Coil sections with stacked coils to have an intermediate drain pan with condensate drop tubes to main drain pan.

2. Completely enclose coil headers within the insulated casing with piping connections extended through cabinet. Piping connections to be on same end of unit.

3. Provide coil section with removable access panel or access door to remove coil.

B. Cooling Coils - Chilled Water:

1. Coil to be constructed of 5/8" outside diameter copper tubing with minimum .0075” thick aluminum fins and cast iron or copper headers. Bond fins by mechanical expansion.

2. Provide coils with a maximum working pressure of 175 psig at 200 degrees F.

3. Provide circuited drainable coils with vent connection at highest point and drain connection at lowest point.

C. Electric Heating Coils:

1. Furnish electric heating coils of high grade type A wire (80% nickel, 20% chromium), insulated by floating high temperature ceramic bushings and supported in heavy duty galvanized steel frame.

2. Recess bushings into embossed openings and stack into supporting brackets spaced on not more than 4" centers.

3. Use stainless steel wire terminals and nuts.

4. Derate heating elements to a maximum of 35 watts per square inch of wire surface.

5. Heater primary protection to be disk type automatic reset cutout-pilot duty. Secondary protection to be load-carrying disk type manual reset thermal cutouts and wired in series with each heater circuit. Wiring, controls, and heater protection to meet both U.L. and N.E.C. requirements.

6. Provide factory wired components to terminal blocks for field connection. Insulate internal wiring for 105 degrees C.

7. Provide protective screens on entering and leaving air sides of heater.

8. Provide built-in disconnect switch, industrial snap action type.

9. Provide built-in pilot lights to indicate when heater is on, when each circuit is on, and overheating.

10. Provide built-in airflow switch in addition to fan interlock.

11. See control drawings for required control components.

12. Electric heating capacity, voltage/phase and required number of steps shall be as scheduled on the drawings.

2.5 ADDITIONAL SECTIONS

A. Filter Section:

1. Provide factory-built filter section complete with filters as scheduled and specified herein. Minimum filter area to be as specified on unit schedule but not to exceed 500 fpm filter face velocity. Filter sections to have full sized, hinged, latched, double wall access doors for filter service.

B. Provide 30% medium efficiency (ASHRAE Standard 52), 2" thick pleated disposable type panel filters equal to Farr 30/30.

C. Provide a factory mounted Dwyer Magnehelic gage across filter section and mark gage to indicate design clean and dirty loading conditions.

D. Provide one complete set of replacement filters to Owner at job completion.

E. Mixing box to have interconnected low-leak type outside and return air dampers with parallel blades. Arrange dampers so outside and return air merge when entering mixing box. Damper rods to rotate in nylon bushings.

PART 3 - EXECUTION

3.1 COORDINATION

A. Prior to purchasing units, refer to drawings and coordinate the required side of unit for motor, access panels and doors, and duct and piping connections to provide proper access clearance.

3.2 INSTALLATION

A. Install each unit on a minimum 4" high, level, rigid, and heavy concrete base.

B. Provide proper clearance at each unit for routine service including the changing of filters, removal of coils, bearing greasing, opening of access doors, and pulling of fan shaft.

C. Ductwork: Duct connections at each unit to allow for straight and smooth airflow. No turns are to be installed at the fan discharge which are in the opposite direction to fan wheel rotation. Provide flexible connections at duct connections to unit.

D. Piping:

1. Support piping independently of coils and with adequate flexibility to prevent undue stress at coil header connections.

2. Install full size drain lines from the drain pan connection to nearest floor drain and include trap to permit condensate to drain freely. The cooling coil condensate drain piping should be suitably configured and trapped to allow the condensate to drain while the air handling unit is in operation.

3. Install service valves on both supply and return lines to coils and install so valves can be shut off, a small section of pipe removed, and coil allowed to slide out. This condition applies to water and steam coils only.

END OF SECTION

SECTION 23 82 40 - ELECTRIC HEATERS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Provide UL listed electric heaters of the type and capacities specified on drawings.

B. Heaters to have a five-year warranty.

C. Heaters to be by Markel, Berko, Q-Mark, or approved equal.

PART 2 - PRODUCTS

2.1 UNIT HEATERS

A. Heaters to be Markel Series 5100 heavy-duty industrial service unit heaters for horizontal or vertical mounting.

B. Enclosure to be heavy gauge steel with baked enamel finish.

C. Heaters to be equipped with individually adjustable outlet louvers.

D. Elements to be high mass, all steel finned tubular type.

E. Motor to be equipped with permanently lubricated bearings and internal overload protection.

F. Fan to be propeller type with fan speed not exceeding 1550 rpm.

G. Heaters to be equipped with manual reset thermal cutouts to disconnect both heating elements and fan.

H. Heaters to be designed for single point power connection, with elements, motor, and control circuits subdivided with factory installed and wired fuses.

I. Thermostats to be low-voltage, wall mounted as scheduled on drawings, heavy-duty, tamperproof type. Manufacturer to furnish necessary contactors, relays, transformers, etc., for complete installation.

J. Provide factory engineered bracket for attachment to wall or ceiling.

2.2 WALL-MOUNTED HEATERS

A. Heaters to be Markel Series 3450 commercial service, wall-mounted, forced-air heaters.

B. Enclosure to be minimum 16 ga. galvanized steel with baked enamel finish.

C. Elements to be high mass, all steel finned tubular type.

D. Motor to be equipped with permanently lubricated bearings and internal overload protection.

E. Fan to be propeller type with fan speed not exceeding 1550 rpm.

F. Heaters to be equipped with manual reset thermal cutouts to disconnect both heating elements and motor.

G. Heaters to be designed for single point power connection, with elements, motor, and control circuits subdivided with factory installed and wired fuses.

H. Thermostats to be low-voltage, unit mounted as scheduled on drawings, heavy-duty, tamperproof type. Manufacturer to furnish necessary contactors, relays, transformers, etc., for complete installation.

I. See drawings for surface or recessed mounting requirements.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Heaters to be installed in accordance with manufacturers' published installation instructions.

END OF SECTION

SECTION 23 82 42 - ELECTRIC DUCT HEATERS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Open coil electric duct heaters.

1.3 SAFETY CODES

A. Electric duct heaters shall meet the requirements of the National Electric Code (NEC) and shall be UL listed for zero clearance to combustible surfaces and for use with heat pumps or central air conditioning units.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Electric duct heaters shall be manufactured by Tutco, Indeeco, Chromalox, Brasch, Markel, or approved equal.

2.2 REQUIREMENTS

A. Heating elements shall be open coil type constructed of high grade 80% nickel/20% chromium resistance wire. Machine crimp coils to stainless steel terminals insulated with ceramic bushings.

B. Support coils by galvanized steel brackets securely fastened to heavy gauge galvanized steel frame.

C. Provide totally enclosed terminal box for each duct heater. Factory apply insulation minimum 1/2" thick between the terminal box and heater frame.

D. Permanently attach a separate, complete, and specific wiring diagram to each heater. Typical wiring diagrams are not acceptable. Clearly mark power and control terminals in terminal box identical to the wiring diagram.

E. Furnish each heater with the following built-in controls:

1. Disc type automatic reset primary thermal cutout.

2. Manual reset secondary thermal cutouts.

3. De-energizing controlling magnetic contactors for each heater stage.

4. Non-fused, disconnect switch with door interlock.

5. Differential pressure type airflow switch.

6. Fan relay for positive electrical interlock.

7. Fuses to protect each circuit in any heater drawing more than 48 amperes.

8. Control transformer.

F. All safety devices shall be serviceable through the terminal box without removing the heater from the duct.

G. Provide coil with number of circuits sufficient to not exceed 48 amperes full load current per circuit and equivalent to number of stages scheduled on drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install unit in accordance with manufacturers' published installation instructions and with NEC Article 424.

B. Maintain minimum three foot working clearance in front of the heater terminal box in accordance with NEC Article 110.

C. Provide access door on entering air side of each heater.

D. Electric duct heaters required for variable volume boxes or fan powered induction boxes to be furnished factory mounted to boxes by terminal box manufacturer.

END OF SECTION

SECTION 26 01 00 - GENERAL PROVISIONS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. New padmounted electrical service.

B. Secondary power wiring and distribution system.

C. Emergency power generation system.

D. Motor control centers.

E. Lightning protection system.

F. Fire alarm and smoke detection system.

G. Telephone system rough-in.

H. Security system rough-in.

I. Lighting control equipment.

J. Electrical control systems and interlock wiring.

K. CCTV system rough-in.

1.3 RELATED WORK

A. Foundations and pads required for equipment furnished under this division of the specifications.

B. Field painting, except such painting as is required to maintain shop coat painting and factory finish painting.

C. Electrical control systems and interlock wiring as required by mechanical drawings, specifications or manufacturer's schematics.

D. Flashing of conduits into roofing and outside walls.

E. Heating, ventilating, and air conditioning equipment.

F. Plumbing equipment.

G. Fuel oil storage tank and fuel transfer pumping system.

H. Kitchen equipment.

I. Telephone system equipment.

1.4 QUALITY ASSURANCE

A. Comply with applicable local, state and federal codes.

B. Comply with applicable requirements of recognized industry associations which promulgate standards for the various trades.

C. Employ only qualified journeymen for this work. Employ a competent qualified electrician to supervise the work.

1.5 STANDARDS

A. Perform work specified in Division 26 in accordance with standards listed below including amendments or revisions. When these specifications are more stringent, they take precedence. In case of conflict, obtain a decision from the Designer.

B. National Fire Codes (NFPA) including, but not limited to following:

1. NFPA-70 - National Electrical Code. 2014 Edition.

2. NFPA-72 - National Fire Alarm Code. 2013 Edition.

3. NFPA-101 - Life Safety Code. 2018 Edition.

4. NFPA-110 - Power Systems, Emergency and Standby. 2013 Edition.

5. NFPA-780 - Lightning Protection Code. 2014 Edition.

C. Applicable Codes:

1. ANSI-A17.1: Elevators, Dumbwaiters, Escalators and moving walks.

2. InterNational Building Code. 2018 Edition.

D. Should any work be construed as being contrary to or not conforming to aforementioned codes, such alleged confliction to be brought to attention of Architect in writing ten (10) days prior to bid date for review so that such point in question may be resolved. All work to be installed in strict conformity with applicable codes without additional cost to Owner.

E. Contractor to submit and/or file with proper authorities all necessary specifications and drawings as required by governing authorities.

1.6 DESIGN REQUIREMENTS

A. Complete Short Circuit, Protective Device Coordination, and Arc Flash Study to meet requirements of NFPA 70 and NFPA 70E. ARC Flash Study to include new panels.

1. Arc Flash Study: Perform Arc Flash Analysis to include the following at each distribution bus:

a. Bolted fault current.

b. Arc fault current.

c. Protective device characteristic and arc fault duration.

d. System voltages and equipment class.

e. Working distances.

f. Calculated incident energy.

g. Calculated arc flash protective boundary.

B. Arc Flash Sign Installation: Implement the Arc Flash sign installation requirements for electrical equipment as specified in NEC Article 110.16 Flash Protection and NFPA 70E.

C. Arc Flash Training: Provide training for the Owner's qualified electrical personnel of the potential arc flash hazards associated with working on energized equipment (minimum of 4 hours).

1. The training shall be certified for continuing education units (CEUs) by the International Association for Continuing Education Training (IACET) or equivalent.

2. Include in Project Close-out Documents training notes, outlines, and Power Point presentation of training session. Also include attendance record of personnel attending the training session.

3. Training session shall be video taped. Include copy of DVD of training session in Project Close-out Documents.

1.7 SUBMITTALS

A. Submit individual submittals for each item or piece of equipment. Assign a separate submittal number and transmittal to each item. Do **NOT** group items or equipment together in one submittal, they will be rejected and returned without review.

B. Within fifteen (15) days after contract has been awarded, Contractor to submit to Designer for review a complete list of materials, equipment, and accessories proposed for use, listing the item and manufacturer's name only.

C. Based upon aforementioned approved listing, Contractor to submit One (1) electronic PDF copy of COMPLETE BROCHURES AND SHOP DRAWINGS OF ALL MATERIALS, FIXTURES, AND EQUIPMENT that he proposes to use giving the names of manufacturers, trade name and specific catalog numbers.

D. Brochures to be submitted in time to allow fifteen (15) days from date of receipt in Engineer's office before final approval or disapproval is required to meet construction schedule. Submittals to bear Contractor's stamp of approval evidencing he has examined and checked same and information contained therein is in accordance with contract requirements, and any deviations to be clearly marked. Approval of shop drawings not to be construed as permitting departure from the contractual documents.

E. Above-mentioned brochures to be submitted and approved before any materials are ordered.

F. In the event that within time stated above contractor fails to submit complete list of materials, equipment and accessories in proper form, the Designer reserves the right to select a full line of materials, fixtures, and equipment, which shall be binding upon Contractor for these materials, fixtures, and equipment as the case may be and which shall be used in his work.

G. Brochures: Submit complete descriptions, illustrations, specification data, etc. of all materials, fittings, devices, fixtures, special systems, etc., including the following:

1. Panelboards.

2. Wiring devices and plates.

3. Motor starters and contactors.

4. Disconnect switches.

5. Enclosed circuit breakers.

6. Lighting, including lamps.

7. Arc flash calculations and printout of labels.

H. Proposed items to be clearly indicated when other items are shown on same sheet. When proposing items other than those specified, brochures to contain both specified item sheets and proposed item sheets for ease of comparison. On request from Designer, samples shall be submitted and/or set up, as directed, for inspection and approval. Samples will be returned to Contractor.

I. Shop Drawings: Submit specific shop drawings for major materials including the following:

1. Motor starters and contactors including custom wiring diagrams.

2. Fire alarms and smoke detection systems, including point-to-point wiring diagrams.

3. Emergency power generator system including automatic transfer switches.

4. Lightning protection system.

5. Electromagnetic shielding systems.

6. Motor Control Centers including schematic wiring diagrams.

7. Intercom equipment.

8. MATV.

9. Dimensional layout of all electrical rooms, drawn to scale, with equipment location shown therein. Clearances to be in accordance with NEC and local codes.

10. Electrical Coordination Study submitted by switchgear manufacturer to include time-current curves and all related breaker data information. Coordination Study must be approved by the engineer prior to order of switchgear.

1.8 OPERATING AND MAINTENANCE MANUALS

A. Prior to final acceptance of the project, furnish to Owner complete bound sets of operation and maintenance manuals of instructions for operation and maintenance of all pieces of equipment and systems provided under this division of specifications.

B. Manuals to also include all submittal data on all materials and equipment. Clearly indicate items provided on this project. A list giving name and address of nearest supply house carrying spare parts and name of Installation Contractor to be given to Owner.

C. Verbally instruct Owner's representatives. Contractor to obtain letter signed by the owner's representative indicating that the in-service training has been completed.

D. Three sets of the following data are required:

1. Operating and maintenance instructions.

2. Spare parts lists.

3. Copies of approved submittal data.

E. Arrange each set of data in an orderly way, and bind each set in a separate 3-ring, hard-cover binder.

F. As soon as data accumulates, prepare one of the sets and deliver to the Owner's Representative, continuously updating this set as additional data is obtained.

G. At completion of work, submit two complete sets of data to the Owner's Representative for distribution to the proper parties.

H. Short Circuit, Protective Device Coordination and Arc Flash Study.

I. Arc Flash Hazard/Risk Category Chart, from NFPA 70E, identifying required protective clothing and Personal Protective Equipment (PPE).

1.9 DELIVERY AND STORAGE

A. Insofar as possible, deliver items in manufacturers' original unopened packaging. Where this is not practical, cover items with protective materials, to keep them from being damaged. Use care in loading, transporting, unloading, and storage to keep items from being damaged.

B. Store items in a clean dry place and protect from damage.

C. All damaged painted surfaces of equipment to be touched up to match original paint.

1.10 RECORD DRAWINGS

A. Keep a set of blueline prints at the job site exclusively for recording deviations from the drawings.

B. Record locations and depths of buried and concealed conduits from fixed easily identifiable objects, such as building walls. Where conduits are concealed in walls, indicate distances off of building corners or other building features not likely to be disturbed by future alterations.

C. Mark deviations in colored pencils so that work of various systems can be easily identified.

D. When work is completed, record all deviations on clean sepia copies of drawings.

E. Submit three sepia copies of completed "record drawings" to Owner's Representative for distribution.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. All materials and equipment used in carrying out these specifications to be American made unless approved otherwise by the Owner and to be new and have UL listing, or listing by other recognized testing laboratory when such listings are available. Specifications and drawings indicate name, type, and catalog numbers of materials and equipment to be used as "standards" shall not be construed as limiting competition. Contractor may at his option, use materials and equipment when, in the judgment of the Designer, they are equivalent to that specified.

B. All products, materials, and equipment shall comply with the Buy American Act.

PART 3 - EXECUTION

3.1 COORDINATION

A. Intent:

1. These sections of specifications and drawings form a complete set of documents for the electrical work of this project. Neither is complete without the other. Any item mentioned in one shall be as binding as though mentioned in both.

2. The intent of these specifications and drawings is to form a guide for a complete electrical installation. Where an item is reasonably necessary for a complete system but not specifically mentioned, such as pull boxes, fittings, expansion fittings, support hangers, etc., provide same without additional cost to Owner.

3. Electrical layouts indicated on drawings are diagrammatical only. Exact location of outlets to be governed by project conditions. The Designer reserves the right to make any reasonable changes (approximately 6 feet) in location of junction boxes, or equipment prior to roughing-in of such without additional cost to Owner.

B. Deviations:

1. No deviations from specifications and drawings to be made without full knowledge and consent of Designer.

2. Should Contractor find during progress of work that existing conditions make desirable a modification of the requirements of any particular item, report such item promptly to Designer for his decision and instructions.

C. Insofar as it is possible to determine in advance, leave proper chases and openings. Place all outlets, anchors, sleeves, and supports prior to pouring concrete or installation of masonry work. Should contractor neglect doing this, any cutting and/or patching required to be done is at this contractor's expense.

D. Visit site and be informed of conditions under which work must be performed. No subsequent allowance will be made because of error or failure to obtain necessary information to completely estimate and perform work involved.

E. Designer to be mediating authority in all design related deviations and disputes arising on the project.

F. Coordinate to assure that proper points of service transformer locations, voltage characteristics and capacity of service are in accordance with contract drawings.

3.2 CUTTING AND PATCHING

A. Repair or replace routine damage caused by cutting in performance of this contract.

B. Correct unnecessary damage caused due to installation of electrical work, brought about through carelessness or lack of coordination.

C. Repairs to be performed with materials which match existing materials and to be installed in accordance with appropriate sections of these specifications.

3.3 TRENCHING, EXCAVATION, BACKFILLING, AND REPAIRS

A. Provide trenching, excavation, and backfilling necessary for performance of electrical work.

B. Trenching and excavation to be unclassified. No extra will be paid in event that rock is encountered.

C. Backfilling to be carefully done using only clean earth thoroughly tamped and compacted below and above embedded items.

3.4 FOUNDATIONS AND PADS

A. Provide foundations and pads required for equipment provided under this division of specifications. Coordinate proper size and location of foundations, pads, anchor bolts, and other items to be built into structure.

B. Concrete to be in accordance with concrete division of these specifications.

3.5 TESTS

A. On completion of work, installation to be entirely free from grounds, short circuits, and open circuits. Perform a thorough operational test in presence of Owner or his representative. Balance all circuits so that feeders to panels be not more than 10% out of balance between phases with all available load energized and operating. Furnish all labor, materials and instruments for above tests.

B. Furnish Owner, as a part of closing file, a copy of such tests including identification of each circuit and readings recorded, also the main service ground test as described in Section 26 05 26 of these specifications. Test information to be furnished to Owner includes ampere readings of all panels and major circuit breakers, insulation resistance reading of motors and transformers.

C. Prior to final observation and acceptance, test, leave in satisfactory operating condition all electrical systems and equipment including but not limited to the following:

1. Electrical distribution system.
2. Ground fault protection system.
3. Emergency power generation system.
4. Fire alarm and smoke detection system.
5. Electric motors for all equipment.
6. Electric safety devices.
7. Any alarm system, generator, door security, etc.
8. CCTV system.

3.6 INSPECTION FEES AND PERMITS

A. Obtain and pay for all necessary permits and inspection fees required for electrical installation.

3.7 IDENTIFICATION OF EQUIPMENT

A. Properly identify all starters, contactors, relays, safety switches and panels with permanently attached black (normal power) or red (essential systems) phenolic plates with 1/4" white engraved lettering on the face of each attached, with two sheet metal screws. Starters and relays connected by the electrical tradesman to be identified by him whether furnished by him or others.

3.8 TEMPORARY LIGHTS AND POWER

A. Provide a temporary electrical lighting and power distribution system of adequate size to properly serve the following requirements, including adequate feeder sizes to prevent excessive voltage drop. Temporary work to be installed in a neat and safe manner in accordance with the National Electrical Code, Article 590, and as required by OSHA or applicable local safety codes.

B. Provide one duplex power outlet for every 1,500 square feet of floor area, evenly distributed throughout the building. Power outlets to be 20 amp, single phase located as directed by the contractor.

C. Check with contractor prior to installation to determine if any lighting or power outlets over the maximum quantity noted above are required.

D. Provide service and panelboards required for above lighting and power outlets.

E. Power consumption will be paid for by the Contractor.

F. Check with the Contractor prior to installation to determine whether single phase or three phase service is desired.

3.9 OBSERVATIONS

A. When field observation services are a part of the project scope, Engineer's office will provide periodic observation of the progress of work specified herein. Purpose of the observation is to ensure compliance of Contractor's work with specifications and drawings. Engineer's office will also observe tests required of Contractor as called for in other sections of specifications.

B. Specifications and drawings represent work to be done in view of total project requirements. Final location of conduits, fixtures, panels, switchboards, etc., to eliminate possible conflict with other trades is responsibility of Contractor. Contractor to provide all supervision required for his personnel to ensure that installation is made in accordance with specifications and drawings and all safety rules and regulations are observed. In event of conflicts of work on project with other trades, Contractor to make every reasonable effort to resolve conflict through meetings and discussions with other parties involved, by preparation of drawings or other appropriate action. Only after this has been done shall the Engineer's assistance be requested.

C. When Engineer is requested to visit project to aid in resolution of conflicts or for witnessing tests, he shall be given a minimum of 48 hours notice prior to time his presence is required at job site.

3.10 WARRANTY-GUARANTEE

A. Designer reserves right to accept or reject any part of installation which does not successfully meet requirements as set out in these specifications.

B. Contractor shall and hereby does guarantee all work installed under this division shall be free from defects in workmanship and materials for a period of one year from date of final acceptance, whichever is earliest. The above parties further agree that they will repair and replace any defective material or workmanship which becomes defective within the terms of this warranty-guarantee.

END OF SECTION

SECTION 26 05 19 - CONDUCTORS 600 VOLT AND BELOW

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Provide a complete system of conductors for lighting, power, and controls throughout building.

B. Refer to drawings for sizes of conductors.

PART 2 - PRODUCTS

2.1 CONDUCTORS - POWER AND LIGHTING

A. Provide 98% conductivity copper conductors with 600-volt insulation.

B. Interior conductors shall be Type THHN-2/THWN-2 insulation.

C. 600-volt insulation for conductors installed in underground raceways shall have XLP (cross-linked polyethylene) insulation, Type XHHW-2.

D. For feeder and branch circuit conductors No. 12 AWG and No. 10 AWG, provide solid type.

E. For all control and motor circuits, and all conductors No. 8 AWG and larger, provide stranded type.

F. Conductors shall be manufactured by Triangle, Phelps Dodge, Southwire, or approved substitute.

G. Provide white or gray colored neutral conductors; provide black or color coded phase conductors.

H. Provide No. 14 AWG stranded type THHN fixture conductors, for conductors entering fixtures and in stems of pendant fixtures.

I. Provide type THHN stranded conductors, 90° C for conductors running through continuous rows of fluorescent fixtures.

J. For service entrance conductors and panel feeders (#1/0 and larger), stranded aluminum conductors of equivalent ampacities may be substituted. Increase conduit sizes to accommodate larger aluminum conductors.

2.2 CONDUCTORS - CONTROLS

A. Single Conductor

1. Class B stranded soft-drawn copper with 600 volt thermoplastic insulation.

2. Size 14 AWG.

3. Type THHN/THWN.

B. Multiconductor

1. 600 Volt insulated Type TC

2. 16 AWG stranded (7x24) copper

3. PVC insulation – unshielded

4. 90º C rating

2.3 CONDUCTORS - INSTRUMENTATION

A. Type TC, Class B concentrically stranded copper with 300 volt PVC insulation.

B. Single twisted pair of triad shielded cables as required.

C. Overall foil shield with stranded, tinned copper drain wire.

D. Separate communication wire for calibration.

E. Size 16 or 18 AWG.

F. Temperature Rating: 105°C.

2.4 CONDUCTORS - THERMOCOUPLE

A. Solid thermocouple extension wire with 300 volt PVC insulation (nominal 16 mils).

B. Color coded per ANSI - MC96.1 - 1982.

C. Single twisted pair, one conductor identified, with overall aluminum/mylar shield with a tinned copper drain wire.

D. PVC insulated copper communications wire.

E. Size 16 AWG for runs over 100 feet - otherwise 20 AWG.

F. Temperature Rating: 105° C.

2.5 ACCEPTABLE MANUFACTURERS AND TYPES - CONTROLS, INSTRUMENTATION, DATA CONNECTIONS AND THERMOCOUPLE

A. Use Belden or approved substitute.

B. Control Wiring: Belden 27090A multiconductor cable

C. Instrumentation: Twisted Pair – Belden 1032A or Belden 3076F cable.

D. Instrumentation: Twisted Triad – Belden 1031A cable.

E. Thermocouple Extension: Belden 311xA series cable where x = thermocouple type.

F. Ethernet Cable: Belden 7953A DataTuff Cat-6 shielded cable

G. Ethernet Fiber: Belden I100655 Fiber – TrayOptic fiber cable.

H. RS – 485 Cable: Belden 3107A cable

I. ControlNet Cable: Belden 3092A or 3093A for underground and wet locations

J. DH+ Cable: Belden 9463 or Belden 9463DB for underground locations

K. DeviceNet: Belden 9880 (Thicknet) or 9907 (Thinnet)

L. Foundation Fieldbus and PROFIBUS Cable: Belden 1327A (2 – Pair) for connection from control cabinet to segment protector and Belden 3076F (1 – Pair) for instrument drop connection.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install pull boxes in circuits or feeders over 100' long.

B. All conductors shall be continuous from origin to panel or equipment termination without splices where possible. Where splices and taps are necessary or are required, they shall be made in splice boxes with suitable connectors.

C. Make all splices or connections only at outlet, pull or junction boxes.

D. Use pulling compound to pull conductors.

E. Install instrument and data connection conductor in separate raceways from all other conductors. Separate control wiring from power wiring in separate raceways. Separation distances shall be as specified by control system manufacturer or as listed in IEEE Standard 518, whichever is greater.

F. Bend radius on conductors shall be less than the limitations listed by the cable manufacturer.

G. Deliver all conductors to job site new and in original wrapping, package or reel.

H. All conductors and connections shall test free of grounds, shorts, and opens.

I. For 20-amp, 120-volt branch circuits, provide No. 10 wire in lieu of No. 12 wire for any branch circuit in excess of 90 linear feet to prevent excessive voltage drop. Where branch circuit exceeds 175 linear feet, use No. 8 wire.

J. Use Ideal wing nuts, Scotchlok Type Y, R, G, or B, or approved equivalent connectors for fixture connections at outlet boxes.

K. Make feeder taps and joints with OZ type T, PT, PM or PTS, or approved equivalent clamp connectors as manufactured by Kupler, or with approved compression sleeves. Wrap connectors with No. 10 electro-seal or approved equivalent plastic filler and vinyl tape.

L. Use only compression lugs equal to T & B series 60,000 for termination of aluminum conductors.

M. Leave a minimum of 8" slack wire in every outlet box whether it be in use or left for future use.

N. Color code conductors as follows:

CONDUCTOR COLOR CODE		
	120/208 Volt	277/480 Volt
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Gray
Ground	Green	Green

O. If the above conflicts with existing color coding, match existing.

P. Use factory color coded conductors where commercially available. If not, use black wire and band with color tape.

END OF SECTION

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. The entire system of raceways and equipment to be grounded in accordance with Article No. 250 of latest edition of National Electrical Code and any local regulation or governmental governing authority.

PART 2 - PRODUCTS

2.1 EQUIPMENT REQUIREMENTS

A. Main service disconnect means shall be bonded to street side of first flange or coupling of incoming main water line serving project with heavy-duty ground clamp in accordance with Article 250.104 of N.E.C. The grounding electrode conductor shall be sized in accordance with Table 250.66 of N.E.C. An additional ground wire of same size shall be run to a tripod grounding rod system driven in ground outside foundation of building. This system shall consist of three 3/4" x 10' copperweld ground rods driven in ground in an equilateral triangular configuration with a minimum of 15' spacing between each. Connection of each ground rod to one another shall be made using a conductor of same size as being run for main service ground. Building steel shall be connected to ground bus on main service with a conductor the same as required on the service. This ground will be in addition to the previously specified grounds.

2.2 GROUND CLAMPS

A. OZ Electrical Manufacturing Company, Steel City, Appleton, or approved substitute.

B. Feeder circuits to panels, motor control centers, etc., shall have a separate green grounding conductor in conduit sized in accordance with Table 250.122 of N.E.C.

C. All branch circuits shall have a separate green grounding conductor installed in same conduit as phase and neutral conductor from panel ground bus to device. The grounding conductor shall be sized in accordance with Table 250.122 of N.E.C.

D. Ground all electrically operated equipment utilizing separate code size grounding conductors run in feeder conduits or contained within outer jacket enclosing the circuit conductors contained in flexible cords.

E. Flexible conduit will not be approved as achieving continuity of ground. All flexible conduit shall have a jumper wire sized to ampacity of branch breaker and shall be connected to conduit system on both ends; this applies to fixtures, motors, controls, etc.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Effectively bond all grounding conductors to grounding electrodes, equipment enclosures and ground busses.

B. Provide a shunt path around main water meter by bonding around both sides of meter to assure continuity.

C. Locate all grounding attachments away from areas subject to physical damage. Provide protective covering as required.

D. Clean all non-conductive surfaces on equipment to be grounded, to assure good electrical continuity.

E. Ground on main service shall be tested to obtain no greater than 10 ohms using 3-Point Fall of potential test. Test data shall be submitted to Engineer for review and such test data shall become a part of the final brochure.

END OF SECTION

SECTION 26 05 29 - SUPPORTING DEVICES AND HANGERS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Provide a system of supporting devices and hangers to ensure secure support or bracing for conduit, electrical equipment, including safety switches, fixtures, panelboards, outlet boxes, junction boxes, cabinets, etc.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Provide appropriate supporting devices and hangers as manufactured by Erico Products, Inc., Steel City, Rayco, or approved substitute:

1. Vertical flange clamps (beam clamps).

2. "Z" purlin clips.

3. Conduit clips.

4. Universal clamps (Beam clamps).
5. Beam clamps (set screw type).
6. Combination push-in conduit clips.
7. Combination conduit hanger clamps.
8. Flexible conduit clips.
9. Special combination conduit clips.
10. One hole steel straps.
11. Minerallac conduit hangers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Secure conduits to within 3' of each outlet box, junction box, cabinet, fitting, etc., and at intervals not to exceed ten feet (10') for EMT and IMC conduit and in accordance with Table 344.30 (B) (2) for Rigid Steel conduit.

B. Install clamps secured to structure for feeder and other conduits routed against the structure. Use drop rods and hangers or racks to support conduits run apart from the structure.

C. Furnish and install suitable angle iron, channel iron or steel metal framing with accessories to support or brace electrical equipment including safety switches, fixtures, panelboards, outlet boxes, etc.

D. Paint all supporting metal not otherwise protected, with rust inhibiting primer and then with a finish coat if appropriate to match the surrounding metal surfaces. (Prepainted or galvanized support material is not required to be painted or repainted.)

E. Use of chains, perforated iron, bailing wire, or tie wire for supporting conduit runs will not be permitted.

END OF SECTION

SECTION 26 05 34 - RACEWAYS AND CONDUIT SYSTEMS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Provide a complete conduit system with associated couplings, connectors, and fittings.

B. Conduits shall be mechanically and electrically continuous from outlet to outlet and from outlets to cabinets, pull or junction boxes.

1.3 SUBMITTALS

A. Submittal for products furnished under this section is not required.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. IMC, RGS and EMT conduit shall be hot-dip galvanized, or electrogalvanized steel by Allied, Wheatland Tube, Republic Conduit, Western Tube, or approved substitute.

B. Erickson couplings for IMC and RGS, shall be used where neither length of conduit can be rotated.

C. IMC/RGS conduit connectors from 1/2” to 4” trade sizes shall use compression type.

D. EMT conduit connectors from 1/2” to 2” trade sizes shall use set screw type. EMT conduit connectors from 2-1/2” to 4” trade sizes shall use two set screw type.

E. Weatherproof hub shall be complete with sealing "O" ring or sealing locknuts.

F. Provide polyvinyl chloride (PVC) conduit, Type 40, and associated couplings, connectors, and fittings. PVC conduit shall be UL listed and 90 degrees C UL rated.

2.2 ELECTRICAL METALLIC TUBING (EMT)

A. Use Electric Metallic Tubing (EMT) for:

1. Branch circuits installed overhead, both exposed and concealed, installed more than 6 feet above finished floor.

2. Branch circuits originating from isolated panels (O.R., Cystoscopy, or Delivery).

2.3 INTERMEDIATE METAL CONDUIT (IMC)

A. Use Intermediate Metal Conduit (IMC) for:

1. Panelboard feeders.

2. Branch circuits installed in hazardous areas.

3. Branch circuits and feeders installed in concrete slabs at ground floor.

4. Branch circuits installed exposed below 6 feet above finished floor.

5. Branch circuits installed in wet locations.

6. Pendant drops.

2.4 RIGID GALVANIZED STEEL (RGS)

A. Conduit Use:

1. Interior and exterior exposed primary service conduit.

2. Interior and exterior exposed secondary service conduit.

3. Exterior exposed branch circuits.

2.5 POLYVINYL CHLORIDE (PVC)

A. Use PVC for:

1. Service entrance conduits for power encased in concrete.

2. Service entrance conduits for telephone.

3. Exterior feeders encased in concrete.

4. Exterior underground branch circuits.

5. Primary power conduits encased in concrete.

B. PVC conduit shall not be used for feeders or branch circuits inside the building.

2.6 FLEXIBLE METAL CONDUIT

A. Provide a flexible metal conduit system for the termination points at equipment that may possibly vibrate such as motors, welders, etc. The length shall not exceed 6 feet.

B. Conduit shall be electrically continuous from outlet or conduit end to the utilization equipment.

C. The total length of flexible conduit in any circuit shall not exceed 6 feet.

D. Where exposed to continuous or intermittent moisture, conduit shall be liquid tight flexible type, U.L. Type EF.

PART 3 - EXECUTION

3.1 INSTALLATION

A. ALL EXPOSED CONDUIT IN PUBLIC AREAS SHALL BE PAINTED BY PAINTER, NOT ELECTRICIAN PRIOR TO INSTALLATION AND TOUCHED UP AS REQUIRED.

B. Minimum size of conduits shall be 1/2 inch.

C. Conduit joints shall be cut square, threaded, reamed smooth, and drawn up tight so conduit ends will butt in couplings, connectors, and fittings.

D. Make bends or offsets with standard ells or field bends with an approved bender.

E. Run conduits concealed in floor slabs, below slabs, or in walls in direct line with long sweep bends or offsets. Run exposed conduits and conduits run above lay-in ceilings parallel to and at right angles to building lines. Group multiple conduit runs in banks.

F. Secure EMT conduits to all boxes and cabinets with a steel set screw on the outside and a locknut on the inside.

G. Cap ends of conduits to prevent entrance of water and other foreign material during construction.

H. Complete conduit systems before pulling conductors.

I. Conduits shall be divided according to voltage and amperage service level. Conduits of different voltage levels shall be physically separated by the following distances unless otherwise specified on the drawings by the electrical engineer or control system supplier.

1. Level 1 conduits shall contain low level input/output signal conductors including RTD cables, thermocouple cables, and 4-20 mA d.c. cables from field transmitters.

2. Level 2 conduits shall contain all conductors for 24 volts d.c. power and signal.

3. Level 3 conduits shall contain all conductors for 120 volt a.c. power to the PLC control cabinets, motor control circuits, field devices requiring 120-volt power, etc.

4. Level 4 conduits shall contain all conductors for 120 volts d.c. control power greater than 3 amps, all 120 volts a.c. power greater than 20 amps, and all power circuits with voltage ratings higher than 120 volts a.c. (277, 480, 4160, 13,200 volts etc.). Examples include 480-volt motor feeds, 5-kV feeders, and 120-volt lighting circuit and input/output devices such as limit switches and solenoid valves.

5. Conduits shall be physically separated from each other by the following distances:

SPACING REQUIREMENTS (IN INCHES) FOR METALLIC CONDUITS			
From Level	To Level 2	To Level 3	To Level 4
Level 1	Minimum 1"	Minimum 6"	Minimum 26"
Level 2	0"	Minimum 6"	Minimum 26"
Level 3	Minimum 6"	0"	Minimum 18"

6. Levels 1, 2, and 3 conductors shall additionally be routed away from sources of high voltage or RF radiation such as switchgear, transformers, radio transmitters, and repeaters. Minimum separation from these sources of interference shall be 5 feet.

7. Data highway communications cable are generally considered Level 1 conductors; however, special requirements apply for routing to assure a low noise environment. Refer to electrical drawings and controls supplier requirements for special considerations before routing these conduits.

J. Where conduits of different levels must cross, the minimum separations shall be maintained, and they shall cross at right angles.

K. Provide cable supports in conduits rising vertically in accordance with the National Electrical Code, Article 300-19.

L. Provide nylon pull cord in all empty conduits. Steel wire not acceptable as pull wire.

M. Conduits which pass through floor slabs (except ground floor) shall be sealed with concrete grout. Seal around conduits or other wiring materials passing through partitions, which extend to the underside of the slab above, and those passing through smoke partitions and fire-rated walls. Refer to appropriate details on architectural and mechanical drawings.

N. Conduits which enter crawl space, tunnels, and basements from outside the building shall be grouted-in to prevent entry of gases, vapors, insects, or rodents to these spaces from street mains.

O. Conduit not serving elevator equipment shall not be permitted to pass through elevator shafts or elevator equipment rooms.

P. Where IMC or RGS conduit is installed in a cabinet, junction box, pull box, or auxiliary gutter, conductors shall be protected by an insulated bushing. Locknuts shall be installed on conduit outside and inside enclosure.

Q. In areas where enclosed and gasketed fixtures and weatherproof devices are specified, where rigid conduit enters a sheet metal enclosure, junction box and outlet box, and not terminated in a threaded hub, a steel, or malleable iron nylon insulated hub, complete with recessed sealing "O" ring or sealing locknut shall be used.

R. Where conduits stub up in conduit space beneath switchgear and do not connect directly to equipment enclosures, use malleable iron nylon insulated ground bushing with a lay-in lug design complete with bonding screw, Raco 1212-1296.

S. Provide seal-off fitting in all conduits entering hazardous areas and any conduits entering a cold temperature area such as freezers and dry refrigerators.

T. In concrete slabs, block up conduit from forms and securely fasten in place. All conduits in slabs shall have a minimum of 1-1/2 inches concrete coverage above and below.

U. Encase in 4 inches of 1:2:4 mix concrete on all sides all feeder conduits laid below ground outside building foundation line.

V. Where conduits running overhead pass through building expansion joints they shall be connected by flexible metal conduit of same size with sufficient slack to allow conduits on either side of expansion joint to move a minimum of 3 inches in any direction. Provide supports as required on each side of expansion joint, all in accordance with seismic requirements of specific area.

W. Conduits for feeders and branch circuits shall be terminated directly into panelboard enclosure without the use of pull boxes, junction boxes, wireways, or auxiliary gutters, unless the panelboard enclosure does not provide sufficient surface area for all conduits. Where such cases exist, the contractor shall notify the Designer. In no case will splices in such boxes, wireways, etc., be permitted.

X. Failure to route conduit through building without interfering with other equipment and construction shall not constitute a reason for an extra charge. Equipment, conduit, and fixtures shall fit into available spaces in building and shall not be introduced into building at such times and manner as to cause damage to structure. Equipment requiring servicing shall be readily accessible.

Y. All conduit to be spot painted within 6 inches of termination and every 10 feet using the following color code:

1. Purple: Essential Distribution not listed herein

2. Red: Fire Alarm System

Z. No conduit shall be installed in elevated slabs.

3.2 EMT

A. Do not use electric metallic tubing in cinder concrete or cinder fill where subject to permanent moisture unless protected on all sides by a layer of noncinder concrete at least 2 inches thick or unless the EMT is at least 18 inches under the fill. Use of set-screw fitting is not acceptable in concrete or in fill under slab.

3.3 PVC

A. Use threaded fittings for all connectors and adapters.

B. Provide code sized ground conductors in all power conduit runs.

C. Provide 1/4-inch nylon pull rope in all primary power and incoming telephone service entrance conduits.

D. Encase all PVC conduit in reinforced concrete with a minimum of 4-inch encasement on all sides except exterior branch circuits.

E. No PVC shall emerge from the ground or the concrete slab or encasement. PVC shall convert to galvanized rigid metal prior to its emergence.

F. Make bends with standard ells or with an approved heat bender.

3.4 FLEXIBLE METAL CONDUIT

A. Flexible metal conduits shall be 1/2 inch minimum size.

B. Where fittings for liquidtight flexible conduit are brought into an enclosure with a knock-out, a gasket assembly, consisting of one piece "O" ring, with Buna-N sealing material, Raco Series 3500, shall be installed on outside of box. Fittings shall be made of either steel or malleable iron only, and shall have insulated throats or insulated bushings.

C. In dry locations, where final connections to motors and other equipment may be made with flexible metal conduit, fittings shall be of steel or malleable iron only with insulated throats or insulated bushings, and shall be of wedge and screw type having an angular wedge fitting between convolutions of conduit.

D. An additional copper ground wire shall be installed inside of flexible conduit and bonded at each end to assure continuity of ground to lighting fixtures, controls, and other utilization equipment.

E. All recessed lighting fixtures shall be connected with flexible metallic conduit from outlet box to fixture. Rigid conduit connections to lighting fixtures are not acceptable.

F. Install liquidtight flexible conduit in such a manner as to prevent liquids from running on the surface toward fittings.

G. Allow sufficient slack conduit to reduce the effect of vibration.

END OF SECTION

SECTION 26 05 37 - OUTLET BOXES

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Provide each fixture, switch, receptacle, communication devices, and other wiring devices with a galvanized outlet box of appropriate size and depth for its particular location and use unless indicated otherwise.

1.3 SUBMITTALS

A. Submittals are not required for items furnished under this section.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Outlets and junction boxes shall be Steel City or approved substitute.

B. Provide 4" square x 1-1/2" deep boxes for switches and receptacles in drywall partitions. Use square cut plaster rings of proper gauge and depth.

C. Provide 4" x 1-1/2" octagonal boxes for ceiling outlets. For increased cubic capacity provide 4" x 2-1/8" octagonal, 4" x 1-1/2" square or 4" x 2-1/8" square boxes for ceiling outlets.

D. Provide 2-1/2" x 3-3/4" one gang masonry boxes for switches and receptacles installed in concrete block walls not plastered. For increased cubic capacity provide 3-1/2" x 3-3/4" one gang masonry boxes. Where more than two conduits enter the box from one direction, provide 4" square boxes with square cut device covers not less than 1" deep specifically designed for this purpose. Use round edge plaster rings only if the block walls are to be plastered. Use sectional or gangable type outlet boxes only in dry wall construction.

E. For all systems boxes, provide 4-11/16" square outlet boxes with square cut device corners for block walls or round edge. Single gang device boxes are not acceptable.

F. Permanent barriers shall be furnished in multi-gang boxes if the voltage between adjacent wiring devices exceeds 300 volts.

G. Provide galvanized malleable iron fittings with threaded hubs for screw connections and with the proper type covers for switches and receptacles served by exposed conduit. Use pressed steel outlet only for ceiling fixture outlets.

H. Provide galvanized malleable iron condulets with threaded hubs and covers and with proper configurations for all changes of direction of exposed conduits. Standard conduit ells may be used if they do not interfere or damage or mar the appearance of the installation.

I. Provide rectangular boxes for floor outlets. Boxes to be 2-gang or 3-gang, fully adjustable before and after concrete pour, Steel City No. 642-643. Cover to be Steel City No. P64-D4/P6DS, aluminum, with duplex screw cover for duplex receptacle. Carpet flange to be lexan type. Fittings to be Steel City No. SFH50, satin aluminum for high tension and Steel City No. SFH50-TEL, satin aluminum for low tension. For boxes in elevated slabs less than four inches thick, use Steel City 642 and 643-SC.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Locate boxes to prevent moisture from entering or accumulating within them.

B. Use boxes of sufficient cubic capacity to accommodate the number of conductors to be installed. See Article #370 of the latest edition of the National Electrical Code.

C. Effectively close unused openings in boxes with metal plugs or plates.

D. Set recessed boxes so that front edges are flush with finished surfaces.

E. Secure boxes to surfaces upon which they are mounted or embed boxes in concrete or masonry. Support boxes from structural members with approved braces.

F. Install blank device plates on outlet boxes left for future use.

G. Provide bushings in holes through which cords or conductors pass.

H. Install boxes so that the covers will be accessible at all times.

I. Outlet boxes in walls shall not be mounted back to back. Where drawings show outlets on both sides of the same wall, the boxes shall be staggered sideways and connected with short nipples to prevent passage of sound. Where outlets are mounted on both sides of same fire wall they are to be staggered a minimum of 24 inches to maintain the ratings of the wall.

J. Where required to hang a specified fixture, provide a fixture stud of the no-bolt, self-locking type on ceiling outlets.

END OF SECTION

SECTION 26 05 38 - PULL AND JUNCTION BOXES

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Provide pull and junction boxes of appropriate size and depth or as indicated on the drawings and as specified hereinafter.

1.3 SUBMITTALS

A. Submittals of products furnished under this section are not required.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS/MATERIALS

A. Pull and junction boxes shall be by Hoffman or approved substitute.

B. For interior work, provide galvanized sheet metal boxes of code thickness with lapped and welded joints, 3/4 inch flanges, screw covers, etc.

C. For exterior work, provide galvanized sheet metal boxes of code thickness with lapped and welded joints, 3/4 inch flanges, bolted covers with full gaskets forming a completely water-tight assembly, equal to Hoffman, Concept Series.

D. For exterior work in graded areas outside the building, provide heavy duty sidewalk junction boxes externally flanged for flush mounting. Covers to be fully gasketed, watertight and secured with plated screws or bolts. Carlon Type "PC" plastic type or approved substitute. See drawings for size and type cover.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide junction boxes as shown on drawings and otherwise where required, sized according to number of conductors in box or type of service to be provided. Minimum junction box size 4 inches square and 2-1/8 inches deep. Provide screw covers for junction boxes.

B. Use minimum 16 gauge steel for pull boxes and provide with screw cover.

C. Install boxes in conduit runs wherever necessary to avoid long runs or excessive bends. Do not exceed 100 foot runs, or three 90 degree bends, without pull boxes.

D. Rigidly secure boxes to walls or ceilings. Use of conduit as a support is not acceptable.

E. Install boxes in accessible locations. Size boxes in accordance with Articles No. 312 and No. 314 of the latest edition of the National Electrical Code.

F. Install boxes so that the covers will be accessible at all times.

G. Do not install pull or junction boxes for joint use of line voltage and signal or low voltage controls unless all conductors are insulated for the highest voltage being used in the same box. Emergency system and normal system circuits shall not be routed through a common pull or junction box.

H. Contractor to spot paint all boxes inside and out per the following color code:

1. Purple: Essential Distribution not listed herein

2. Red: Fire Alarm System

END OF SECTION

SECTION 26 05 45 - PAD TRANSFORMER ELECTRIC SERVICE

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Service will be underground and will be a 480/277-volt, 3-phase, 4-wire, wye system.

B. System will be serviced by Singing River EPA.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Service shall be grounded in accordance with latest edition of National Electric Code, Article No. 250, and any special requirements as required by municipal, state, or federal authorities having jurisdiction.

B. Metering shall be provided by power company on transformer housing.

C. Transformers shall be provided by power company and shall be a pad-mounted type of transformer.

D. Transformer shall be mounted on a reinforced concrete pad, sized and detailed in accordance with utility company requirements. This will be installed on raised platform as shown on drawings.

E. Primary conduits shall be provided by Division 26 as shown on drawings, including pull rope, excavation, backfill, and a 4" concrete envelope. Any spare conduits shown shall be capped off 12 inches above grade with plumber's pipe cap.

F. Conduits shall be terminated with OZ Type R, G & W Type CS, or equal cable terminator.

G. Primary conductors shall be provided by power company.

H. Secondary conduits, wire, excavation, and backfill to be provided by Division 26 as shown on drawings from transformer to main distribution point.

I. Division 26 to provide secondary lugs on transformer and shall coordinate with power company as to proper drilling and lugs required.

PART 3 - EXECUTION

3.1 INSTALLATION/COORDINATION

A. Division 26 shall coordinate with power company to determine final exact location of transformers, exact sizes required, and conduit stub-up points for primary and secondary entrances within transformer building.

B. Division 26 shall be responsible for furnishing a breakdown listing the loads as shown on the drawings for the power company.

END OF SECTION

SECTION 26 05 47 - SEISMIC RESTRAINT OF ELECTRICAL EQUIPMENT AND SUSPENDED UTILITIES

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 DESCRIPTION

A. Provide engineered seismic restraint systems for suspended and base mounted Panelboards, Generators, and Automatic Transfer Switches utilities compliant with the currently adopted version of the International Building Code (IBC) with local building code amendments.

B. All equipment manufacturer’s shall submit, as part of the equipment submittal, compliance certifications and anchorage details specific to each unit provided.

C. At seismic restraint installation locations, provide vertical support systems engineered to accommodate dead load plus seismic force reactions.

1.3 RELATED SPECIFICATION SECTIONS

A. Panelboards 26 24 16.

B. Generators / Automatic Transfer Switches 26 36 00.

1.4 REFERENCES

A. Publications, codes and standards listed below form a part of this specification to the extent referenced.

1. 2018 International Building Code (IBC)

a. Chapter 16 - Structural Design

b. Chapter 17 – Structural Tests And Special Inspections

2. ASCE 7-16, Chapter 13, Minimum Design Loads For Buildings and Other Structures, American Society of Civil Engineers (ASCE).

3. ACI 318, Building Code Requirements for Structural Concrete, American Concrete Institute (ACI).

1.5 COMPONENT IMPORTANCE FACTOR

A. In order to identify systems requiring seismic restraint and to define those from which restraints may be excluded, utility components are assigned an ASCE 7 Importance Factor (Ip) on the basis of the following:

B. Ip = 1.5

1. Seismic Use Group III, essential facilities required for post earthquake recovery – all “Designated Seismic Systems” per IBC Chapter 17 required for the continued operation of the facility.

2. Life-safety component which is required to function after a seismic event including fire alarm systems.

3. Components that contain hazardous or flammable materials.

C. Ip = 1.0: All other components.

1.6 SUBMITTALS

A. Equipment Certification.

1. Equipment manufacturer to provide certificate of compliance for 2018 IBC proxing on line capability for the project use group and seismic design category. Provide certifications for the following equipment: Emergency and stand by power systems including generators, fuel tanks, and automatic transfer switches, switchgear, motor control centers, transformers, electrical substations, UPS and associated batteries, distribution panels including electrical panel boards, control panels including fire alarm, and auxiliary or remote power supplies. Equipment manufacturer certification to be based on shake table or three dimensional shock testing or experience data as required by ASCE/SEI 7-16.

2. The following equipment is considered rugged and does not require a certificate of compliance: columns (ceiling or wall mounted), equipment not weighing more than 20 lbs. that are factor assembled discrete components.

B. Contractor to identify and convey each overhead deck condition to which seismic attachments will be made. Information to include type and density of concrete, concrete thickness, size and gage of metal deck and any point load limitations or restrictions.

C. Provide Seismic Design Force calculations per ASCE 7-16, Formulas 13.3-1 thru 13.3-3 stamped by a registered design professional qualified structural engineer licensed to practice in the State where project is located. For multi-story projects, provide calculated Seismic Design Force for each floor.

D. Submit seismic restraint layouts stamped by a registered design professional qualified structural engineer licensed to practice in the State where project is located. Seismic restraint layouts to show:

1. All vertical support and seismic brace locations.

2. All anchorage connections to structure. Anchor brand, type, quantity and size.

3. Vertical support and brace reaction point load at all connections to structure. For review by engineer of record in checking suitability of the building structure to accommodate imposed loads.

4. Plan set sheets showing appropriate installation details reflecting actual job site conditions.

E. Include cover sheet with Seismic Restraint Bracing Legend delineating:

1. Maximum Allowable Size or Utility Weight (Lbs/Lf).

2. Minimum Vertical Support Rod Diameter.

3. Support Rod Total Vertical Load.

4. Maximum Allowable Transverse Brace Spacing.

5. Transverse Brace Reaction.

6. Maximum Allowable Longitudinal Brace Spacing.

7. Longitudinal Brace Reaction.

8. Minimum Required Seismic Restraint Brace Arm Assembly.

9. Minimum Required Seismic Restraint Anchorage To Overhead Structure.

10. Installation Detail Drawing References.

1.7 QUALITY ASSURANCE

A. Project engineer of record to check suitability of structure to accommodate applied seismic loads.

B. Project Architect or Engineer of Record is to provide a “Statement of Special Inspections” in conformance with 2018 IBC, Chapter 17.

C. Each contractor responsible for the construction of a “Designated Seismic System” shall submit to the building official and owner prior to the commencement of work on the system or component a written “statement of responsibility” per IBC Chapter 17.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Seismic restraint hardware and engineering by International Seismic Application Technology (ISAT), Mason Industries, Tolco, or approved equal.

B. Vertical support and seismic restraint anchorages to utilize Cast-In Place Deck Inserts, or Post Installed Anchors.

C. Vertical support and seismic restraint connections to structural steel are to utilize fixed Beam Clamp connections or Welded or bolted connections.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Roof mounted equipment: All roof mounted equipment is to be positively attached to roof support curb or isolators by bolting or welding. All support curbs to resist compressive, shear, tension, and rotational loads and translate these loads to building structure. Curb design to minimize rotational loads to structure and be positively attached to building structure by bolting or welding.

B. For conditions not covered within pre-engineered drawings, the required engineering is to be performed by a registered Engineer.

C. Manufacturer shall provide field installation training prior to commencement of install.

D. Field relocation of any seismic installation points away from that shown on the furnished shop drawing layouts shall be coordinated with Engineer of record.

E. Consult Engineer of record when field conditions prohibit compliance with the supplied installation details.

F. In order to satisfy ASCE 7 minimum yield strength requirements, the allowable brace spacing for non-ductile systems (eg. cast iron, plastic and glass pipe) shall be no more than half that for ductile systems.

3.2 EQUIPMENT CONNECTIONS

A. Equipment manufacturers to provide equipment anchorage details as part of equipment certification.

B. Where seismic bracing is allowed to be omitted due to size or proximity to overhead deck, all terminations to fixed equipment, panels, etc. or to other portions of the system requiring seismic restraint are to utilize flexible connectors.

C. Where seismic bracing is allowed by code to be omitted due to size or proximity to overhead deck, contractor shall be responsible for assuring that damaging impact or vertical support failure cannot occur.

3.3 SPECIAL INSPECTION

A. Special Inspection Requirements: All Designated Seismic Systems are subject to Special Inspection per IBC Chapter 17.

B. Special inspection for mechanical components shall be provided as follows:

1. For all Designated Seismic Systems within seismic design categories D, E or F.

2. Periodic special inspection during the anchorage of electrical equipment for emergency or standby power systems in structures assigned to Seismic Design Categories C, D, E or F.

3. Periodic special inspection during the installation of anchorage of all other electrical equipment in Seismic Design Categories E or F.

4. Periodic special inspection during the installation for flammable, combustible or highly toxic piping systems and their associated mechanical units in Seismic Design Categories C, D, E or F.

5. Periodic special inspection during the installation of HVAC ductwork that will contain hazardous materials in Seismic Design Categories C, D, E or F.

6. Periodic special inspection during the installation of vibration isolation systems where the construction documents indicate a maximum clearance (air gap) between the equipment support frame and restraint less than or equal to 1/4 inch.

C. Install identification tags at all seismic brace locations. Tags to include the following information:

1. Specific seismic forces (g-force) the location was designed to resist.

2. Maximum brace reaction at connection to structure.

3. For single hung items, the maximum pipe/conduit size the brace location was designed to accommodate.

4. For trapeze supported items, the maximum weight (lbs/lf) the brace location was designed to accommodate.

5. For suspended equipment, the maximum unit operating weight (lbs) the brace location was designed to accommodate.

6. Location identifier cross matched to that on plan set layout.

7. Company name of installing contractor.

D. Upon completion of construction a Quality Assurance Representative of Engineer of Record shall review the installation of the seismic-force-resisting system and provide documentation indicating general conformance to seismic restraint layout drawing.

END OF SECTION

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Provide circuit breaker type panelboards as indicated on drawings and as specified in this section.

B. Refer to drawings for numbers of branch circuits, their ratings, number of poles, arrangements, etc.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS/EQUIPMENT

A. Provide panelboards by Square D, ABB, Siemens, or Eaton. Square D type designations are used to indicate type and quality of panelboards.

B. Lighting panelboards for 277/480-volts, 3-phase, 4-wire service shall be Square D type NF.

C. Power panelboards for 120/208-volt, and 480/277-volt, 3-phase, 4-wire service shall be Square D I-Line distribution type.

D. Lighting and power panelboards and their associated circuit breakers shall be furnished with a short-circuit current rating greater than the available fault current shown on the panel schedules.

E. Series rated panelboards are not acceptable.

F. Provide panelboards of circuit breaker, dead-front safety type, UL labeled and meeting all applicable requirements of the National Electrical Manufacturers Association.

G. Provide panelboards with lugs (both main lugs and branch circuit lugs) suitable and UL approved for aluminum and copper 75 degree C rated conductors.

H. Provide shunt trip and GFI breakers where indicated on panel schedule.

I. Provide electrically isolated neutral bars.

J. Provide separate ground bars complete with lugs or connectors on bar.

K. Provide panelboards with sequence phased bus bars or distributed phase bussing for: 3-phase, 4-wire, 277/480-volts wye and 120/208-volts wye.

L. Provide panel doors equipped with chrome-plated locks and catches, all keyed alike. Provide two keys for each lock. Provide fronts with adjustable indicating trim clamps.

M. Provide thermal magnetic circuit breakers which are fully rated and temperature rated for a 40 degree C ambient. Breakers shall be quick-make, quick-break type with trip indication shown by handle position other than ON or OFF and with a common trip on all multi-pole breakers.

N. Where specific panelboard types, breaker types, or adjustable breaker devices are shown on the drawings, and the contractor elects to use another manufacturer or type, contractor will be responsible for additional cost incurred by the designer for evaluation of breaker coordination.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Ground separate ground bars to panel boxes and to the main service entrance ground bus with a code-sized grounding conductor installed in the same conduit as the phase and neutral conductors.

B. Install all circuits which use a common neutral in accordance with the latest edition of the National Electrical Code, Article Nos. 210-4, 210-5, 215-4, and 220-4d. Balance all circuits to achieve not greater than 10% unbalanced neutral current in panel feeders.

C. Provide six circuit breaker handle lock-on devices for each lighting panelboard for installation by the contractor on circuits as directed by the Owner to prevent unauthorized personnel from turning off circuits to controls, unit heaters, clocks, night lights, etc. Turn the spare lock-on devices over to the Owner for his use.

D. Provide typed directory cards mounted under plastic on the doors of all panelboards. The directories shall indicate the type of devices being served, including the space number or space names in which the devices or fixtures are located.

E. Provide engraved Bakelite nameplates for all the circuit breakers in use on power panelboards. Indicate the device, panel, or motor being served with 1/4" high letters. Provide nameplates without engraving for the spare breakers and/or spaces. Secure all nameplates to the panelboard trim with two roundhead sheet metal screws.

F. Provide engraved Bakelite nameplates on the visible face of all lighting and power panels indicating the panel and emergency system branch designation in 3/8" letters. Secure the nameplates with a minimum of two round-head sheet metal screws. Normal power nameplates shall be black and emergency power nameplates shall be red.

G. Provide 7 sets of final as-built drawings for the panels after delivery of the panels for distribution by the Owner.

H. Contractor to spot paint panel backbox per the following color code:

Purple:	Essential Distribution not listed herein

END OF SECTION

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Provide switches, receptacles, device plates, and other wiring devices as indicated on drawings.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Acceptable manufacturers include Leviton, Hubbell, Eagle, Arrowhart, Pass and Seymour, and Bryant. Leviton numbers are used for clarity.

2.2 SWITCHES

A. 20-Amp, 120/277 VAC:

1. Single pole: Leviton No. 1221-2W.

2. Three-way: Leviton No. 1223-2W

3. Single pole, weatherproof: Leviton No. 1221-2W with Steel City No. SW1-C weatherproof plate.

4. Single pole with pilot light (120 VAC): Leviton No. 1221-PLC.

5. Momentary contact switch: Leviton No. 1257.

B. Dimmers shall be universal (LED/CFL/MLV/Incandescent) slide dimmers equal to Leviton DSM10-1LZ.

2.3 RECEPTACLES

A. 20-Amp, 125-VAC, NEMA 5-20R:

1. Duplex type: Leviton No. 5362-W (white).

2. Ground fault circuit interrupter: Leviton No. MGFN2-W (white).

3. GFCI Duplex type, heavy-duty industrial grade, Weather and Tamper-Resistant: Leviton G5362-WTW (White).

4. Weatherproof “In Use”, extra-duty type cover: Leviton 5980-UCL.

5. Duplex type, heavy-duty industrial grade, Weather and Tamper-Resistant: Leviton TWR20-W (White).

2.4 MISCELLANEOUS DEVICES

A. Twist lock receptacle: Hubbell No. 23000-HG series or approved substitute.

B. Flush dryer receptacle, 30-amp, 125/250 VAC: Leviton No. 5207 with No. 84028 plate.

2.5 DEVICE PLATES

A. Provide Leviton Series 84 stainless steel or approved substitute. Provide cast alloy or stamped metal plates on all exposed switches and receptacles.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mounting:

1. Mount all switches 46" above the finished floor to centerline of switch unless noted otherwise.

2. Mount all receptacles 18" above the finished floor to centerline of receptacle unless noted otherwise.

3. Mount weatherproof receptacles vertically.

4. Work devices to nearest block course using proper type outlet boxes as specified under Section 26 05 37. Check architectural and furniture drawings for counter (desk, special booth etc.) locations. Mount devices above work counters. Verify other special mounting conditions and locate devices as required.

B. Polarity: Properly wire all convenience outlets so that the hot wire, the neutral wire and the ground wire connect to the proper terminal on all receptacles.

C. Grounding: Install all receptacles in boxes specified under Section 26 05 37, and install a No. 12 green ground wire from device grounding terminal back to the grounding bus in the panelboard and bond to outlet box.

D. Receptacles shown on the drawings as "special mounting height" shall be installed at mounting height as indicated on drawings. Where no mounting height is given and receptacles are above counters (or casework), they shall be mounted with centers 4" above top of counter. If the counter has a backsplash, receptacles shall be mounted with centers 4" above top of backsplash. Where special mounting height receptacles are not above counters and no mounting height is indicated, receptacle mounting heights shall match adjacent light switches or above counter receptacles. The Contractor shall coordinate the installation of all special mounting height receptacles with architectural design.

E. Install device plates in full contact with wall surface. Plates shall not project out from the wall.

F. Install device plates in full contact with surface-mounted box. Plates shall not project out from the edge of the box.

END OF SECTION

SECTION 26 28 18 - SAFETY SWITCHES

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Provide horsepower-rated, quick-make, quick-break, safety switches provided with the number of poles and fuses as required.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS/EQUIPMENT

A. Safety switches shall be as manufactured by General Electric, Square D Company, Cutler-Hammer, or approved substitute.

B. For 208- and 240-volt circuits, use general-duty type switches with Class R fuse clips. For 480-volt circuits, use heavy-duty type switches with Class R fuse clips.

C. Switches shall have arc shields, shall be of enclosed construction and fusible or non-fusible as indicated. Switches shall be rated for either 250-volt AC or 600-volt AC service as required.

D. Safety switches for all part-winding or two-speed motors requiring remote disconnect to be similar to Square D Series HLL-660, six-pole.

E. Switches shall have Electrical Interlock Kit with one normally open and one normally closed contact.

F. All switches shall be capable of interrupting locked rotor current of motor which it serves.

G. Enclosures to be NEMA-1 for interior use and NEMA-3R for exterior use unless noted otherwise.

H. Provide dual-element Bussman type FRN (250 volt) or type FRS (600 volt) fuses for any fusible safety switch serving a motor circuit.

I. For non-motor loads, provide dual element Bussman type LPN (250 volt) or type LPS (600 volt).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide non-fusible switches at remote motor locations (raintight where required) as indicated on drawings.

B. Provide fusible disconnects at package A/C units, fused as specified on unit nameplate.

C. Mount switches to walls or adjacent to equipment enclosures using unistruts with a minimum of four bolts using toggle anchors for masonry construction, Phillips "Red Head" anchors for poured concrete construction and bolts, jumbo washers, lock washers and nuts for equipment enclosure mounting.

D. All safety switches to be identified with Bakelite nameplates.

END OF SECTION

SECTION 26 29 13 - INDIVIDUAL STARTERS AND CONTROLS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Provide conduit, wiring and electrical connections to motors, safety switches, starters, relays, electrical interlock circuits, valves, unit heaters, fan coil units, pumps, air handling units, etc., complete and ready for operation. The Division 26 contractor shall review the electrical requirements of other sections and divisions of these specifications and drawings and provide the required power and control wiring.

B. Provide starters as shown on mechanical drawings and as scheduled on Electrical Drawings except custom designed starter such as chiller machine, those physically mounted on the unit such as a deaerator, or any piece of equipment where starter is furnished as an integral part of the equipment.

C. Starters shall be installed by Division 26 but provided by Division 23 or other divisions.

D. Control Wiring:

1. Division 23 shall furnish and install line- and low-voltage control wiring, including conduit, conductors, and terminations for same. Division 23 shall also furnish and install control components associated with the line- and low-voltage control systems and shall wire and connect components in accordance with approved wiring diagrams.

2. Division 26 shall furnish and install power wiring including conduit, conductors, and terminations to motors, safety switches, starters, relays, valve and damper actuators, and other components requiring power as indicated on the electrical drawings, by the specifications, and in accordance with approved wiring diagrams. Division 26 shall also furnish and install starters as scheduled on the electrical drawings.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS/MATERIALS

A. Starters shall be as manufactured by Square D, G.E., Cutler-Hammer, or approved substitute.

B. Starters used on 208-volt systems shall have two cartridge fuses in the control circuit.

C. Starters used on 480-volt systems shall have an individual 480/120-volt control transformer with two cartridge fuses in the primary and one in the secondary.

D. All starters to be provided with melting alloy overloads.

E. Starters used inside shall have NEMA 1 enclosures; starters used in damp locations or exposed to the weather to have NEMA 3R enclosures.

F. Manual Motor Starter with Heater Unit: Square D Class 2510.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Connect all pumps, fans, and heating and air-conditioning equipment and have equipment complete and ready for operation. Contractor shall be responsible for checking with equipment manufacturer to obtain exact requirements. Electrical drawings showing mechanical requirements are diagrammatic only to indicate size, type, number of control items, and approximate location.

B. A short section of flexible conduit shall be used at each motor. Watertight flexible conduit shall be used on any motors in damp or exterior locations.

C. Flexible metallic conduit for motor connections shall be 1/2" minimum size.

D. Identify starters and controls as required by Section 26 01 00.

END OF SECTION

SECTION 26 32 13 - DIESEL ENGINE DRIVEN GENERATOR SETS SYSTEM

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. This specification includes packaged engine-generator sets for emergency power to be installed as per plans and specifications. Unit(s) shall provide for completely automatic unattended operation, for the duration of any loss of normal utility power. Unit(s) to be capable of reaching operating range within 10 seconds of initial start signal. Unit(s) shall be of an emergency KW/KVA capacity as shown on plans.

B. Full-service responsibility for satisfactory operation and performance of this system shall rest with Division 26 contractor supplying the emergency power system. Engine/generator to be furnished with all necessary features and options to comprise a complete operable system when installed as per manufacturers' recommendations.

C. The generator set covered by these specifications shall be designed, tested, rated, assembled, and installed in strict accordance with all applicable standards below:

1. ISO8528

2. UL508

3. UL2200

4. UL142

5. Designed to allow for installed compliance to NFPA 37, NFPA 70, NFPA 99 and NFPA 110.

D. The manufacturer's standard warranty shall in no event be for a period of less than two (2) years from date of initial start-up of the system and shall include repair parts, labor, reasonable travel expense necessary for repairs at the job site, and expendables (lubricating oil, filters, antifreeze, and other service items made unusable by the defect) used during the course of repair. Running hours shall be limited to 500 hours annually for the system warranty by both the manufacturer and servicing distributor. Submittals received without written warranties as specified will be rejected in their entirety.

E. The authorized manufacturer’s dealer must have a generator set service location within 100 miles of the site. The dealer shall have a rental fleet with similar sized generator sets to the generator set(s) being supplied.

F. Unit to be equipped for outdoor installation as shown on drawings.

1.3 RELATED SECTIONS

A. 26 36 00 - Automatic Transfer Switch (ATS)

B. 26 05 26 - Grounding and Bonding for Electrical Systems

1.4 SUBMITTALS

A. Contractor shall provide as part of submittal data: Complete, composite electrical and mechanical drawings indicating control wiring routing, quantity and size, as well as size and suggested routing of coolant, fuel lines and exhaust lines. If options or special equipment other than those specified below are required, they shall be included in the submittals.

B. Engine-generator submittals shall include the following information:

1. Factory published specification sheet.

2. Manufacturer's catalog cut sheets of all auxiliary components such as battery charger, control panel, enclosure, etc.

3. Dimensional elevation and layout drawings of the generator set, enclosure and transfer switchgear and related accessories.

4. Weights of all equipment.

5. Concrete pad recommendation, layout, and stub-up locations of electrical and fuel systems.

6. Interconnect wiring diagram of complete emergency system, including generator, switchgear, day tank, remote pumps, battery charger, control panel, and remote alarm indications.

7. Engine mechanical data, including heat rejection, exhaust gas flows, combustion air and ventilation air flows, fuel consumption, etc.

8. Generator electrical data including temperature and insulation data, cooling requirements, excitation ratings, voltage regulation, voltage regulator, efficiencies, waveform distortion and telephone influence factor.

9. Generator resistances, reactances, and time constants.

10. Generator locked rotor motor starting curves.

11. Manufacturer's documentation showing maximum expected transient voltage and frequency dips, and recovery time during operation of the generator set at the specified site conditions with the specified loads.

12. Manufacturer's and dealer's written warranty.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS/EQUIPMENT

A. Emergency generator shall be by Caterpillar, Kohler, or Cummins.

2.2 GENERAL REQUIREMENTS

A. Genset Requirements: The generator set shall be Standby Duty rated at KW/KVA as noted on plans, 1800 RPM, 0.8 power factor, 480 V, 3-Phase, 60 hertz, including radiator fan and all parasitic loads. Generator-set shall be sized to operate at the specified load at a maximum ambient of 122° F (50° C) and altitude of. System voltage to be 208/120-volts, 3-phase, 4-wire, 60 Hz., .8 power factor.

1. Power is available for the duration of an emergency outage.

2. Average Power Output = 70% of standby power.

3. Load = Varying.

4. Typical Hours/Year = 200 Hours.

5. Maximum Expected Usage = 500 hours/year.

6. Typical Application = Standby.

2.3 ENGINE

A. Engine shall be full diesel, compression ignition, liquid-cooled, and capable of producing the rated KW at a governed speed of 1800 rpm as specified under job site conditions. Engine to be equipped with electric starting, battery charging generator, electronic governor, fuel filters, oil filters, air cleaners, cooling system, and other equipment to provide a complete operable system. Selling distributor to be a factory authorized distributor of the diesel engine utilized in the standby engine generator system.

B. The engine will utilize in-cylinder combustion technology, as required, to meet applicable EPA non-road regulations and/or the EPA NSPS rule for stationary reciprocating compression ignition engines. Additionally, the engine shall comply with the State Emission regulations at the time of installation/commissioning. Actual engine emissions values must be in compliance with applicable EPA emissions standards per ISO 8178 – D2 Emissions Cycle at specified ekW / bHP rating.

2.4 COOLING

A. The generator set shall be equipped with rail-mounted, engine-driven radiator with blower fan and all accessories. The cooling system shall be sized to operate at full load conditions and 122°F ambient air entering the room or enclosure (if an enclosure is specified). The generator set supplier is responsible for providing a properly sized cooling system based on the enclosure static pressure restriction. Please assume a 7°F air to core temperature rise across the engine.

B. Engine shall be equipped with thermostatically controlled water jacket heater to maintain minimum 80-degrees F water jacket temperature under ambient conditions. Vendor shall consult with and coordinate special extreme cold weather needs with Electrical Engineer. Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity. Heater shall include a circulation pump. Provide isolation valves that allow for change out of the heater without having to drain the entire system.

C. Complete cooling system shall be filled with anti-freeze coolant (0 degrees F or less as required by the extreme of local weather conditions) supplied by the vendor at start-up.

2.5 OUTDOOR INSTALLATIONS

A. Sound Attenuated Enclosure: The complete diesel engine generator set, including generator control panel engine starting batteries shall be enclosed in a factory assembled, sound attenuated enclosure mounted on the fuel tank base.

1. A weather resistant, sound attenuated enclosure of 14-gauge steel with electrostatically applied powder coated baked polyester paint. The enclosure shall have a resulting sound level of 75_dba @_23 feet with the genset running under full load. It shall consist of a roof, side walls, and end walls.

2. Fasteners shall be either zinc plated or stainless steel.

3. Internally mounted exhaust silencer to meet sound level listed above.

4. Enclosure door shall include control panel viewing window in order to view generator controller without having to access the generator enclosure. No exceptions.

5. Acoustical foam shall be provided between all supports and inside doors and sound baffles or air intake and air discharge.

6. NFPA 110 Level 1 outdoor installations may require motorized automatic dampers at intake and discharge and space heater to maintain 40°F internal temperature.

7. Load center sized for generator ancillary components.

8. Radiator Air Discharge must be vertically discharged without exception.

2.6 SILENCERS AND BATTERIES

A. For indoor generator sets, furnish and install super critical grade exhaust silencer. VEE-type engines shall have dual inlet, single outlet. Condensate trap, pet cock drain shall be installed in the silencer. A flexible section, 36 inches minimum, shall be provided between the engine exhaust manifold and the silencer. This section shall be carbon steel bellows type. The silencer shall be provided with mounting brackets for ceiling suspension. The silencer shall be installed from the equipment room ceiling in a horizontal position. The silencer shall be mounted so that its weight is not supported by the engine nor will exhaust system growth due to thermal expansion be imposed on the engine.

B. Engine/generator manufacturer shall specify exhaust line size required for acceptable back pressure. Exhaust line shall be Schedule 40 pipe and be connected to engine manifold through seamless, flexible, carbon steel bellows type connection. Exhaust systems installed inside structure shall be fully insulated (under Division 23) and lines passing through walls shall pass through sleeves.

C. Provide starting batteries capable of starting unit in time specified under installed conditions and capable of (2) 75-second periods of engine cranking. Batteries to be installed in steel, insulated rack(s).

D. Battery heater pads to be furnished on outdoor installations.

E. Provide batteries of the heavy-duty, maintenance-free lead-acid type, plastic case, shipped dry with electrolyte installed at start-up. Battery cables to be sized and provided by engine/generator vendor. Battery voltage shall be compatible with the starting system.

F. Battery Charger: Current-limiting, automatic-equalizing and float-charging type. Unit shall comply with UL 1236 and include the following features:

1. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.

2. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from -40°C to +60°C to prevent overcharging at high temperatures and undercharging at low temperatures.

3. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to ±10%.

4. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.

5. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.

6. Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.

2.7 FUEL TANKS

A. Subbase Fuel Tank:

1. Provide a double wall sub-base tank constructed to meet all local codes and requirements. A fuel tank base of capacity as noted on the drawings (for NFPA 110 Level 1 systems provide 133% capacity) shall be provided as an integral part of the enclosure. It shall be contained in a rupture basin with 110% capacity. The tank shall meet UL142 standards. A locking fill cap, a mechanical reading fuel level gauge, low fuel level alarm contact, normal and emergency vent extensions to 12', and fuel tank rupture alarm contact shall be provided.

2. Provide 5 Gallon Fuel Fill spill containment with overfill prevention valve (without exception).

3. Provide engineered steel platform and steps (not ships ladder) for access on all sides of generator enclosure that contain access panels. Catwalk shall be fully engineered with handrails, supports, and footings as required for a complete system. Catwalk must be wide enough so that access doors of enclosure can open 180-degrees (minimum of 3'-0"). Contractor is responsible for providing engineered shop drawings of catwalk to include in submittal package (if control panel or breaker handle is above 6'7").

2.8 GENERATOR

A. The synchronous generator shall be dual bearing, self-ventilated, drip-proof design in accordance with NEMA MG 1 and directly connected to the engine flywheel housing with a flex coupling. The generator shall meet performance class G2 of ISO 8528.

1. The excitation system shall be permanent magnet and enable the alternator to sustain 300% of rated current.

2. Form Wound 1500kW and above and above 600V, Random Wound below 1500kW.

3. Rotor/Stator Temperature rise at 40^{O} Ambient: 105^{O} C.

4. Insulation Class H.

5. Subtransient Reactance no greater than 12%.

B. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.

C. All load connections shall be made up in rear mount junction box. Generator construction to allow load connections to be made on top, bottom or either side of junction box.

D. Digital Voltage Regulator:

1. The digital voltage regulator shall be microprocessor based with fully programmable operating and protection characteristics. The regulator shall maintain generator output voltage within +/- 0.25% for any constant load between no load and full load. The regulator shall be capable of sensing true RMS in three phases of alternator output voltage or operating in single phase sensing mode. The voltage regulator shall include a VAR/Pf control feature as standard. The regulator shall provide an adjustable dual slope regulation characteristic in order to optimize voltage and frequency response for site conditions. The voltage regulator shall include standard the capability to provide generator paralleling with reactive droop compensation and reactive differential compensation.

2. The generator set controller shall allow system parameter setup and monitoring and provide fault alarm and shutdown information through the controller. A PC-based user interface shall be available to allow viewing and modifying operating parameters in a Windows compatible environment.

E. Generator Circuit Breaker: Molded-case, electronic-trip type; 100 percent rated; complying with UL 489.

1. Tripping Characteristics: Adjustable long-time and short-time delay and instantaneous.

2. Ground-Fault Protection: Comply with NFPA 70, signals for ground-fault. Integrate ground-fault alarm indication with other generator-set alarm indications.

3. Energy Reduction Maintenance Setting (ERMS): Provide ERMS switch on breakers 1200A and above.

4. Trip Settings: Selected to coordinate with generator thermal damage curve.

5. Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.

6. Suitable for Service Entrance

F. Generator Protector: Microprocessor-based unit shall continuously monitor current level in each phase of generator output, integrate generator heating effect over time, and predict when thermal damage of alternator will occur. When signaled by generator protector or other generator-set protective devices, a shunt-trip device in the generator disconnect switch shall open the switch to disconnect the generator from load circuits. Protector shall perform the following functions:

1. Initiates a generator overload alarm when generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other generator-set malfunction alarms.

2. Under single or three-phase fault conditions, regulates generator to 300 percent of rated full-load current for up to 10 seconds.

3. As overcurrent heating effect on the generator approaches the thermal damage point of the unit, protector switches the excitation system off, opens the generator disconnect device, and shuts down the generator set.

4. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot.

2.9 GENERATOR CONTROL PANEL

A. Provide a fully solid-state, microprocessor based, generator set control. The control panel shall be designed and built by the engine manufacturer. The control shall provide all operating, monitoring, and control functions for the generator set. The control panel shall provide real-time digital communications to all engine and regulator controls via SAE J1939.

B. Environmental: The generator set control shall be tested and certified to the following environmental conditions:

1. –40°C to +70°C Operating Range

2. 100% condensing humidity, 30°C to 60°C

3. IP22 protection for rear of controller; IP55 when installed in control panel.

4. 5% salt spray, 48 hours, +38°C, 36.8V system voltage.

5. Sinusoidal vibration 4.3G's RMS, 24-1000Hz.

6. Electromagnetic Capability (89/336/EEC, 91/368/EEC, 93/44/EEC, 93/68/EEC, BS EN 50081-2, 50082-2).

7. Shock: withstand 15G.

C. Functional Requirements: The following functionality shall be integral to the control panel.

1. Standard ISO labeling

2. The control shall include a minimum 33 x 132 pixel, 24mm x 95mm, positive image, transflective LCD display with text-based alarm/event descriptions.

    a. The control shall include a minimum of 3-line data display.

    b. Audible horn for alarm and shutdown with horn silence switch.

3. Multiple language capability.

4. Remote start/stop control.

5. Local run/off/auto control integral to system microprocessor.

6. Cooldown timer.

7. Speed adjust.

8. Lamp test.

9. Emergency stop push button.

10. Voltage adjust.

11. Voltage regulator V/Hz slope – adjustable.

12. Password protected system programming.

D. Digital Monitoring Capability: The controls shall provide the following digital readouts for the engine and generator. All readings shall be indicated in either metric or English units.

1. Engine:

    a. Engine oil pressure

    b. Engine oil temperature

    c. Engine coolant temperature

    d. Engine RPM

    e. Battery volts

    f. Engine hours

    g. Engine crank attempt counter

    h. Engine successful start counter

    i. Service maintenance interval

    j. Real time clock

    k. Engine exhaust stack temperature

l. Engine main bearing temperature

2. Generator:

a. Generator AC volts (Line to Line, Line to Neutral and Average)

b. Generator AC current (Avg and Per Phase)

c. Generator AC Frequency

d. Generator kW (Total and Per Phase)

e. Generator kVA (Total and Per Phase)

f. Generator kVAR (Total and Per Phase)

g. Power Factor (Avg and Per Phase)

h. Total kW-hr

i. Total kVAR-hr

j. % kW

k. % kVA

l. % kVAR

m. Generator bearing temperature

n. Generator stator winding temperature

3. Voltage Regulation:

a. Excitation voltage

b. Excitation current

E. Alarms and Shutdowns: The control shall monitor and provide alarm indication and subsequent shutdown for the following conditions. All alarms and shutdowns are accompanied by a time, date, and engine hour stamp that are stored by the control panel for first and last occurrence:

1. Engine Alarm/Shutdown

a. Low oil pressure alarm/shutdown

b. High coolant temperature alarm/shutdown

c. Loss of coolant shutdown

d. Overspeed shutdown

e. Overcrank shutdown

f. Emergency stop shutdown

g. Low coolant temperature alarm

h. Low battery voltage alarm

i. High battery voltage alarm

j. Control switch not in auto position alarm

k. Battery charger failure alarm

2. Generator Alarm/Shutdown

a. Generator phase sequence

b. Generator over voltage

c. Generator under voltage

d. Generator over frequency

e. Generator under frequency

f. Generator reverse power (real and reactive)

g. Generator overcurrent

3. Voltage Regulator Alarm/Shutdown

a. Loss of excitation alarm/shutdown

b. Instantaneous over excitation alarm/shutdown

c. Time over excitation alarm/shutdown

d. Rotating diode failure

F. Inputs and Outputs:

1. Programmable Digital Inputs: The Controller shall include the ability to accept programmable digital input signals. The signals may be programmed for either high or low activation using programmable Normally Open or Normally Closed contacts.

2. Programmable Relay Outputs: The control shall include the ability to operate programmable relay output signals, integral to the controller. The output relays shall be rated for 2A @ 30VDC and consist of six (6) Form A (Normally Open) contacts and two (2) Form C (Normally Open & Normally Closed) contacts.

3. Programmable Discrete Outputs: The control shall include the ability to operate two (2) discrete outputs, integral to the controller, which are capable of sinking up to 300mA.

G. Maintenance: All engine, voltage regulator, control panel and accessory units shall be accessible through a single electronic service tool. The following maintenance functionality shall be integral to the generator set control:

1. Engine running hours display.

2. Service maintenance interval (running hours or calendar days).

3. Engine crank attempt counter.

4. Engine successful starts counter.

5. 40 events are stored in control panel memory.

6. Programmable cycle timer that starts and runs the generator for a predetermined time. The timer shall use 7 user-programmable sequences that are repeated in a 7-day cycle. Each sequence shall have the following programmable set points:

a. Day of week

b. Time of day to start

c. Duration of cycle

H. Remote Communications:

1. The control shall include Modbus RTU communications as standard via RS-485 half duplex with configurable baud rates from 2.4k to 57.6k.

2. Remote Monitoring Software: The control shall provide Monitoring Software with the following functionality.

a. Monitor up to eight (8) generator sets, plus ATS and UPS.

b. Provide access to all dates and events on generator set communications network.

c. Provide remote control capability for the generator set(s).

d. Ability to communicate via Modbus RTU or remote modem.

2.10 REMOTE ANNUNCIATOR

A. Provide a remote annunciator to meet the requirements of NFPA 99/110, Level 1.

1. Remote Annunciator shall include a lamp test pushbutton, alarm horn and alarm acknowledge pushbutton.

2. Provide the following individual light indications for protection and diagnostics.

a. Overcrank

b. Low coolant temperature

c. High coolant temperature warning

d. High coolant temperature shutdown

e. Low oil pressure warning

f. Low oil pressure shutdown

g. Overspeed

h. Low coolant level

i. EPS supplying load

j. Control switch not in auto

k. High battery voltage

l. Low battery voltage

m. Battery charger AC failure

n. Emergency stop

o. Spare

p. Spare

3. Ability to be located up to 4000 ft from the generator set.

4. Remote E-Stop: Provide a remote e-stop in a NEMA 1 enclosure with break-glass cover.

5. Remote annunciator panel shall be mounted where shown on the drawings.

PART 3 - EXECUTION

3.1 PROJECT SPECIFIC FACTORY EQUIPMENT TESTS

A. Before shipment, factory test engine-generator set, and other system components and accessories manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:

1. Full load run.

2. Maximum power.

3. Voltage regulation.

4. Transient and steady-state governing.

5. Single-step load pickup.

6. Safety shutdown.

3.2 INSTALLATION REQUIREMENTS

A. Entire unit shall be installed in accordance with manufacturers' recommendations.

B. Mounting: Complete engine/generator and all mounted accessories shall be assembled on a common channel steel base. Fuel oil lines and lube oil drain shall terminate in base. Lube oil drain line shall be brought out to beyond the base to facilitate changing of the oil. Flexible fuel line sections (18" long) to be installed between base and fuel lines. Heavy-duty, steel spring vibration isolators shall be installed between the base and mounting pad. Isolators shall be sized and located as recommended by Generator Manufacturer.

C. Contractor shall provide the services of a factory-trained engineer for periodic job site visits during installation to ensure that the system is being installed in accordance with manufacturers' recommendations.

D. Complete engine/generator system shall be tested after installation to ensure that the engine/generator, automatic transfer switch, alarm annunciators, and all other equipment function in accordance with the specifications.

E. After installation, a 4-hour full load test shall be conducted by the distributor's engineer. This test shall be conducted using available building load, plus temporary load bank capacity so that full nameplate reading is utilized during test. Temporary load banks shall be furnished by the generator distributor and connected by Division 26 contractor. Test data shall be recorded and become a part of the three (3) Owners Manuals to be supplied.

F. After Owner acceptance, Factory Representative shall provide a minimum of one (1) day of Owner training in the complete operation and maintenance of the automatic transfer switch system and generator system. The training session for the automatic transfer switch system and generator system shall be scheduled on a separate day from the startup and testing day and shall be scheduled at least two weeks in advance with the Owner and before building acceptance.

G. Ground the engine generator frame and enclosure using an equipment grounding conductor sized in accordance with the NEC. Ground generator neutral on 4-pole (switched neutral) applications.

END OF SECTION

SECTION 26 36 00 - AUTOMATIC TRANSFER SWITCH

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Provide automatic transfer switch(es) as shown on the drawings.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Provide automatic transfer switch as manufactured by ASCO, Kohler, Zenith, Russelectric, or approved substitute.

2.2 EQUIPMENT

A. Switch shall be UL listed and CSA certified. It shall meet the voltage impulse withstand test in accordance with the proposed NEMA Standard ICS-109.21 and voltage surge withstand capability in accordance with ANSI C37.90A/IEEE 472. Switch(es) shall have ampere rating and voltage rating as shown on drawings.

B. Transfer switch(es) to be in NEMA-1 wall-mounted enclosures unless otherwise indicated. All control relays to be accessible from front of enclosure for maintenance and repair. Transfer mechanism to be electrically operated, mechanically held. Failure of the emergency source shall result in retransfer to the normal source. The transfer switch to be equipped with a manual operator to allow for manual transfer.

C. Engine starting contacts to be provided to start engine, should the voltage of the normal source drop below the preset value, after a time delay of 1-3 seconds to allow for momentary dips.

D. After restoration of normal power, transfer switch shall remain in emergency position for an adjustable period of 0-30 minutes (set for 15 minutes unless directed otherwise). After retransfer to normal, engine/generator to continue to run for an adjustable period of 0-20 minutes to allow for cool down. A voltage/frequency relay to be provided to prevent transfer to the emergency source until operating level is attained.

E. In addition to position indicating lamps, auxiliary contacts to be provided (one normally open, one normally closed).

F. Provide test switch to simulate a power failure, under load conditions.

G. Provide an automatic exerciser to operate the unit for a period of 30 minutes every 168 hours. During exercise period, transfer switch(es) shall not transfer to the emergency source.

H. Transfer switches used with ground-fault equipment, 4-wire systems to be 4-pole switched neutral or 3-pole with overlapping neutral contacts.

I. Switch(es) to be double throw actuated by a single operator, momentarily energized. Main contacts may be replaced without major disassembly. Transfer switch(es) with magnetic blow outs to be provided on each pole.

J. Normal voltage sensing to be on 3-phase with pick-up at 95 percent and drop-out at 90 percent of normal voltage.

K. Interlocked molded case circuit breakers, contactors or transfer devices with dual solenoid operators are not acceptable.

L. ATS shall be equipped with a transparent protective cover allowing visual inspection of contacts while inhibiting inadvertent contact with energized components.

M. Integrated Load Metering: The ATS Controller shall include integral load metering. Metered values shall be viewable form the Controller LCD and be accessible through serial communications.

1. Source 1 voltage (3 phase).

2. Source 2 voltage (3 phase).

3. Load voltages (3 phase).

4. Source 1 Frequency
5. Source 2 Frequency
6. Load Frequency
7. Load Currents (3 phase)
8. Load kW
9. Load kVar
10. Load KVA
11. Power Factor

N. Provide all wiring and raceways as required for elevator pre-signal and controls as required by elevator manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Switch shall be installed as shown on the drawing complete with all controls for engine starting and transfer.

END OF SECTION

SECTION 26 41 13 - LIGHTNING PROTECTION

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Contractor shall provide all labor, materials and items of service required for the completion of a functional and unobtrusive system of air terminals, conductor, grounds and other components necessary for the protection of the building against damage by lightning.

B. The system shall be completely concealed where possible, with only the air terminals and roof conductor visible, and complying in all respects with the following Standards:

1. Underwriters' Laboratories, Inc. - No. UL96A.

2. National Fire Protection Association - No. NFPA780.

3. Lightning Protection Institute-No. LPI-175.

1.3 QUALITY ASSURANCE

A. The installing contractor shall be actively engaged in the installation of lightning protection systems and shall be listed and published by Underwriters' Laboratories as such at www.ul.com, under “Certifications” (Category Code OWAY). He shall have a minimum of five years’ experience in this work.

B. The installing contractor shall be a Lightning Protection Institute Certified Master Installer as recognized and published at www.lightning.org.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials used shall be new and be the product of a manufacturer member of Lightning Protection Institute, approved and labeled by Underwriters Laboratories (UL96 Standard).

B. Cable downlead conductors, terminals and fittings at the roof line shall be aluminum and all components below the roof line shall be copper. When structural steel is utilized as the downlead system an aluminum cable connection below the roof to the top of the steel is acceptable.

C. All conductors, terminals and fittings shall be copper or bronze.

D. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the project include, but are not limited to the following:

1. Erico, Inc.

2. Preferred Lightning Protection.

3. National Lightning Protection.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Submit a list of materials and system shop drawings to Architect for review. System design shall be by a certified Lightning Protection Institute Master Installer/Designer.

B. Install lightning protection components and system in accordance with NFPA 780, UL96A and LPI-175 Standards. Electrical service entrance surge protection device(s) (SPD) shall meet the requirements of UL96A, Para. 13.1.

C. Do not combine incompatible metals. Acceptable metal combinations shall be in accordance with UL96A Follow Up and Inspection Instructions.

D. Coordinate installation of lightning protection system with other building systems and components including electrical wiring, supporting structures, building materials/finishes and HVAC metal bodies requiring strike termination devices (air terminals) and/or bonding to the system.

E. Coordinate installation of strike termination devices and cable fasteners with roof system(s) manufacturer and roofing contractor.

F. Provide NFPA-780 Potential Equalization for buildings exceeding sixty (60') feet in height above grade.

G. A UL Master Label Certificate shall be furnished for new structures with no connections to existing structures.

END OF SECTION

SECTION 26 43 00 - SURGE PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Provide 3-phase, 4-wire Surge Protective Devices (SPDs) at the main service and electrical panels as indicated on the panelboard schedules and on the riser diagram.

1.3 RELATED WORK

A. Section 26 24 16 - Panelboards.

B. Section 26 05 26 – Grounding and Bounding for Electrical Systems.

C. Section 26 41 13 – Lightning Protection

1.4 STANDARDS

A. UL compliance: Listed to UL 1449 4th Edition by an OSHA approved Nationally Recognized Test Lab (NRTL)

B. ANSI/IEEE compliance: Comply with ANSI/IEEE C62.1, C62.41, and C62.45 test procedures.

C. National Electric Code - Section 280 and 285.

D. UL96A, Para. 13.1

1.5 SUBMITTALS

A. Submit product data and shop drawings as required by Section 26 01 00.

B. Submittals shall include the following:

1. Complete manufacturers' data for each suppressor indicating part numbers and rated voltages and currents.

2. Product performance analysis with graphic display of let-thru waveforms and peak clamping voltages for ANSI C62.41 tests, Categories A3 & B3 ringwaves and C1 & C3 impulses.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. SPDs shall be as manufactured by Current Technology, EFI Corporation, Liebert, or approved equal.

B. The suppressor manufacturer shall offer factory repair service for all units, which will include replacement for non-repairable sealed units.

2.2 WARRANTY

A. SPD devices shall be warranted for a minimum of 10 years.

2.3 SPECIFICATIONS

A. General:

1. SPD shall be internally fused, capable of allowing the suppressor's maximum rated transient current to pass through the suppressor without fuse operation. SPD shall be listed as a Type1 SPD without the need for upstream over current protection for safe operation.

2. Proper operation of the suppressor elements on each phase shall be indicated by a normally-on LED or lamp. Also, normally closed contacts shall be used for remote annunciation of suppressor failure.

3. The SPD shall be compatible with the electrical system voltage, current, and distribution configuration.

4. The SPD maximum continuous operating voltage shall be 115% of the nominal RMS voltage with no degradation. The MCOV value shall be a tested value as outlined in UL1449 3rd Edition section 37 .7 .3. The MCOV shall not be a claimed value based solely on the MCOV of the surge component used in the design, nor based solely on the 115% over voltage test outlined in UL1449.

5. The SPD shall be sine-wave tracking to provide added protection against oscillatory transients, such as Category A and B Ringwaves.

6. Failure of the SPD shall not cause any disruption of power.

B. Service Entrance SPD Devices:

1. The SPD shall have a surge current capacity of 100,000 amps (8 x 20 microsec) minimum per mode.

2. SPD devices shall meet or exceed the following operating characteristics and ratings: (Series Ratings)

3. The SPD shall be a Type1 listed SPD per UL1449 3rd Edition.

4. The SPD shall meet the requirements of UL96A, Para. 13.1

5. The unit shall not have more than 10% deterioration or degradation of the UL1449, 3rd Edition Voltage Protection Rating (VPR) due to repeated surges. Acceptable clamping values are shown below based on test procedures outlined in UL1449 3rd Edition.

System Voltage	Mode	MCOV	B3 Ringwave	C3 Comb. Wave	UL 1449 Second Edition SVR Rating	UL 1449 Third Edition VPR Rating
120/240 120/208	L-N	150	325/375	650/775	400/400	700/700
	L-G	150	400/450	650/825	500/500	700/700
	N-G	0	350/350	500/500	500/500	900/1000
	L-L	300	400/500	950/1250	700/700	900/1000
277/480	L-N	320	550/600	1125/1225	800/800	900/1000
	L-G	320	850/875	1075/1225	1000/1000	1200/1200
	N-G	0	700/700	900/900	900/900	1200/1500
	L-L	550	650/750	1950/2200	1500/1500	1800/1800

C. Distribution Panel SPD Devices:

1. The SPD shall have a surge current capacity of 60,000 amps (8 x 20 microsec) minimum per mode.

2. SPD devices shall meet or exceed the following operating characteristics and ratings: (Series Ratings)

3. The SPD shall be a Type1 or Type2 SPD per UL1449 3rd Edition.

4. The unit shall not have more than 10% deterioration or degradation of the UL1449, 3rd Edition Voltage Protection Rating (VPR) due to repeated surges. Acceptable clamping values are shown below based on test procedures outlined in UL1449 3rd Edition.

System Voltage	Mode	B3 Ringwave	B3/C1 Comb. Wave	C3 Comb. Wave	UL 1449 Second Edition SVR Rating	UL 1449 Third Edition VPR Rating
120/240	L-N	420	642	1040	400	800
120/208	L-G	480	690	1300	400	800
	N-G	340	620	1240	400	800
	L-L	610	1010	1420	700	1200
277/480	L-N	660	910	1490	700	1200
	L-G	750	1068	1830	800	1200
	N-G	720	974	1690	800	1200
	L-L	960	1700	2290	1500	1800

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount all 3-phase SPD devices in a separate cabinet attached to the panelboard it serves. The SPD shall not be internally mounted to the power or distribution panelboard. Cabinets for devices serving large service entrance main switchboards shall be located in a section of the switchboard where this option is made available by the manufacturer or be externally mounted to the switchboard. Cabinets for devices serving flush-mounted panelboards shall also be suitable for flush mounting. Cabinets shall comply with Section 26 27 16 of the specifications.

B. Ground the SPDs and cabinets in accordance with the manufacturer's instructions, the National Electrical Code (section 280 and 285), and wiring diagrams shown on the drawings.

C. Provide wiring to the remote monitor(s) in accordance with the manufacturer's instruction and as shown on the drawings.

D. The SPD shall not include multiple replacement modules.

E. All conductors associated with SPDs shall be installed in conduit. Minimum conductor size shall be #8 AWG copper. Conductors shall be as short and as straight as possible with no unnecessary length or turns. A maximum length of 12 inches is required where possible.

F. SPDs shall be connected in parallel with main conductors. Service entrance SPDs shall incorporate the use of an internally mounted disconnect. Panelboard surge protectors shall be installed behind a minimum 60 amp overcurrent/disconnecting device. Where 12 inches of lead length is not possible utilization of a low impedance preassembled cable assembly is required to lower the clamping voltages of the installed system to acceptable levels. Lead length must include phase connection plus neutral or ground.

G. Mounting position of the SPD and overcurrent protection device shall be coordinated to minimize the total phase, neutral and ground cable lengths to achieve minimum installed system clamping voltages.

END OF SECTION

SECTION 26 48 00

MOTOR CONTROL CENTER

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish, install and test the motor control center as shown on the Drawings and as specified herein.

B. Motor control centers shall be sized to include all equipment, spares and spaces shown on the Drawings.

1.02 RELATED WORK

A. Concrete for equipment pad is included in this Division and shall confirm to requirements of Division 3.

B. Equipment mounting hardware and seismic calculations shall be as specified in Division 26.

1.03 SUBMITTALS

A. Submit shop drawings and product data, for the following in accordance with Section 26 01 00, General Requirements and Section 01 33 00, Submittals:
   1. Equipment outline drawings showing elevation and plan views, dimensions, weight, shipping splits and metering layouts. Indicate all options, special features, ratings and deviations from this Section.
   2. Conduit entrance drawings.
   3. Bus arrangement drawings.
   4. Unit summary tables showing detailed equipment description and nameplate data for each compartment.
   5. Product data sheets and catalog numbers for overcurrent protective devices, motor starters, control relays, control stations, meters, pilot lights, and all other related items. List all options, trip adjustments and accessories furnished specifically for this project.
   6. Provide control systems engineering to produce custom unit elementary drawings showing interwiring and interlocking between units and to remotely mounted devices. Show all field devices, switches, lights, wire and terminal numbers. Indicate special identifications for electrical devices per the Drawings. AutoCad (Rev. 14) produced drawings shall be provided.
   7. Instruction and renewal parts books.
   8. Itemized list of spare parts tailored specifically for this project, including quantities, description, part numbers, cost and lead time.
   9. Test and inspection reports.
   10. Complete bill of materials list.

11. The equipment drawings, summary tables, elementary drawings/diagrams, spare parts list and bill of materials list shall be computer generated (i.e. no hand drawings, sketches, or lists will be acceptable).

1.04 REFERENCE STANDARDS

A. Motor control centers shall be designed, built and tested in accordance with NEMA Standard ICS-2 and Underwriters Laboratories (UL) Standard No. UL-845. Equipment shall conform to ANSI C19.3 test standards and the requirements of the National Electric Code (NEC).

B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

A. The motor control center shall be the product of a manufacturer who shall also be the manufacturer of all the circuit breakers, fused switches and motor starters included in the motor control center and who has produced the same type of equipment for a period of at least 15 consecutive years.

B. Motor control centers shall be designed, assembled and tested by the manufacturer of the motor control equipment included in the control center assembly.

C. All units and sections shall be UL labeled. Motor control centers containing service entrance equipment shall be UL labeled "Suitable For Use As Service Equipment."

1.06 OPERATING AND MAINTENANCE MANUALS

A. Operating and maintenance manuals shall be furnished in accordance with Section 01 78 23.

B. The manuals shall be bound and shall also include:
1. A list of "as left" settings for all motor circuit protectors and circuit breakers.
2. A table listing cubicle number, load description, installed overload heater size and motor horsepower, Amps, service factor and starting code letter.

1.07 MANUFACTURERS

A. The general arrangement of each motor control center is shown on the Drawings. Motor control center shall be one of the following products or equal:
1. General Electric Co., “8000-Line”.
2. Square D Corp., "Model 6".
3. Cutler-Hammer, “Freedom 2100 Series".
4. Siemens/Control Systems Inc.
5. Or equal.

1.08 PROJECT SITE REQUIREMENTS – NOT USED

1.09 SPARE PARTS

A. Provide the following spare parts in the quantities specified:
   1. One dozen each size of cover bolts, cage nuts and door fasteners.
   2. One can(s) of aerosol touch-up paint.
   3. 50% replacement fuses, all types and sizes.
   4. 100% replacement lamps for pilot lights.
   5. 100% of each color replacement lens caps for pilot lights.
   6. 50% size one starter coils.
   7. 50% replacement overload heaters of each size range used.
   8. Two overload relays for each size used.

B. Spare parts shall be boxed or packaged for long term storage. Identify each item with manufacturers name, description and part number on the exterior of the package.

PART 2 - PRODUCTS

2.01 RATING

A. Service: 480/277 Volt, three Phase, three Wire, 60 Hz.

B. The overall short circuit withstand and interrupt rating of the equipment and devices shall be not less than 65,000 Amps, RMS symmetrical at 480 Volts. Main and feeder circuit protective devices shall be fully rated for the indicated short circuit current. Systems employing series connected ratings for main and feeder devices shall not be used. Motor starter units shall be tested and UL labeled for the indicated short circuit current in combination with the motor branch circuit protective device.

C. The continuous current rating of the main horizontal bus shall be as shown on the Drawings. Vertical busses shall be sized for the structure load and shall have a minimum rating of 300 Amps. Bus bracing shall equal or exceed the specified equipment short circuit rating.

D. Motor control center, including devices, shall be designed for continuous operation at rated current in a 40°C ambient temperature.

2.02 CONSTRUCTION

A. Enclosure

Enclosure type shall be NEMA 12 unless otherwise noted on the Drawings.

B. Structure

Motor control center shall consist of a series of metal enclosed, free-standing, dead front vertical sections bolted together to form double wall construction between sections. Individual vertical sections shall be nominally 90 inches high, 20 inches wide and 20 inches deep unless otherwise shown on the Drawings. Bottom channel sills shall be mounted front and rear of the vertical sections extending the full width of each shipping split. Top of each section shall have removable plates with lifting angle. Make provisions for field installation

of additional sections to each end and provide full depth cover plates (rodent barriers) at each end of the motor control center channel sills.

1. Provide continuous top and bottom horizontal wireways extending the full width of the line-up, isolated from the horizontal bus. Provide a four inch wide, full height, vertical wireway in each section, equipped with a hinged door and cable supports. Vertical wireway shall be isolated from the bus and device compartments. Wireway openings shall have rolled edges or protective grommets.
2. Provide individual, flange formed, pan type door with concealed hinges and quarter turn latches for each device compartment and future space. Doors shall be removable. Door removal shall not be required to withdraw starter units or feeder tap devices.
3. Motor control center shall be designed for against-the-wall mounting. All wiring, bus joints and other mechanical parts requiring tightening or other maintenance shall be accessible from the front or top.

C. Unit Compartments

1. Provide individual compartments for each removable combination starter and feeder tap device unit. Steel barriers shall isolate the top, bottom and sides of each compartment from adjacent units and wireways. Removable units shall connect to the vertical bus in each section with tin plated, self aligning, pressure type copper plug connectors. Size five and larger starter units may be wired directly to the bus. Removable units shall be aligned in the structure on guide rails or shelves and secured with a cam latch mechanism or racking screw.
2. Provide individual, isolated compartments for fixed mounted devices such as circuit breakers, cable lugs, metering, relaying and control devices. Main and bus tie circuit breakers shall be wired directly to the main horizontal bus. All bus connections shall be fully rated.
3. Provide the following features:
   a. Provision to padlock removable units in a partially withdrawn TEST position, with the bus stabs disengaged.
   b. Provision to padlock unit disconnect handles in the OFF position with up to three padlocks.
   c. Mechanical interlock with bypass to prevent opening unit door with disconnect in the ON position, or moving disconnect to the ON position while the unit door is open.
   d. Mechanical split-type terminal blocks for disconnecting external control wiring.
   e. Auxiliary contact on unit disconnect to isolate control power when fed from an external source.
   f. Disconnect operating handles and control devices mounted on the removable units.
   g. Compartments containing motor starters shall have wiring diagrams and heater tables fastened to the compartment door. Compartments containing panelboards shall have circuit directories fastened to the compartment door. Diagrams, tables and directories shall consist of two ply laminated plastic, with black face and white core.

D. Bus Systems

1. Main horizontal bus: Tin plated copper, bolted joints, accessible from the front of the structure, fully rated throughout the lineup.
2. Vertical section bus: Tin plated copper, full height, totally insulated and isolated by glass polyester barriers with shutters to cover stab openings when units are withdrawn. Provide fishtape barriers to isolate bottom wireways from lower ends of vertical bus.
3. Vertical buses used for a tie circuit breaker or tie feeder lugs shall be rated for a continuous capacity equivalent to the main horizontal bus rating.
4. Horizontal ground bus: Provide a tin plated copper ground bus in each section equipped with lugs for termination of feeder and branch circuit ground conductors. Connect to ground bus in adjacent sections with splice plates.
5. Buses shall be sized for a maximum current density of 1200 Amps per square inch.

E. Wiring

1. Wiring: Stranded copper, minimum size No. 14 AWG, with 600 Volt, 90° degree C, flame retardant, Type MTW thermoplastic insulation, NEMA Class II-S, Type B. Line side power wiring shall be sized for the full rating or frame size of the connected device.
2. Identification: All wires shall be numbered with type written heat shrinkable wire markers at each termination point, color coding per NEMA standards and the NEC. Foreign voltage control wiring shall be yellow.

F. Signage

1. Each motor control center shall be furnished with a sign marked "DANGER – 480 VOLTS - KEEP OUT". Letters shall not be less than one inch high, ¼ inch stroke. Signs shall be laminated plastic, engraved white letters with a red background.
2. Compartments with voltages from sources outside of the compartment shall have a sign mounted inside the compartment door marked "CAUTION - THIS UNIT CONTAINS A VOLTAGE FROM AN EXTERNAL SOURCE". Letters shall be black on a high visibility yellow background.
3. Provide a two inch by six inch nominal engraved master nameplate, of two ply laminated plastic, black face, ½ inch high by 1/8 inch stroke white letters, screw fastened to the top wireway of each lineup with stainless steel screws. Include MCC designation and service ratings.
4. Provide one inch by three inch nominal engraved unit nameplates of two ply laminated plastic, black face, white core, 3/8 inch high by 1/16 inch stroke white letters, screw fastened to each door with stainless steel screws. Equipment names shall be as shown on the single line diagrams.

2.03 COMPONENTS

A. General

The Drawings indicate the approximate horsepower and intended control scheme of the motor driven equipment. Provide the NEMA size starter, circuit breaker trip ratings, control power transformers and thermal overload heater element ratings matched to the motors and control equipment actually supplied, in compliance with the NEC and the manufacturers

heater selection tables. All variations necessary to accommodate the motors and controls as actually furnished shall be made without extra cost to the OWNER.

B. Circuit Breakers

1. Power circuit breakers (400 Amp and larger): 100% equipment rated, 600 Volt, molded case circuit breakers with integral fully adjustable solid state trip device. Trip device shall be temperature insensitive and have the following characteristics and functions:
   a. Independently adjustable long time pick-up and delay.
   b. Independently adjustable short time pick-up and delay with I^2t in and out switch.
   c. Adjustable instantaneous.
   d. Independently adjustable ground fault pick-up and delay.
   e. Trip mode targets for over load, short circuit and ground fault.
   f. Long time pick-up light or other indicator.
2. Circuit breakers (less than 400 Amps): Thermal-magnetic trip type, 600 Volt, two or three Pole as required, labeled in accordance with UL 489. Provide integral current limiting fuses as required to meet the specified equipment short circuit rating. Provide independently adjustable magnetic trips on 225 Amp frame breakers and larger.

C. Branch Circuit Feeder Breakers (Non-motor loads)

Molded case circuit breakers: Thermal-magnetic trip type, 600 Volt, two or three Pole as required, labeled in accordance with UL 489. Circuit breakers shall be fully rated to meet the specified equipment short circuit rating. Provide independently adjustable magnetic trips on 225A frame breakers and larger.

D. Combination Starter Units

1. Combination starters shall include a motor circuit protector (MCP) in series with a motor controller and an overload protective device. The MCP shall have an adjustable magnetic trip range up to 1000% of rated continuous current and a trip test feature. MCP's shall be labeled in accordance with UL489.
2. Motor starters: three Pole, 600 Volt, electrically operated, of the types shown on the Drawings. Provide NEMA sizes as required for the horse-powers shown on the Drawings. Minimum size shall be NEMA Size 1. Fractional size starters are not acceptable. IEC rated starters will not be acceptable. Starters shall have 120 Volt encapsulated operating coils; individual control power transformers with primary and secondary fuses and silver cadmium oxide renewable line contacts.
3. Multi-speed and reversing starters shall include two motor rated contactors mechanically and electrically interlocked so that only one device may be energized at any time.
4. Wye-delta starters shall be closed circuit transition for use with six or 12 lead motors.
5. Contactors: Electrically held, 120 VAC coil operator, suitable for tungsten, ballast, or resistive non-motor loads, with over current protection, control transformer and contact ratings and poles as shown on the Drawings.

6. Motor overload protection: Ambient compensated, adjustable, three Pole, thermal bi-metallic or melting alloy type, with push-to-test feature. Overload relays for submersible pump motors shall be ambient compensated, quick trip, Class 10. Overload relays shall be manually reset from outside the enclosure by means of an insulated pushbutton. Provide auxiliary alarm contacts where shown on the Drawings.
7. Auxiliary contacts: Form C, NEMA A600 rating, as required by the control schemes on the Drawings. Provide one normally open and one normally closed spare contacts on each starter. Additional auxiliary contacts shall be furnished as shown on the Drawings or as required by the control schematic and this Section.
8. Control power transformers: Two winding type, 120 VAC secondary, fused in accordance with the NEC. Provide extra capacity as required or where shown on the Drawings.

E. Instrumentation and Metering
1. Instrumentation transformers: Indoor, 600 Volt, butyl-rubber molded, metering class designed in accordance with ANSI and NEMA standards. Window type current transformers, with burden capacity as low as 50 VA, may be used where such capacity is sufficient. Current transformer accuracy ratings shall be at least equal to NEMA standard requirements for the particular application.
2. Instrument transducers: Inputs matched to the corresponding metering circuit, four 20 mADC output, 0.5% accuracy, as manufactured by Rochester Instrument Systems or equal.
3. Elapsed time hour meters: Five digit, non-reset type, with 120 Volt synchronous motor.
4. Indicating meters: Four inch square, 250° scale, 1% accuracy switchboard type. Meter types as shown on the Drawings.
5. Instrument control switches: 600 Volt switchboard type, rated 20 Amps continuous, with black molded phenolic escutcheon plates, white characters, General Electric, Type SB-1 or equal.
6. Provide micro-processor based metering units where indicated on the Drawings. Meters shall display all digital values of power such as voltage, current, phases, power factor, kW demands, kWH, etc. Meters shall be manufactured by one of the following:
   a. General Electric –PQM II.
   b. Or equal.
7. Provide GE-Multinet-FE or equal transcriber to convert modbus output to Ethernet output and fiber optic output.

F. Relays and Timers
1. Control relays and timers: Heavy duty machine tool type, with 10 Amps, 600 Volt convertible contacts, General Electric Co., CR120 Series; Cutler-Hammer, Type M-600; Square D, Type X or equal. Provide pneumatic timing or latching attachments as required by the control schemes shown on the Drawings.
2. Panel mounted timers (Provide as noted on the Drawings): Flush mounted, plug-in type, Eagle Signal, Bulletin 125 Cycle-Flex or equal, with ranges as shown on the Drawings.

G. Pilot Devices
1. Control operators: Heavy duty, full size, oiltight, with NEMA A600 contact rating. Types and quantities as shown on the Drawings.
2. Indicator lights: Full size, oiltight, low voltage, with push-to-test feature. Colors and quantities as shown on the Drawings.

H. Miscellaneous Units
1. Bus connected surge protection: 600 Volt, 3 Phase lightning arrestor and surge capacitor, with current limiting fuse in series with each pole. Fuses shall be equipped with “blown-fuse” indicators, by General Electric "Tranquell" Series; Advanced Protection Technologies XTE/5000 HP Series, or equal.
2. Transient voltage surge suppressors (TVSS): Unit shall be metal oxide varistors (MOV) technology and shall be listed under UL 1449 – Second Edition. TVSS shall provide suppression for all modes of protection: L-N, L-G, and N-G in WYE systems. Each mode shall be fused with a 200 KAIR rated fuse. TVSS shall incorporate copper bus for the surge current path. The UL clamping voltage shall not exceed 800V for L-N, L-G, and N-G.

Refer to Section 16280 for TVSS.

2.04 SURFACE PREPARATION AND SHOP COATINGS

A. All non-current carrying metal parts of the control center assembly shall be cleaned of all weld spatter and other foreign material and given a heat cured, phosphatized chemical pre-treatment to inhibit rust.

B. Indoor equipment shall be finish painted with one coat of manufacturers standard electrocoated, heat cured enamel. Color shall be ANSI 49 or 61 light gray.

C. Outdoor equipment shall be finish painted with two coats of polyurethane or epoxy enamel, two to three mil thickness. Exterior color shall be light gray.

D. Unpainted non-current carrying parts shall receive a protective zinc plating to prevent corrosion.

2.05 SHOP TESTING

Perform manufacturers standard production testing and inspection in accordance with NEMA and ANSI standards. Submit certified copies of the test results and reports.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Motor control center floor sill shall be bolted directly to the raised concrete base. Structure shall be leveled and plumb. Provide hardware and shims for installation.

B. Field installed interior wiring shall be neatly grouped by circuit and bound by plastic tie wraps. Circuit groups shall be supported so that circuit terminations are not stressed.

C. In general, all conduit entering or leaving a motor control center shall be stubbed up into the bottom horizontal wireway directly below the vertical section in which the conductors are to be terminated, or shall enter the motor control center from the top. Conduits shall not enter the motor control center from the side unless approved in writing by the ENGINEER.

D. Install the equipment in accordance with the manufacturer's instructions.

E. Remove temporary lifting angles, lugs and shipping braces. Touch-up damaged paint finishes.

F. Make wiring interconnections between shipping splits.

G. Install bus splice plates and torque connections.

H. No operator devices shall be located over six feet, six inches above the finished floor. Circuit breaker operation handles more than six feet, six inches above the finished floor shall have operating arm extensions.

3.02 FIELD TESTING

A. Make the following minimum tests and checks before the manufacturer's representative is called in for testing and adjustment.
1. Megger incoming line terminals and buses, phase-to-phase and phase-to-ground after disconnecting devices sensitive to megger voltage.
2. Remove current transformer shunts after completing secondary circuit. Check polarity and continuity of metering and relaying circuits.
3. Check mechanical interlocks for proper operation
4. Test ground connections for continuity and resistance.
5. Adjust unit compartment doors.
6. Check control circuit interlocking and continuity with starters in the TEST position. Provide external source of control power for this test.
7. Adjust motor circuit protectors and voltage trip devices to their correct settings.
8. Install overload heaters or adjust relays for actual motor nameplate currents. If capacitors are installed between starter and motor, use overload relay heaters based on measured motor current.

B. In the event of an equipment fault, notify the ENGINEER immediately. After the cause of the fault has been identified and corrected, a joint inspection of the equipment shall be conducted by the CONTRACTOR, the ENGINEER and the equipment manufacturer's factory service technician. Repair or replace the equipment necessary prior to placing the equipment back into service.

3.03 ADJUSTMENT

A. The motor control center manufacturer shall provide the services of a factory trained service technician for start-up and training of the OWNER'S personnel. The first trip shall be coordinated with the equipment start-up. The second trip shall include any necessary follow-up or punch list work and shall also include instructions to the OWNER or to his/her designated personnel. The manufacturer's service technician shall demonstrate and test all operational features of the installed equipment to the satisfaction of the OWNER. Submit a certified copy of the field inspection to the ENGINEER. No equipment shall be energized without the approval of the OWNER.

B. The motor control center manufacturer's factory service technician shall make the following inspection, tests and adjustments:
   1. Calibrate and test main and feeder circuit breaker trip devices.
   2. Inspect the installation for compliance with the manufacturer’s recommended installation practices and report all deviations to the ENGINEER.

3.04 CLEANING

Remove all rubbish and debris from inside and around the control center. Remove dirt, dust, or concrete spatter from the interior and exterior of the equipment using brushes, vacuum cleaner, or clean, lint-free rags. Do not use compressed air.

END OF SECTION

SECTION 26 51 00 - INTERIOR LIGHTING AND LAMPS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. Provide labor, material, equipment and services necessary to provide all interior lighting fixtures, necessary hangers and lamps. Fixtures include all interior fixtures plus all exterior fixtures mounted to exterior wall or to structures connected directly to building.

1.3 SUBMITTALS

A. Submit for approval prior to purchasing fixtures complete fixture lists of fixtures proposed to be used. Include cuts of both specified fixture and proposed equivalent fixtures if fixtures other than those specified are submitted.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Provide lighting fixtures indicated by type on lighting fixture schedule on drawings.

2.2 EQUIPMENT REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Standards:

1. ENERGY STAR certified.

2. California Title 24 compliant.

3. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.

4. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

5. UL Listing: Listed for damp location.

6. Recessed luminaires shall comply with NEMA LE 4.

7. User Replaceable Lamps:

a. Bulb shape complying with ANSI C78.79.

b. Lamp base complying with ANSI C81.61.

C. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.

D. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products, and complying with the applicable IES testing standards.

E. Provide luminaires from a single manufacturer for each luminaire type.

F. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

G. Rated lamp life of 50,000 hours to L70.

H. Lamps dimmable from 100 percent to 0 percent of maximum light output.

I. Internal driver.

PART 3 - EXECUTION

3.1 INSTALLATION REQUIREMENTS

A. Comply with NECA1.

B. Fixtures shall be securely mounted as required by Section 410, NEC and as specified herein.

C. Fixtures mounted in a suspended ceiling shall be secured to the grid with approved clips as required by the NEC.

D. Fixtures shall be mounted in locations as shown on architectural reflected ceiling drawings.

E. Mount fixtures as called for in schedule on electrical drawings. Determine type of ceiling to be installed in each space from architectural drawings and schedules and furnish fixtures suitable for the exact type.

F. Receive, store, uncrate, and install lighting fixtures shown in schedule on drawings to be furnished by others.

G. Recessed fixtures in dropped ceiling areas shall be connected using Greenfield and No. 14 THHN wire. Greenfield shall be connected to fixture and outlet box. Each piece of Greenfield shall include in it a separate insulated green grounding conductor not smaller than No. 14 AWG for grounding continuity between fixture and conduit system. Grounding conductor shall be mechanically connected in a permanent and effective manner to fixture and conduit system and shall be electrical continuous. No conduit shall enter a recessed fixture directly as this would prevent removal of fixture without disturbing balance of circuit.

H. Joints in fixture wiring shall be made using wire nuts, preinsulated Scotch locks, Ideal No. 30-410 crimps and No. 30-415 wrap caps, or other approved mechanical means of connection.

I. Adjustable type fixtures shall be adjusted by the Contractor to illuminate intended area to satisfaction of Owner.

J. Any adjustable outside area lights or lights mounted on building shall be adjusted at night by the contractor to satisfaction of Owner.

K. Recessed fixtures installed in exposed or concealed tee bar ceilings may not use ceiling grid to support fixtures. Fixtures shall be securely fastened to ceiling framework per NEC Article 410, and shall be supported as described in seismic detail.

L. Surface or recessed fixtures in or on plastered or drywall ceilings shall be supported in accordance with seismic fixture mounting details and shall not depend on ceilings for support.

M. Support fixtures in seismic zones per detail on drawings.

N. All light fixtures shall be grounded in accordance with the NEC. Any fixtures suspended from ceiling which do not include a separate ground wire shall be grounded in a method approved by section 250 of the NEC. Where the conduit is utilized as the ground with a hook pendant style mounting system, a separate ground conductor shall be bonded to the conduit where the conduit ceases to be continuous and routed to the fixture.

END OF SECTION

SECTION 26 56 00 - EXTERIOR LIGHTING AND LAMPS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.
2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.
3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.
2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.
3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. Waivers will not be considered.

1.2 WORK INCLUDED

A. Provide labor, materials, equipment and services necessary for installation of all exterior lighting fixtures, lamps, poles, pole bases etc. for:

1. Area lighting.
2. Parking lot and access roads.
3. Walkways and exterior building lights.

B. Refer to details and arrangements shown on drawings.

C. Provide concrete bases as required for type of arrangements indicated.

D. Concrete bases as required for type of arrangements indicated shall be installed under Division 03. Coordinate with other divisions for proper size of bases, anchor bolt arrangements, conduit stub-ups to pole bases, etc.

E. Fixtures, poles, and appurtenances, shall be suitable for exterior use, shall be UL listed, and shall be of standard design for intended application.

1.3 SUBMITTALS

A. Submit for approval prior to purchasing fixtures complete shop drawings and brochures including photometrics for each type of exterior lighting system specified. Shop drawings and brochures shall be specific and shall include all pertinent data and accessories. If substitute fixtures are proposed, include cuts of both specified fixture and proposed equivalent fixtures including photometrics of both fixtures.

B. If requested by Architect, submit a sample fixture which will be returned after inspection by Architect.

C. Architect reserves right to accept any fixture as an approved equivalent.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Lighting fixtures as indicated on Lighting Fixture Schedule.

B. Contactors and selector switches shall be Square D or approved substitute.

C. Photocells: Tork.

D. Lighting Contactors: Square D or approved substitute.

2.2 MATERIALS

A. Provide luminaire and pole assemblies as scheduled.

B. Luminaires, including all components, shall be designed to meet extreme temperature (low), moisture, and wind conditions in area.

C. Poles: Steel round or square, designed for wind load in the area of installation.

D. All 150-1500 watt metal halide luminaires shall be equipped with a proper ballast that is in compliance with the minimum requirements of the Energy Independence and Security Act of 2007 (EISA of 2007). Luminaires shall be marked with the circle E symbol indicating compliance with EISA.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install parking lot/roadway luminaires and poles on concrete bases. Provide all anchor bolts and bolt hole circle templates. Adjust luminaires to correct tilt and lamp all fixtures.

B. Adjust or rotate area and roadway lighting at night to maximize light utilization in intended areas.

C. Install large area luminaires and poles on concrete bases. Provide all anchor bolts and bolt hole circle templates. Adjust luminaires to correct tilt and lamp all fixtures.

D. Contractor to adjust or rotate area and roadway lighting at night to maximize light utilization in intended areas.

E. Bond together ground connections of luminaires to equipment grounding conductor, pole, and if present, separate 3/4" diameter x 10' copperweld ground rod driven at base of each pole.

F. Ground all luminaires to poles and all poles to equipment grounding conductor or to separate 3/4" diameter x 10' copperweld ground rod driven at base of each pole.

G. Each pole mounted outside lighting luminaire shall have its conductors spliced to the branch circuit connectors in the pole base. Provide a Tron waterproof fuse holder with time delay fuse (1.5 X luminaire current) in the pole base for each ungrounded conductor for each luminaire.

END OF SECTION

SECTION 26 56 10 – EXTERIOR LIGHTING BOLLARDS

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes exterior illuminated bollards complete with LED light source, drivers, internal wiring, mounting base, concrete foundations, anchorage, internal crash reinforcement, and accessories.

B. Coordination:

1. Division 26 – Electrical: Power wiring, grounding, circuits.
2. Division 31 – Earthwork: Trenching and backfilling for conduit.
3. Division 32 – Site Improvements: Concrete foundations and pads for bollards.

1.2 REFERENCES

A. ANSI C136 – Roadway and Area Lighting

B. ASTM B117 – Salt Spray (Corrosion Testing)

C. UL 1598 – Luminaires for Wet Locations

D. NEC – National Electrical CodeE. IES LM-79 and LM-80

1.3 SUBMITTALS

A. Product Data: Manufacturer data sheets showing materials, dimensions, wattage, voltage, LED module, finish, and mounting details.

B. Shop Drawings: Foundation interface, anchor bolt layout, conduit entry details.

C. Photometric Data: IES file for basis of design.

D. Certifications: UL Listing, IP rating.

E. Warranty Statement.

F. Crash Resistance Submittal:

1. Documentation confirming bollard is engineered for 10 mph low-speed vehicle impact intent.

2. Details of internal structural steel reinforcement.

3. Foundation reinforcement details and coordination.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 5 years' experience producing exterior LED luminaires.

B. Installer Qualifications: Licensed electrical contractor.

C. Regulatory Requirements: Conform to NEC and local electrical codes.

1.5 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: Waivers will not be considered.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver luminaires in factory packaging, labeled with model and finish.

B. Store indoors, protected from weather and construction activities.

1.7 WARRANTY

A. Provide min. 5-year manufacturer warranty covering LED modules, drivers, and finish.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Product:

1. NLS Lighting – Seaside Series Bollard SSX; 36" height, stacked louver, flat top. Model reference: SSX-S-UNV-SL-16L-35-40K (4000K). Dark Bronze – Seaside Marine Finish.

B. Acceptable Manufacturers:

1. BEGA
2. Sternberg Lighting
3. Hydrel
4. LSI Industries
5. Or approved equal meeting requirements of this section.

2.2 PERFORMANCE REQUIREMENTS

A. Height: 36 inches (nominal). 6” diameter

B. Light Source: High-output LED.

C. Correlated Color Temperature (CCT): 4000K, neutral white.

D. Color Rendering Index (CRI): Minimum 70.

E. Voltage: 120–277V universal driver.

F. Optics: Shielded stacked louvers for glare control.

G. Output: 1500–2000 lumens typical.

H. Dimming: 0–10V standard.

I. Certifications: UL listed, Wet Location.

J. Ingress Protection: IP65 or better.

K. BUG Rating: B1-U1-G1 or better.

L. Operating Temperature: -40°F to +120°F

M. Impact Resistance (Low Speed Vehicle Mitigation):

1. Provide bollards designed to resist incidental low-speed vehicle impact.

2. Minimum performance: Capable of withstanding a 10 mph (16 kph) vehicle impact from a 5,000 lb passenger vehicle with limited deformation sufficient to deter casual vehicular encroachment.

3. Intent: Provide deterrence and separation from pedestrian areas, not high-security crash protection.

4. Bollard manufacturer shall provide documentation of structural reinforcement options or internal steel core capable of meeting this requirement.

5. Coordinate footing depth and reinforcement with structural engineer to meet impact resistance intent.

2.3 CONSTRUCTION

A. Housing: Marine-grade aluminum, corrosion resistant.

B. Finish: Seaside Marine Finish – polyester powder coat.

C. Internal Steel Reinforcement

1. Factory-installed Schedule 40 steel pipe core.

2. Hot-dip galvanized.

3. Mechanical load transfer to foundation.

D. Base: Surface bolt-down steel base.

E. Hardware: Stainless steel, tamper resistant.

F. Top: Flat top, tamper resistant.

G. Lens: Diffused or clear internal LED compartment.

2.4 ACCESSORIES

A. Anchor Bolt Kit: Included with bollard.

B. Base Cover: Matching bollard finish.

C. Surge Suppression: 10kA minimum recommended.

D. Internal Reinforcement for Impact Rating.

1. Provide schedule 40 steel pipe core, minimum 4" diameter, factory-integrated into bollard assembly.

2. Internal reinforcement shall be hot-dip galvanized per ASTM A123.

3. Extend reinforcement into concrete foundation to achieve continuous structural load transfer.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify concrete foundations, anchor bolts, and conduit entries before installation.

B. Report conflicts prior to installation.

3.2 INSTALLATION

A. Install per manufacturer instructions and NEC requirements.

B. Secure bollards plumb and aligned.

C. Provide crash concrete foundations coordinated with Division 32:

1. Minimum 18" diameter x 36" deep foundation unless noted otherwise.
   a. Reinforcement steel tiled to bollard core.
   b. Secure bollards plumb and aligned.
   c. Seal base to prevent moisture intrusion.

2. Provide leveling nuts and grout pad.

3. Coordinate conduit entry.

D. Concrete foundations shall be engineered to resist specified impact loading in coordination with structural drawings. Minimum foundation depth 36" unless otherwise engineered.

3.3 FIELD QUALITY CONTROL

A. Test operation of each luminaire.

B. Replace damaged luminaires or finishes.

3.4 CLEANING AND PROTECTION

A. Clean exposed surfaces.

B. Protect finished bollards until final acceptance.

END OF SECTION

SECTION 26 68 00

WATER PLANT CONTROL PANEL

PART 1 - GENERAL

1.01 Scope of Work

A. Furnish, install, and test the control panel as shown on the Drawings and specified herein.

B. The control panel shall be sized to include all equipment shown on the Drawings.

1.02 Submittals

Submit, in accordance with Section 26 01 00, shop drawings and product data for all components of the control panel.

1.03 Reference Standards

The water plant control panel shall be designed, built, and tested in accordance with UL standards.

PART 2 - CONTROL PANEL SPECIFICATIONS

2.01 General

A. The control panel shall be in the motor control center.

B. All power and control wires shall be stranded copper type MTW. All wiring shall be in covered plastic wireway.

C. All points necessary for external connection in the controller, whether power or control, shall be wired to a terminal strip located at the top or bottom of the enclosure as directed by the Engineer. The terminal strip shall be permanently marked with the same designation as the wire connected to it.

D. All power and control wires shall be marked at both ends using self-adhering wire markers. No two wires having different functions within the control panel shall have the same markings.

E. All circuit breakers, starters, and other control devices mounted within the controller panel shall be labeled for identification both within the panel and on the wiring schematic with corresponding designations.

F. Control power shall be 120 volts and shall be protected by a correctly sized circuit breaker. If required, provide a properly sized control power transformer with primary over current protection.

G. Each starter shall be provided with overload protection in all three phases and each individual starter shall have phase failure protection.

H. All selector switches, pilot lights, and control devices shall be visible and operable from the controller exterior door or an interior deadfront panel when required. The deadfront panel shall be constructed of anodized aluminum and shall have a continuous aluminum hinge. An anodized aluminum deadfront shall be utilized when the controller environment is not conducive to exposed controls or as specified on Drawings.

I. All approval drawings shall be prepared per J.I.C. standards for Engineer's review prior to any fabrication of control equipment. The controller shall be produced by a UL 508 listed shop. Proof of label availability shall be submitted with above drawing.

J. The controller manufacturer shall provide a written warranty with approval drawings covering all controller materials and parts furnished for a period ending one year after final acceptance of the project. This warranty shall cover all material replacement, all labor, and all travel expenses.

K. The controller manufacturer shall show satisfactory evidence that he maintains a fully equipped factory organization capable of furnishing adequate service for the equipment furnished, including replacement parts within a 200-mile radius of the job site. Suppliers employing outside organizations for "ON CALL" service shall not be considered.

L. The controller manufacturer shall have a service department capable of responding in emergency conditions twenty-four/seven and three hundred sixty-five days a year (24/7/365).

2.02 Water Plant Control Panel

A. SERVICE ENTRANCE: The control panel shall be designed for 277/480 volt, three-phase, three-wire power as indicated on the Drawings.

B. MAIN BREAKER: Provide a properly sized main breaker, as shown on the Drawings. The actual main breaker size may differ from that indicated on the Drawings dependent of the actual motor horsepower being furnished. In addition, provide a through the door operator mounted on the interior deadfront. The operator shall prevent the deadfront from being opened while the breaker is in the "ON" position.

C. POWER DISTRIBUTION BLOCKS: Provide properly sized Power Distribution Block(s) (PDB), as required for the control panel. Power distribution blocks shall be UL Listed, rated for the voltage and ampere rating required, and manufactured by Marathon, Square D, or approved equal. If required, provide lug(s) for service entrance neutral.

D. SERVICE ENTRANCE SURGE PROTECTION DEVICE: Provide a service entrance rated Type 2, AC power distribution Surge Protection Device (SPD-a), per Component

Specifications, designed to protect all types of loads fed from the distribution panels, branch panels and/or individual equipment panels. Units shall be UL listed and shall bear a UL label. Surge Protection Device shall be rated for 160kA per phase and 80kA per mode.

E. POWER MONITOR: Provide a service entrance rated Power Monitor (PM) per Component Specifications. Power monitor shall constantly monitor the three-phase voltages to detect harmful power line conditions caused by single-phasing, low voltage, phase reversal, and voltage unbalance. When a harmful condition is detected, no three-phase motors shall be allowed to operate. Phase monitor shall be protected by 1 amp, 480 volt fuses on the primary side.

F. SERVICE PUMPS NO. 1 AND NO. 2: For each pump, the motor control center shall provide a properly sized combination circuit breaker and across the line motor starter with Class 10 ambient compensated overload protection and individual phase failure protection as indicated on the Drawing. The actual horsepower may differ from that indicated on the Drawing. In addition, provide the following equipment and controls.

1. The pumps shall be controlled by a Duplex Pump Controller (DC1-1), per Component Specifications. The controller shall be capable of operating with dry contact outputs for All-Stop, Lead Start, and Lag Start during normal operation. In the automatic mode, the Duplex Pump Controller shall receive stop and start commands based upon the signal from the Hydropneumatic tank control panel. The Duplex Pump Controller shall be a standard, catalogued product of a water and wastewater automation equipment manufacturer regularly engaged in the design and manufacture of such equipment for a period of at least 15 years. Pump controller shall be UL recognized for use in industrial control panels. The duplex controller shall perform all control functions as specified in Component Specifications Section. The duplex pump controller shall have the following indicators and controls for each pump:
   a. Manual-Off-Automatic selector switch for Service Pump No. 1
   b. Manual-Off-Automatic selector switch for Service Pump No. 2
   c. Pump 1 / Pump 2 – Lead / Lag Selector Switch
   d. Green “Pump 1 Running” pilot light
   e. Green “Pump 2 Running” pilot light
   f. Red “Pump 1 Failure” pilot light
   g. Red “Pump 2 Failure” pilot light
   h. Red “High Water” pilot light
2. Provide a Motor Monitor (MM-4 and MM-5) complete with properly sized Current Transformer, both per Component Specifications. The Motor Monitor shall provide a positive run signal, monitor motor running current, and indicate motor running time and motor full load running amperes. In addition, the motor monitor shall come complete with high or low amperes set point for each pump.

G. R.O. SUPPLY PUMPS: SERVICE PUMPS NO. 1 AND NO. 2: For each pump, the motor control center shall provide a properly sized combination circuit breaker and across the line motor starter with Class 10 ambient compensated overload protection and individual phase failure protection as indicated on the Drawing. The actual horsepower may differ from that indicated on the Drawing. In addition, provide the following equipment and controls.

1. The pumps shall be controlled by a Duplex Pump Controller (DC2-3), per Component Specifications. The controller shall be capable of operating with dry contact outputs for All-Stop, Lead Start, and Lag Start during normal operation. In the automatic mode, the Duplex Pump Controller shall receive stop and start commands based upon the signal from the R.O. control panel. The Duplex Pump Controller shall be a standard, catalogued product of a water and wastewater automation equipment manufacturer regularly engaged in the design and manufacture of such equipment for a period of at least 15 years. Pump controller shall be UL recognized for use in industrial control panels. The duplex controller shall perform all control functions as specified in Component Specifications Section. The duplex pump controller shall have the following indicators and controls for each pump:
   a. Manual-Off-Automatic selector switch for R.O. Pump No. 1
   b. Manual-Off-Automatic selector switch for R. O. Pump No. 2
   c. Pump 1 / Pump 2 – Lead / Lag Selector Switch
   d. Green “Pump 1 Running” pilot light
   e. Green “Pump 2 Running” pilot light
   f. Red “Pump 1 Failure” pilot light
   g. Red “Pump 2 Failure” pilot light
   h. Red “High Water” pilot light
2. Provide a Motor Monitor (MM-1 and MM-2) complete with properly sized Current Transformer, both per Component Specifications. The Motor Monitor shall provide a positive run signal, monitor motor running current, and indicate motor running time and motor full load running amperes. In addition, the motor monitor shall come complete with high or low amperes set point for each pump.

H. WELL PUMP NO. 1: Provide a properly sized combination circuit breaker and across the line motor starter with Class 10 ambient compensated overload protection and individual phase failure protection as indicated on the Drawing in the motor control center. The actual horsepower may differ from that indicated on the Drawing. In addition, provide the following equipment and controls.

1. The pump shall be controlled by a Simplex Pump Controller (SC-1), per Component Specifications. The controller shall be capable of operating with float switches or a level controller with dry contact outputs for All-Stop, Lead Start, and Lag Start during normal operation. In the automatic mode, the Simplex Pump Controller shall receive stop and start commands based upon the level in the Ground storage tank as sensed by the submersible pressure/level transmitter (LT-GS. The Simplex Pump Controller shall be a standard, catalogued product of a water and wastewater automation equipment manufacturer regularly engaged in the design and manufacture of such equipment for a period of at least 15 years. Pump controller shall be UL recognized for use in industrial control panels. The Simplex Pump Controller shall perform all control functions as specified in Component Specifications Section. The Simplex Pump Controller shall have the following indicators and controls for each pump:
   a. Manual-Off-Automatic selector switch for Well Pump No. 1
   b. Green “Pump 1 Running” pilot light
   c. Red “Pump 1 Failure” pilot light

d. Red "High Water" pilot light

2. Provide a Motor Monitor (MM-1) complete with properly sized Current Transformer, both per Component Specifications. The Motor Monitor shall provide a positive run signal, monitor motor running current, and indicate motor running time and motor full load running amperes. In addition, the motor monitor shall come complete with high or low amperes set point for each pump.

I. ENCLOSURE LIGHTING: Provide a 24V DC LED enclosure interior light. Light shall be surface mounted to the top of the enclosure interior to provide illumination to the interior deadfront door and the backplate. Light shall be Forest Lighting model number T5N241 or approved equal.

J. COMMON ALARM LIGHT: Provide a weatherproof exterior common Alarm Light (AL), per Component Specifications, with red Lexan lens and mounted on the side of the enclosure/building where shown on plans or as directed by the Engineer. The alarm light shall burn dim and steady during normal conditions to indicate electrical power "ON" and lamp good. During any alarm condition, the alarm light shall flash brightly.

K. R.O. CONTROL: Provide a properly sized contactors as shown on Drawings, for the R.O. Control panel. In addition, provide the following equipment and controls.

1. Provide a Simplex Controller (SC-2) per Component Specifications. In the automatic mode and after a field adjustable time delay, the R.O. Control panel shall operate when the finished water tank requires water. The Simplex Controller shall be a standard, catalogued product of a water and wastewater automation equipment manufacture regularly engaged in the design and manufacture of such equipment for a period of at least 15 years. The Simplex Controller shall have the following operators and indicators for the aerator blower motor:
   a. Manual-Off-Automatic Selector Switch
   b. Green "Running" pilot light
   c. Red "Failure" pilot light
   d. Red SPARE pilot light

L. FINISHED WATER STORAGE TANK LEVEL/METER CONTROLLER: Provide a six point ground storage tank Level/Meter Controller (LMC-FW) per Component Specifications. The Level Meter/Controller shall be a standard, catalogued product of a water and wastewater automation equipment manufacturer regularly engaged in the design and manufacture of such equipment for a period of at least 15 years. The controller shall receive an analog signal from the storage tank submersible pressure transducer (LT-FW). The level/meter controller shall provide OFF-ON setpoint controls for the Duplex Pump Controller (SWC-1). Provide the following set points for this controller:

1. Finished Water Storage Tank Full, Well Stop (Rising Level)
2. LEAD R.O. Pump START (Falling Level)
3. LAG R.O. Pump START (Falling Level)
4. Service Pumps No. 1 & No. 2 Permissive Run (Rising Level)
5. Service Pumps No. 1 and No. 2 Stop/Lockout (Falling Level)
6. Finished Water Storage Tank Low Level Alarm (Falling Level)

Level meter/controller shall have built in level transducer signal failure relay option with two

relays, to energize when the input signal goes above 20mA or below 4mA. The relays can energize on both high/low conditions, or one can energize on high failure and the other on low failure. In addition, either relay may be set to 'flash' on and off during the failure condition. This failure alarm shall also energize a front panel flashing LED alarm indicator. This information shall be transferred to the Remote Telemetry Unit, transmitted to the Central Telemetry Unit, and displayed on the existing SCADA computer.

M. GROUND STORAGE TANK LEVEL/METERCONTROLLER: Provide a six-point ground storage tank Level/Meter Controller (LMC-GS) per Component Specifications. The Level Meter/Controller shall be a standard; catalogued product of a water and wastewater automation equipment manufacturer regularly engaged in the design and manufacture of such equipment for a period of a least 15 years. The controller shall receive an analog signal from the storage tank submersible pressure transducer (LT-GS). The level/meter controller shall provide OFF-ON setpoint controls for the Well Controller (SWC-1). Provide the following set points for this controller:

1. Finished Water Storage Tank Full, Well Stop (Rising Level)
2. Well Start (Falling Level)
3. R.O. Pumps No. 1 & No. 2 Permissive Run (Rising Level)
4. R.O. Pumps No. 1 & No. 2 Stop/Lockout (Falling Level)
5. Ground Storage Tank Low Level Alarm (Falling Level)

Level meter/controller shall have built in level transducer signal failure relay option with two relays, to energize when the input signal goes above 20mA or below 4mA. The relays can energize on both high/low conditions, or one can energize on high failure and the other on low failure. In addition, either relay may be set to "flash" on and off during the failure condition. This failure alarm shall also energize a front panel flashing LED alarm indicator. This information shall be transferred to the Remote Telemetry Unit, transmitted to the Central Telemetry Unit, and displayed on the existing SCADA computer.

2.03 HYDROPNEUMATIC TANK CONTROLLER PANEL: Provide a Hydropneumatic Tank Controller (HTC), as described below and as shown on drawings. Hydropneumatic Tank Controller shall be furnished and installed where shown on the drawings as a combination pressure and level control system including all pressure controls, air compressor controls, air release electric solenoid, tank Pressure Meter/Controller (PMC-1) with automatic level controls, tank level sight gauge and pressure gauge, thermostatically controlled freeze protection and weather proof duplex receptacle. Thermostat shall be adjustable from 50ºF to 90ºF with 2ºF fixed differential. Receptacle shall come complete with a weatherproof cover. Cover shall be UL listed for wet locations, with cover closed, and shall be constructed of tough plastic that is resistant to high impact and sunlight. In addition, the cover shall be non-corrosive, non-conductive and protect against rain, snow and ice. The control system shall accurately and automatically maintain the correct air/water ratio in tank at all times. All the above-described equipment shall be housed in one single factory built enclosure. The complete unit shall be pre-wired, adjusted and tested at the factory for proper system operation prior to shipment. The Control Panel shall include Pressure Meter/Controller (PMC-1) and a Pressure Sensor (PT-1), all per Component Specifications, for Pump(s) or Well(s) Start/Stop and for air pressure control. The pressure control for the system shall be set from within the control system enclosure. Provide Manual-Off-Automatic selector switches for each pump, or well, and for air compressor. The enclosure shall be equal to NEMA 4X, constructed of fiberglass and light gray in color. The enclosure shall be lockable

to prevent entry of unauthorized personnel. Enclosure shall be constructed with sectionalized interior control compartments to house all electrical control components and for switch mounting. The hydropneumatic control system shall be equal to the HYDRO WATCH panel as manufactured by Control Systems, Inc., Jackson, Mississippi. The system shall have a pressure range form high pressure of 80 PSI to a low pressure of 60 PSI. Provide the system with a heavy duty air compressor, Thomas catalog no. GH-610B, capable of a maximum air pressure of 100 PSI at 4.3 CFM.

A. PRESSURE SENSOR: Provide a non-submersible Pressure Sensor with the proper operating range for the project in question. Sensor shall meet the requirement for CE marking of EN50081-2 for emissions and EN50082-2 for susceptibility and shall have exceptional Proof Pressure and Stability along with Vacuum up to 6000 PSI (400 bar). Pressure sensor shall be able to survive most pressure spikes caused by pump ripple, solenoid valves, etc. In addition, pressure sensor shall have the following features and functions.

a. Pressure Range: Vacuum to 400 bar (6000 psi)
b. Proof Pressure: 4 x Full Scale (FS) (<1% FS Zero Shift)
c. Burst Pressure: >35 x FS <= 4 bar (60 psi);
>20 x FS <=40 bar (600 psi);
>5 x FS <=400 bar (6000 psi)
d. Fatigue Life: Designed for more than 100 million FS cycles
e. Supply Voltage Sensitivity: 0.01% FS/Volt
f. Long Term Drift: 0.2% FS/year (non-cumulative)
g. Accuracy: 0.5 % FS typical (optional 0.15% FS)
h. Thermal Error: 2.0% FS typical
i. Compensated Temperatures: -20°C to 80°C (-5°F to 180°F)
j. Operating Temperatures: -40°C to 125°C (-22°F to 260°F)
k. Zero Tolerance: 1% of span
l. Span Tolerance: 1% of span
m. Response Time: 0.5 ms
n. Pressure Port: 1/4-18 NPT External
o. Wetted Parts: 17-4 PH Stainless Steel
p. Enclosure: 316 SS, 17-4 PH SS
q. Vibration: 70g, peak to peak sinusoidal, 5 to 2000 Hz; (Random Vibration: 20 to 200 Hz @ =20g Peak per MIL-STD.-810E Method 514.4)
r. Acceleration: 100g steady acceleration in any direction 0.032% FS/g for 1 bar (15 psi) range decreasing logarithmically to 0.0007% FS/g for 400 bar (6000 psi) range.
s. Shock: 20g, 11 ms, per MIL-STD.-810E; Method 516.4 Procedure l
t. Approvals: CE, UR (12 ET, 16 ET Intrinsically safe)
u. Voltage Output Units: Output: 4-20 mA; Supply Voltage (Vs): 1.5 Vdc above span to 35 Vdc; Min. Load Resistance: (FS output / 2) Kohms
v. Current Output Units: Output: 4-20 mA (2 wire); Supply Voltage (Vs): 24 Vdc, (7-35 Vdc); Max. Loop Resistance: (Vs-7) x 50 ohms

TAG	SERVICE
PT-1	Hydropneumatic Tank Pressure Sensor

B. PRESSURE METER/CONTROLLER: Provide an electronic solid state proportional Pressure

Meter/Controller that will accept a four (4) to twenty (20) mA or a one (1) to five (5) Vdc signal, condition the signal to provide a valid basis for control and then perform ON/OFF or OPEN/CLOSE discrete dry type set point contact conditions based on the input value of the analog input signal. The Pressure Meter/Controller shall have the following features.

a. Provided with a 3.5-digit LED readout meter in PSI.
b. Provide six (6) separate setpoints each with discrete, isolated sealed SPDT relay output contacts.
c. Provide excitation voltage to drive a transducer/transmitter and condition its output signal to provide a continuous display of pressure.
d. The setpoints shall be field adjustable to operate on rising above or falling below the setpoint.
e. An LED indicator shall be provided for each setpoint to indicate when it is activated.
f. The actual setting of each setpoint shall be able to be displayed on the digital readout at any time.
g. The setting of each setpoint shall be adjustable throughout the complete signal range from the front of the meter/controller.
h. Provide a means of manually ramping the meter/controller, up and down, throughout its complete signal range, to test the operation of the setpoints.
i. The meter/controller shall come complete with a four (4) to twenty (20) mA or a one (1) to five (5) Vdc output signal for additional monitoring and control devices.

TAG	SERVICE
PMC-1	Hydropneumatic Tank Pressure Meter/Controller

PART 3 – FIELD INSTURMENTATION

3.01 Junction Box and Analog Signal Line Filter: Provide and install a properly sized NEMA 4 rated junction box, suited for outdoor/wet locations, complete with an analog signal Line Filter (LF) per Component Specifications. Junction box shall have a 1/8-inch drain/breather hole installed in the bottom of the enclosure. Line filter shall protect associated equipment from transient voltage surges and induced voltages. Junction box shall be field installed by the Contractor in close proximity of the submersible pressure level transmitter. The Contractor shall be responsible for properly sealing the conduits entering junction box.

3.02 Conduits: All conduits entering control panels shall be properly sealed, per plans, to ensure corrosive gasses and water/moisture does not enter into panel. It is the responsibility of the Contractor to provide and install adequate conduit seals. It is recommended that re-enterable sealant compounds equal to 3M Scotchcast 2112C or Alesko Epoxy Sealing Putty are used.

3.03 Grounding: All control panels shall be properly grounded per Section 16060 – Grounding and Bonding for Electrical Systems. The Contractor shall provide certified test reports of ground resistance.

A. Certification that the materials and installation are in accordance with the drawings and specifications.

B. Certification by the Contractor that the complete installation has been properly installed and tested.

PART 4 - COMPONENT SPECIFICATIONS

4.01 Service Entrance Surge Protection Device (SPD): The SPD shall be mounted in the control panel / motor control center section adjacent to the Main Breaker. The SPD is connected to the main bus in the panel with conductors of size and of no greater length than indicated in the Surge Protection Device manufacturer's installation instructions. SPD shall be a Type 2 device ideal for distribution panels, branch panels, and critical loads.

A. SPD shall provide transient voltage surge suppression and electrical high frequency noise filtering. Unit is designed for parallel connection to the main bus. SPD unit uses selenium cells and metal oxide varistors to achieve its performance. Products using gas tubes, spark gaps, silicon avalanche diodes, or other components, which under failed conditions would cause system failure, are not acceptable.

B. Manufacturer qualifications: The product of a manufacturer engaged in the commercial design and manufacture of the type of product described herein for a minimum 10 years.

C. Standards: Product complies with the requirements of the following:
1. cUL
2. CE Compliant
3. UL 1449 3rd Edition
4. UL 1283 Listed
5. NEMA LS1 Compliance

D. Operating Voltage: 120/240 volts, 3-phase, 3-wire + neutral and ground.

E. Maximum Continuous Operating Voltage (MCOV): greater than 115 percent of nominal voltage for all products. All suppression filter systems comply with NEMA LS 1.

F. Frequency: Operating frequency range of 47 – 64 Hertz.

G. Protection Modes: all phases – phase to ground; all phases – phase to neutral; all phases – phase to phase; and neutral to ground.

H. Rated Single Pulse Surge Current Capacity: at rated voltage, no less than:
160,000 A Line to Line
80,000 A Line to Neutral
80,000 A Line to Ground
80,000 A Neutral to Ground

I. Tested Single Pulse Surge Current Capacity: Filter system is designed to withstand a single pulse surge current up to 150 percent of the design rating and tested at an independent test laboratory. In the absence of testing facilities capable of such testing, testing of individual components or sub-assemblies within a mode is accepted by ANSI C62.41-1991; the testing

includes a Category C1 surge test followed by a second Category C1 test. The test results demonstrate the unit does not degrade by more than 10 percent from the initial test.

J. Clamping Voltage: Suppression filter system clamping voltages are in compliance NEMA LS1-1992.

K. High Frequency Filter: EMI-RFI noise rejection or attenuation values comply with test and evaluation procedures of NEMA LS1-1992.

L. Overcurrent Protection: Unit includes coordinated UL 489 or UL 198 listed or recognized overcurrent protection devices. If fuses are used, unit incorporates non-encapsulated, field replaceable fuses.

M. Documentation: Provide product data including equipment manual, electrical and mechanical drawings indicated dimensions weights, mounting provisions, connection details and layout diagram, certified tests of UL1449 Listing/Clamp Voltages and NEMA LS1 compliance, certified single pulse surge current capacity testing, and minimum repetitive surge current capacity testing.

N. Status Indicators: Unit has long-life, solid state, externally visible status indicators that monitor the on-line status of each phase of the unit.

O. Warranty: 15-years Unlimited Free Replacement for service entrance Surge Protection Device.

P. Service entrance Surge Protection Device system shall be equal to Surge Suppression Inc. Model SSMA 16-3Y2.

TAG	SERVICE
SPD-1	Service Entrance Surge Protection Device

4.02 Phase Failure/Unbalance/Under Voltage/Reversal Relay: Phase monitor shall be designed to protect 3-phase motors regardless of size and for use with 200 – 240 or 425 – 485 VAC, 50 to 60 Hz motors to prevent damage. The unit shall constantly monitor the three phase voltages to detect harmful power line conditions caused by single phasing, low voltage, phase reversal, and voltage unbalance. When a harmful condition is detected, an output relay is deactivated after a trip delay. The output relay shall reactivate after power line conditions return to an acceptable level for the specified Restart Delay. The trip delay shall prevent nuisance tripping due to rapidly fluctuating power line conditions. Phase monitor shall have the following features and functions.

A. Under Voltage: Trip: -15% of setting for 230V (-10% for 480V)
Reset: -12% of setting for 230V (-8% for 480V)

B. Over Voltage: Trip: -15% of setting for 230V (-10% for 480V)
Reset: -12% of setting for 230V (-8% for 480V)

C. Phase Unbalance: Trip: 7% with 5 second trip delay
15% with 1 second trip delay

Reset: 6%

D. Trip Delay: 5 seconds (delay is reduced to 1 second if Phase Unbalance is 15% or greater)

E. Reset Delay: 2 seconds standard (5-60 seconds optional)

F. Voltage Range: 200V to 240V or 425V to 525V

G. Output Rating: 10A resistive at 240VAC
6A resistive at 240VAC

H. Operating Temp: -40°C to +50°C, -38°F to +122°F

I. Storage Temp: -45°C to +85°C, -47°F to +185°F

J. Enclosure: Lexan, surface mount

K. UL and cUL listed

TAG	SERVICE
PM	Electrical System Power Monitor

4.03 Duplex Pump Controller: Provide a duplex controller to control two pumps that includes the following control functions.

A. Operators and indicators (for each pump)
1. Manual-Off-Automatic selector switch
2. Pump 1 / Pump 2 – Lead / Lag Selector Switch
3. Green "Pump Running" pilot light
4. Red "Pump Failure" pilot light
5. Red "Pump Seal Failure" pilot light (if required)

B. A "Pump No. 1 Lead – Alternate – Pump No. 2 Lead" sequence selector switch to select either pump as lead pump or to select that the motors alternate as lead pump on each call for cycle.

C. Signal inputs for Stop, Lead Pump Start, Lag Pump Start, and a High-Level Alarm. The sensors shall be optically isolated and operate on 12V DC with a maximum current of 12mA for intrinsic safety.

D. Pilot light indicators for each level control input which includes start and stop levels and running inputs for each pump along with a high-level alarm.

E. A field adjustable failure time delay for each pump, in the range of five seconds to six and a half minutes, to start the lag pump at the lead pump start point if the lead pump fails or if the lead pump selector switch is placed in the off position. If a pump fails, the remaining functional pump shall remain the lead pump on future cycles. The failed pump shall only be

called to operate at the lag pump operating point. Normal pump alternation shall resume when failure condition is corrected, and pump has been reset.

F. Soft stop feature to require the motors to stop three seconds apart during the condition that both motors are running when signaled to stop. Soft start feature to require the motors to start three seconds apart during conditions that the lead and lag motors are called for simultaneously.

G. Individual field adjustable time controls to delay starting each pump in the automatic mode after power failure or during initial startup.

H. Pump failure, pump seal failure, and high-level alarm red pilot lights shall flash when activated.

I. Provide pump running, pump failure, and seal failure alarm contacts for each pump. In addition, provide a high-level alarm contact.

J. Manual override inputs for each pump which can be used to manually override the duplex control pump outputs when the controls are in the Auto mode. Inputs shall be provided to start or stop each pump from a remote location.

K. Improper sequence alarm (if required) to activate the common alarm in the event the control level inputs are activated in the wrong order. The order shall be Stop, Lead Start, and Lag Start. The High-Level alarm shall not be included in the improper sequence test.

L. Provide automatic pump alternation on seal failure when a seal failure condition is detected, and the motors are in the automatic mode. The failed pump shall be made the lag pump on future cycles until the failure condition is corrected.

M. An exterior alarm light output which would flash the light brightly during any failure condition. The output shall allow the light to dim glow under normal conditions to indicate that power is on and the lamp is good. A normally open common alarm output contact shall be energized by these alarm conditions.

N. UL recognized for use in industrial control panels.

TAG	SERVICE
DC4-5	Service Pump No. 1 & No. 2 Controller
DC2-2	R.O. Supply pump No. 1 & No. 2 Controller

4.04 Simplex Controller: Provide a Simplex Controller including the following features:

A. Manual-Off-Automatic selector switch, amber "Call" pilot light, green "Well Running" pilot light, red "Well Failure" pilot light and a red "Signal Failure" pilot light.

B. Well control inputs shall be optically isolated and their power limited to 24 VDC with a maximum current of 16 mADC for intrinsic safety.

C. Provide a field adjustable time delay to start the well after well "Call For" signal is received. This time delay shall be field adjustable to occur each time the well is called to operate for backspin protection. The timing period shall be adjustable from 13 to 165 seconds.

D. Provide Common Alarm controls, which include a dry-contact output and flashing exterior alarm light output. The controls shall activate the dry-contact output and flash the alarm light output during well failure or low level conditions.

E. Provide a well failure dry-contact output and flashing alarm indicator. The failure controls shall energize the dry-contact output, flash the well failure alarm indicator and energize the common alarm circuitry if the well fails to run when called for while in the Automatic mode of operation.

F. The Manual-Off-Automatic switch shall bypass all of the controls and energize the well call-for dry-contact output when placed in the Manual position. In the Manual and Off positions the well failure alarm shall be disabled.

G. The Manual-Off-Automatic switch shall be used to reset a well failure alarm after the failure condition has been cleared, by manually switching the well to the Off position and back to Automatic.

H. Provide an input alarm to indicate low-level condition. Provide a red panel indicator and dry-contact output for the alarm. On alarm, flash the indicator, close the alarm dry-contact output, and energize the Common Alarm circuitry.

I. Provide a field adjustable time delay to prevent well failure signal from being activated until the controller has had time to receive a well "Running" signal. The timing range shall be adjustable from 5 seconds to 5.25 minutes. During well failure conditions, provide the following controls.
   1. Red "Well Failure" pilot light on face of controller shall flash when activated.
   2. Activate the Common Alarm relay and exterior flashing light output.
   3. Provide a dry type contact closure for remote alarming that will activate during "Well Failure" condition.

J. The Simplex Well Controller shall be solid state and easily replaceable. Conventional relay and/or timer construction is not acceptable.

TAG	SERVICE
SWC-1	Well Controller
SC-2	R.O. Controller
SC-3	Bleach Controller

4.05 Motor Monitor: Provide an electronic solid state Motor Monitor powered by 120 volt AC that will accept a zero to five amp input signal. Condition the signal to perform ON/OFF or OPEN/CLOSE discrete dry type setpoint contact conditions based on the input signal value. The Motor Monitor shall have the following features.

A. Provide an LCD readout meter providing field adjustable scales of 0-25.0, 0-50.0, 0-100.0, 0-250, 0-500 and 0-1000 to accurately indicate the motor full load current using the 0-5 amp input signal.

B. The Monitor shall be capable of displaying motor total running time up to 99,999.9 hours and be provided with reset capability from the rear of the monitor. The display shall include a non-volatile EEPROM memory backup that does not require battery backup during power failure.

C. Provide two separate field adjustable setpoints, each with discrete, isolated sealed SPDT relay output contacts. The setting of each setpoint shall be adjustable throughout the complete signal range from the front of the Monitor. Each set point shall be provided with a field adjustable "ON" and "OFF" time delay, adjustable from zero to 15 seconds. The actual setting of each setpoint shall be able to be displayed on the LCD readout at any time. An LED indicator shall be provided for each setpoint and shall operate as follows:

1. Setpoint No. 1: When setpoint is timing, the indicator shall burn amber. After timing period and current is at or above setpoint, indicator shall burn green.
2. Setpoint No. 2: When set point is timing, the indicator shall burn amber. After set timing period and current is at or above setpoint, indicator shall burn red.

TAG	SERVICE
MM-1	Service Pump No. 1 Motor Monitor
MM-2	Service Pump No. 2 Motor Monitor
MM-3	R.O. Supply Pump No. 1 Motor Monitor
MM-4	R.O. Supply Pump No. 2 Motor Monitor
MM-5	Well Motor Monitor

4.06 Current Transformer: Current transformers insulation class shall be 0.6 KV BIL, 10 KV Full Wave. They shall be manufactured to meet the requirements of UL1244 and have a minimum accuracy of 60Hz of 2%. Current transformers shall be provided with brass stud terminals and mounting bracket.

4.07 Level Meter/Controller: Provide an electronic, solid-state, proportional Level Meter/Controller that will accept a four to 20 mA or a one to five volt DC signal. In addition, condition the signal to provide a valid basis for control and then perform ON/OFF or OPEN/CLOSE discrete dry type set point contact conditions based on the input value of the analog input signal. The Level Meter/Controller shall have the following features.

A. Provided with a 3.5 digit LED (or LCD if required) readout meter in feet of water. The display shall be capable of being calibrated from the front of the unit and have a maximum display of 1999, with a decimal point that is user selectable.

B. The display zero indication shall be able to be offset anywhere within the range of the meter, with a minimum range of 60 counts.

C. Provide six separate setpoints each with discrete, isolated sealed SPDT relay output contacts.

D. Provide excitation voltage to drive a transducer/transmitter and condition its output signal to provide a continuous display of level.

E. The setpoints shall be field adjustable to operate on rising above or falling below the setpoint.

F. An LED indicator shall be provided for each setpoint to indicate when it is activated.

G. The actual setting of each setpoint shall be able to be displayed on the digital readout at any time.

H. The setting of each setpoint shall be adjustable throughout the complete signal range from the front of the meter/controller.

I. Provide a means of manually ramping the meter/controller, up and down, throughout its complete signal range, to test the operation of the setpoints.

J. The meter/controller shall come complete with a four to 20 mA, or a one to five volt DC output signal for additional monitoring and control devices.

K. Provide a signal failure relay option with two relays, to energize when the input signal goes above 20 mA or below 4 mA. The relays can energize on both high/low conditions or one can energize on high failure and the other on low failure. In addition, either relay may be set to 'flash' on and off during the failure condition. This failure alarm shall also energize a front panel flashing LED alarm indicator.

L. Provide a Lamp Test feature to test the digital display and individual LED setpoint indicators.

TAG	SERVICE	SCALE
LMC-1-1	Ground Storage Tank Level Controller	0-35 feet
LMC-1-2	Finished Water Storage Tank Level Controller	0-35 feet

4.08 Submersible Pressure/Level Transmitter: Provide a solid-state direct submersible transducer with stainless steel housing. The range of the transducer shall be as required for the desired application with excitation voltage of 15 - 45V DC. The transducer shall incorporate a diffused silicon semiconductor sensor protected by an integral stainless steel diaphragm and fill fluid. The transducer shall be able to be mounted at the bottom of a pit with support bracket and be cable connected, providing an analog input signal to a meter/controller. The analog signal shall be 4 – 20mA or 1-5V DC as required. The operating temperature shall be -40°F to 176°F and the accuracy shall be ± 0.5% O.S. (including linearity, hysteresis, and repeatability.)

TAG	SERVICE	SCALE
LT-GS	Ground Storage Take Level Transmitter	0-35 feet
LT-FW	Finished Water Storage Tank Leve Controller	0-35 feet

4.09 Telemetry Line Filter: Provide a telemetry line filter with a fast-acting design to protect data and communications equipment from transient voltage surges and induced voltages. The filter shall be a

low-impedance, two-stage hybrid design with a first stage consisting of a heavy-duty energy handling gas discharge tube having a breakdown voltage rating between 200 and 350 volts. Impulse breakdown at 100 volts per microsecond shall equal 600 volts. A filter capacitor shall be connected across the lines, rated 1kv. The second stage shall consist of two current limiting resistors: a fast-acting solid-state transient voltage surge absorber from each line to ground to protect each line up to a maximum continuous voltage of 30V AC or 38V DC with a 50 nanosecond response time; and a separate bi-directional transient voltage surge absorber rated at 1500W at 33V DC, which is connected across the two lines, for maximum protection. Integral wiring terminal blocks shall be included for both line and equipment sides of the filter. The filter shall be mountable directly on the panel backplate or be able to use track mounting if required.

TAG	SERVICE
LF-WW	Analog Signal Line Filter

4.10 Common Alarm Light: Alarm Light shall be RAB catalog number VBR100/GL100PGR or equal. Alarm light enclosure shall be constructed of die cast aluminum with a sturdy mounting bracket. Alarm light shall be suitable for wet location and comply with UL Standard 1598 for hazardous locations where the lamp, socket, and wiring require protection from rain, corrosive fumes, non-combustible dusts, moisture, and non-explosive vapors and gases. The alarm light shall burn dim and steady during normal conditions to indicate electrical power "ON" and lamp good. During any alarm condition, the alarm light shall flash brightly. Alarm light shall be mounted on the side of the enclosure or as directed by the Engineer.

TAG	SERVICE
AL	Common Alarm Light

PART 5 - EXECUTION

5.01 Installation

A. Control panel shall be installed in the motor control center.

B. Field installed interior wiring shall be neatly grouped by circuit and bound by plastic tie wraps. Circuit groups shall be supported so that circuit terminations are not stressed.

C. Install the equipment in accordance with the manufacturer's instructions.

D. Remove temporary lifting angles, lugs, and shipping braces. Touch-up damaged paint finishes.

5.02 Field Testing

A. Make the following minimum tests and checks before the manufacturer's representative is called in for testing and adjustment.
   1. Megger incoming line terminals and buses, phase-to-phase and phase-to-ground after disconnecting devices sensitive to megger voltage.
   2. Remove current transformer shunts after completing secondary circuit. Check polarity and continuity of metering and relaying circuits.

3. Check mechanical interlocks for proper operation.
4. Test ground connections for continuity and resistance.
5. Adjust unit compartment doors.
6. Check control circuit interlocking and continuity with starters in the TEST position. Provide external source of control power for this test.

B. In the event of an equipment fault, notify the Engineer immediately. After the cause of the fault has been identified and corrected, a joint inspection of the equipment shall be conducted by the Contractor, the Engineer, and the equipment manufacturer's factory service technician. Repair or replace the equipment necessary prior to placing the equipment back into service.

5.03 Cleaning: Remove all rubbish and debris from inside and around the control panel. Remove dirt, dust, or concrete spatter from the interior and exterior of the equipment using brushes, vacuum cleaner, or clean, lint-free rags. Do not use compressed air.

END OF SECTION

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SECTION 27 00 00 - GENERAL PROVISIONS FOR COMMUNICATIONS WORK

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 GENERAL REQUIREMENTS

A. Applicable requirements of General Requirements/Provisions shall be considered a part of this section and shall have the same force as if printed herein full. In addition, all information related to communications infrastructure that is documented in the architectural, structural, mechanical, and electrical drawings/documents shall be included as part of the Communications documents.

1.3 QUALITY ASSURANCE

A. Specifications, Standards and Codes: All work shall be in accordance with the following:

1. The National Electrical Code (NFPA 70) as adopted by the local AHJ

2. American National Standards Institute (ANSI)

3. National Electrical Manufacturers Association (NEMA)

4. Telecommunications Industries Association (TIA)

5. Electronic Industries Association (EIA)
6. Institute of Electrical & Electronics Engineers (IEEE)
7. Underwriters Laboratories (UL)
8. American Standards Association (ASA)
9. Federal Communications Commission (FCC)
10. Occupational Safety and Health Administration (OSHA)
11. American Society of Testing Material (ASTM)
12. Americans with Disabilities Act (ADA)
13. Local city and county ordinances governing electrical work
14. In the event of conflicts, the more stringent provisions shall apply.

1.4 SCOPE

A. The work to be done under this section of the Specifications shall include the furnishing of labor, material, equipment and tools required for the complete installation of the work indicated on the Drawings or as specified herein.

B. All materials, obviously a part of the Communications Infrastructure and necessary to its proper operation, but not specifically mentioned or shown on the Drawings, shall be furnished and installed without additional charge.

C. The Drawings and Specifications are complementary to each other and what is called for by one shall be as binding as if called for by both. If a discrepancy exists between the Drawing and Specifications, the higher cost shall be included, and the engineer shall be notified of the discrepancy.

1.5 WORK INCLUDED

A. The Communications Infrastructure installed and work performed under this Division of the Specifications shall include but not necessarily be limited to the following:

B. Voice/Data Cabling Infrastructure

C. CATV Cabling Infrastructure System

D. CATV Cabling Distribution System

E. Audio-Visual Systems

F. Satellite Distribution System

G. Overhead Paging System

H. Wireless Access System

I. Nurse Call System

J. Emergency Call System

K. Patient Wandering System

L. Emergency Phones / Call Boxes

M. Low Voltage & Communications conduits, raceways, cable tray, racks, cabinets and equipment mounting boards

N. Grounding and Bonding

O. Underground raceway excavation, backfill, and compaction

P. Concrete work for duct banks, maintenance holes, handholes, vaults and restoration (where applicable)

1.6 DEFINITIONS

A. Terms: The following definitions of terms supplement those of the General Requirements and are applicable to Division 27 - Communications:

B. Provide: As used herein shall mean “furnish, install and test (if applicable) complete.”

C. Infrastructure: As used herein shall mean cable, conduit, raceway, cable tray or j-hooks with all required boxes, fittings, connectors, and accessories; completely installed.

D. Work: As used herein shall be understood to mean the materials completely installed, including the labor involved.

1.7 DRAWINGS

A. Drawings are generally diagrammatic and show the arrangement and location of pathways, outlets, support structures and equipment. The Contractor shall carefully investigate the structural and finish conditions affecting his work and arrange his work accordingly. Should conditions on the job make it necessary to make adjustments to pathways or materials, the Contractor shall so advise the Engineer and secure approval before proceeding with such work.

B. Where exact locations are required by equipment for stubbing-up and terminating conduit concealed in floor slabs, the Contractor shall request shop drawings, equipment location drawings, foundation drawings, and any other data required by him to locate the concealed conduit before the floor slab is poured.

C. Materials, equipment or labor not indicated but which can be reasonably inferred to be necessary for a complete installation shall be provided. Drawings and Specifications do not undertake to indicate every item of material, equipment, or labor required to produce a complete and properly operating installation.

D. The right is reserved to make reasonable changes in locations of equipment indicated on Drawings prior to rough-in without increase in contract cost.

E. The Contractor shall not modify the size or number of conduit runs indicated on the Drawings without the written approval of the Engineer.

F. Any work installed contrary to Contract Drawings shall be subject to change as directed by the Engineer, and no extra compensation will be allowed for making these changes.

G. The location of equipment, support structures, outlets, and similar devices shown on the Drawings are approximate only. Do not scale Drawings. Obtain layout dimensions for equipment from Architectural plans unless indicated on Communications plans.

H. Schematic diagrams shown on the Drawings indicate the required functions only. The technology of a particular manufacturer may be used to accomplish the functions indicated without exact adherence to the schematic Drawings shown. Additional labor and materials required for such deviations shall be furnished at the Contractor's expense.

I. Verify the ceiling type, ceiling suspension systems, and clearance above hung ceilings prior to ordering cabling and associated hardware. Notify the Engineer of any discrepancies or potential conflicts which may inhibit the completion of the specified work.

J. Review all architectural drawings for modular furniture. The contractor is not relieved of his/her responsibilities due to improper coordination. If the contractor feels they do not have the proper construction drawings in order to properly coordinate their work, they must request them of the owner, architect, engineer, or General Contractor.

K. Portions of these Drawings and Specifications are abbreviated and may include incomplete sentences. Omissions of words or phrases such as “the Contractor shall,” “shall be,” “as indicated on the Drawings,” “In accordance with,” “a,” “the” and “all are intended” shall be supplied by inference.

1.8 SUBMITTALS

A. Submit for approval, details of all materials, equipment and systems to be furnished. Work shall not proceed without the Owner and/or the Designer’s approval of the submitted items. The contractor shall supply one (1) in electronic PDF format consisting of COMPLETE BROCHURES AND SHOP DRAWINGS OF ALL MATERIALS, HARDWARE, COMPONENTS AND EQUIPMENT:

1. Submittals for individual systems and equipment assemblies that consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered, reviewed or stored, and such submittals will not be returned except at the request and expense of the Contractor.

2. Materials, hardware or components to be used complete the work identified must be clearly identified with a bold arrow or circle on each individual cutsheet. The submittal will be rejected without the proper identification.

3. Contractor shall generate shop drawings. Modify reviewed and accepted shop drawings to include revisions based upon completion of work. Submit shop drawings with record drawings on hard copy.

4. Shop drawings shall include equipment racks, patch panels, termination blocks, connection details, rack mounting details and any other details not included in the construction drawings.

B. Any materials and equipment listed that are not in accordance with Specification requirements may be rejected.

C. The approval of material, equipment, systems and shop drawings is a general approval subject to the Drawings, Specifications and verification of all measurements at the job. Approval does not relieve the Contractor from the responsibility of shop drawing errors. The Contractor shall carefully check and correct all shop drawings prior to submission for approval.

1.9 QUALITY ASSURANCE

A. Equipment and materials required for installation under these Specifications shall be the current model and new (less than one [1] year from the date of manufacture), unused and without blemish or defect.

B. Equipment shall bear labels attesting to Underwriters Laboratories, where subject to label service. Manufacturers of equipment and materials pertinent to these items shall have been engaged in the manufacture of said equipment a minimum of three (3) years and, if so directed by the Owner, be able to furnish proof of their ability by submitting affidavits and descriptive data about their product including size and magnitude comparable to requirements specified herein.

1.10 CONTRACTOR QUALIFICATIONS

A. The Contractor shall have total responsibility for the coordination and installation of the work shown and described in the Drawings and Specifications. The Contractor shall be a company specializing in the design, fabrication and installation of integrated communications systems.

B. Communications Systems specified shall be installed under the direction of a qualified Contractor. Qualification requirements shall include submittal by the Contractor to the Architect of the following:

1. List of previous projects of this scope, size and nature; including names and sizes of projects, description of work, time of completion and names of contact persons for reference.

2. Shall certify that they are manufacturer-authorized for work to be performed.

C. Contractor must employ at least one (1) full-time Registered Communications Distribution Designer (RCDD). The RCDD shall be a W2 employee and not a subcontractor.

D. Contractor must employ at least one (1) full-time certified Crestron programmer. The Crestron programmer shall be a W2 employee and not a subcontractor.

1.11 COORDINATION WITH OTHER TRADES

A. The Contractor shall coordinate communications work with that of other sections as required to ensure that the entire communications work will be carried out in an orderly, complete and coordinated fashion.

1.12 SITE INVESTIGATION

A. Prior to submitting bids of the project, visit the site of the work to become aware of existing conditions that may affect the cost of the project. Where work under this project requires extension, relocation, reconnections or modifications to existing equipment or systems, the existing equipment or systems, shall be restored to their original condition before the completion of this project.

1.13 PERMITS

A. Obtain all permits and inspections for the installation of this work and pay all charges incident thereto. Deliver to the Owner all certificates of said inspection issued by authorities having jurisdiction.

1.14 RENOVATIONS AND ADDITIONS

A. All work that would adversely affect the normal operation of the other portions of the Owner's property shall be done at a time other than normal working hours. Normal working hours shall be considered 8 a.m. to 5 p.m. Monday through Friday.

B. Prior to submitting bids on the project, visit the site of the work to become aware of existing conditions that may affect the cost of the project.

C. Where work under this project requires extension, relocation, reconnections or modifications to existing equipment or systems, the existing equipment or systems shall be restored to their original and operating condition. Remove all equipment indicated to be demolished, including outlets, devices, raceways and support structures.

D. Care shall be exercised in the removal and storage of equipment indicated to be relocated or removed and reused. Prior to placing back into service, equipment shall be cleaned, and marred or chipped paint surfaces touched-up.

E. Provide all coring, cutting and patching to existing walls, floors, etc., required for the removal of existing work or the installation of new work.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Where equipment is identified by manufacturer and catalog number, it shall be as the base of requirements for quality and performance. Where manufacturers for equipment are identified by name, the Contractor may submit for approval, similar equipment of other manufacturers as substitution. The Engineer's decision as to whether the submitted equipment is acceptable shall be final and binding.

B. All changes necessary to accommodate the substituted equipment shall be made at the Contractor's expense, and shall be as approved by the Engineer. Detailed drawings indicating the required changes shall be submitted for approval at the time the substitution is requested.

C. If substitutions are made in lieu of device specified; form, dimension, design and profile shall be submitted to the Engineer for approval.

D. Submit request for approval of substitute materials in writing to the Architect at least ten days prior to bid opening.

2.2 MATERIALS

A. All materials used in this work shall be new and shall bear the inspection label of Underwriters' Laboratories Inc. or certification by other recognized laboratory.

B. The published standards and requirements of the Telecommunications Industries Association (TIA), National Electrical Manufacturers Association (NEMA), the American National Standard Institute (ANSI), the Institute of Electrical and Electronic Engineers (IEEE), and the American Society of Testing Materials (ASTM), are made a part of these Specifications and shall apply wherever applicable.

C. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, for which replacement parts are available.

D. When more than one unit of the same class of equipment or material is required, such units shall be the products of a single manufacturer or partner manufacturers that offer a certified solution.

E. Components of an assembled unit need not be products of the same manufacturer, but must offer a certified end-to-end solution.

F. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.

G. Components shall be compatible with each other and with the total assembly for the intended service.

PART 3 - EXECUTION

3.1 EXAMINATION OF CONDITIONS

A. Prior to the start of work, the Contractor shall carefully inspect the installed work of other trades and verify that such work is complete to the point where installation may properly commence. Start of work indicates acceptance of conditions.

B. Install equipment in accordance with applicable codes and regulations, the original design and the referenced standards.

C. In the event of a discrepancy, immediately notify the Project Manager.

D. Do not proceed with installation until unsatisfactory conditions and discrepancies have been fully resolved.

3.2 PROTECTION OF SYSTEMS AND EQUIPMENT

A. Protect materials and equipment from damage during storage at the site and throughout the construction period. Equipment and materials shall be protected during shipment and storage against physical damage, dirt, theft, moisture, extreme temperature and rain.

B. Damage from rain, dirt, sun and ground water shall be prevented by storing the equipment on elevated supports and covering the sides with securely fastened protective rigid or flexible waterproof coverings.

C. During installation, equipment shall be protected against entry of foreign matter on the inside and be vacuum cleaned both inside and outside before testing, operating or painting.

D. As determined by the Project Manager, damaged equipment shall be fully repaired or shall be removed and replaced with new equipment to fully comply with requirements of the Contract Documents. Decision of the Project Manager shall be final.

E. Damaged paint on equipment and materials shall be repainted with painting equipment and finished with the same quality of paint and workmanship as used by the manufacturer.

3.3 ACCESS TO EQUIPMENT

A. Equipment shall be installed in location and manner that will allow convenient access for maintenance and inspection.

B. Working spaces shall be not less than specified in the National Electrical Code (NEC) for voltages specified.

C. Where the Project Manager determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled, one time only, as directed by the Project Manager, at no additional cost to the Owner. “Conveniently accessible” is defined as being capable of being reached without the use of ladders or without climbing or crawling under or over obstacles such as motors, pumps, belt guards, transformers, piping and duct work.

3.4 CLEANING

A. During construction, and prior to Owner acceptance of the building, remove from the premises and dispose of packing material and debris caused by communications work.

B. Remove dust and debris from interiors and exteriors of electrical equipment. Clean accessible current carrying elements prior to being energized.

3.5 COMPLETION

A. General: Upon completion of the work, remove excess debris, materials, equipment, apparatus, tools and similar items. Leave the premises clean, neat and orderly.

B. Results Expected: Systems shall be complete and operational and controls shall be set and calibrated. Testing, start-up and cleaning work shall be complete.

C. Maintenance Materials: Special tools for proper operation and maintenance of the equipment provided under this Specification shall be delivered to the Owner.

3.6 TESTING AND VERIFICATION

A. See specific Division 27 sections for testing parameters of sub-systems.

B. The Contractor shall verify that requirements of this Specification are met. Verification shall be through a combination of analyses, inspections, demonstrations and tests, as described below.

C. Verification by inspection includes examination of items and comparison of pertinent characteristics against the qualitative or quantitative standard set forth in the Specifications. Inspection may require moving or partially disassembling the item to accomplish the verification, included as part of the work at no additional cost to the Owner.

D. The Contractor shall verify by formal demonstrations or tests that the requirements of this Specification have been met. The Contractor shall demonstrate that the communications systems, components and subsystems meet Specification requirements in the “as-installed” operating environment during the “System Operation Test.” Even though no formal environmental testing is required, the Contractor shall measure and record temperature, humidity and other environmental parameters and the environmental conditions, which were encountered during the “System Operation Test.”

E. The Contractor shall carefully plan and coordinate the final acceptance tests so that tests can be satisfactorily completed. The Contractor shall provide necessary instruments, labor and materials required for tests, including the equipment manufacturer's technical representative and qualified technicians in sufficient numbers to perform the tests within a reasonable time period.

F. The Contractor shall satisfy all items detailed in the final acceptance check-off list (punch list). The list shall be a complete representation of specified installation requirements. At the time of final acceptance punch list items shall be corrected until the system is found to be acceptable to the Owner and the Project Manager.

G. After the Contractor systems have been installed and tested, the completed test plan shall be signed by the Communications Contractor Project Manager and submitted for approval.

END OF SECTION

SECTION 27 01 05 - CABLE PLANT

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 SUMMARY

A. Section Includes: Equipment, materials, labor, and services for/to extend existing telephone and data distribution system including, but not limited to:

1. Raceway, boxes, and cable tray.

2. Telephone and data cabling terminations.

3. Optical fiber and terminations.

4. Telecommunications outlets.

5. Terminal blocks/cross-connect systems.

6. Equipment racks and cabinets.

7. System testing.

8. Documentation and submissions.

B. Provide all equipment, materials, labor, and services, not specifically mentioned or shown, which may be necessary to complete turn-key installation. Ensure that they are in compliance with requirements stated or reasonably inferred by the contract documents.

C. Work not included work will be done by others: Off-site services: Providing data concentrations, hubs, servers, computers, and other active devices.

1.3 REFERENCES

A. ANSI/ICEA S-83-596-1994 - Fiber Optic Premises Distribution Cable.

B. EIA/TIA-455 - Output Far-Field Radiation Pattern Measurement

C. EIA/TIA-492AAAA-A 1998 - Detail Specification for 62.5-mm Core Diameter/125-mm Cladding Diameter Class Ia Multimode, Graded Index Optical Waveguide Fibers.

D. EIA/TIA-568B.1-2000 - Commercial Building Telecommunications Wiring Standard.

E. EIA/TIA-569A - Commercial Building Standard for Telecommunications Pathways and Spaces.

F. EIA/TIA-606 - Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.

G. EIA/TIA-607 - Commercial Building Grounding and Bonding Requirements for Telecommunications.

H. EIA/TIA TSB67 - Transmission Performance Specifications for Field Testing of Unshielded Twisted-Pair Cabling Systems.

I. IEEE 802.3 - Standard for Information Technology, Telecommunications and information exchange between systems, Local and metropolitan area networks, Specific requirements, Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications.

J. NEC - National Electrical Code.

K. REA PE-71.A: Specification for Inside Wiring Cable.

L. TDM BICSI - Building Industry Consulting Services International Telecommunications Distribution Methods Manual.

1.4 SYSTEM DESCRIPTION

A. A telecommunications cabling system generally consists of telecommunication outlets, wall telephones in common and mechanical areas, Intermediate Distribution Frames (IDF) located on each floor, and the Main Distribution Frame (MDF) Rate demarcation point (RDP) is located in the MDF.

B. All voice cables will consist of Category 6 cable terminated with an RJ-11 jack and terminated on 110 blocks in the IDF.

C. All data cables will consist of Category 6 cable terminated with an RJ-45 jack and terminate the cables on rack-mounted modular patch panels located in the appropriate IDF.

D. All wireless access point data cables will consist of Category 6A cable terminated with an RJ-45 jack and terminate the cables on rack-mounted modular patch panels located in the appropriate IDF.

1.5 PERFORMANCE REQUIREMENTS

A. Copper wiring installation shall support Gigabit Ethernet.

B. Fiber optic cabling installation shall support Ten Gigabit Ethernet.

C. Outdoor conduit formations shall allow for standard cable racking without changing formation as it enters manhole.

1.6 SUBMITTALS FOR REVIEW

A. Submittals: Follow Section 26 01 00.

B. Shop Drawings: Conform to sheet names, CAD layering, line styles, and symbols as indicated in BICSI TDM Manual, 14th Edition.

1. Telecommunication drawings.

a. Indicate layout cabling and pathway runs, and single point ground system.

b. Indicate diagrammatic location of conduit system.

c. Indicate each floor with triangles denoting approximate location of each drop, numbered according to Owner numbering specifications.

2. Distribution frames: Show layout of applicable equipment including incoming distribution racks, patch panels and LAN equipment.

C. Product Data: Provide information on the following:

1. Equipment support racks.

2. Telecommunication cabling (backbone and horizontal).

3. Fiber optic type LC connectors.

4. Telecommunication outlet/connector assembly RJ-45 jacks.

5. Patch panels.

6. Power strips.

7. Cable hangers.

8. Floor outlet boxes.

9. External mounted raceway.

10. Data equipment racks.

D. Samples: Provide samples of all equipment if desired by Owner/Architect.

E. Submit evidence of optical fiber attenuation according to EIA/TIA 455-46, -61, or -53.

1.7 SUBMITTALS FOR INFORMATION

A. Submittals: Follow Section 26 01 00.

B. Test Reports: Submit test reports as indicated with Record Documents.

C. Submit evidence of installer qualifications including test plan, professional references, and labeling scheme.

1. Include names and locations of two projects successfully completed using fiber optic and copper communications cabling systems in similar environments.

2. Include written certification from users systems have performed satisfactorily for not less than 18 months.

3. Include specific experience in installing and testing structured telecommunications distribution systems using fiber optic and Category 5 or higher, cabling systems.

4. Provide a list of at least five professional references for similar projects. Include Company names, Contacts, phone numbers and a description of projects.

D. Provide a complete and detailed test plan for the telecommunications cabling system including a complete list of test equipment for the UTP and OFN components and accessories. Include procedures for certification, validation, and testing. Furnish factory reel tests for fiber optic cables.

1.8 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 26 01 00.

B. Record actual locations of outside plant, including cables, pairs, and conduit, including "as built" record CAD drawings and cable records in a machine-readable format. Indicate final telecommunications cabling configurations, including location, gage, pair assignment and patch panels after telecommunications cable installation.

C. Provide plastic laminated schematic of telecommunications cable system showing cabling, distribution frames, and equipment rooms keyed to floor plans by room number.

D. Submit conduit mandrel test results with close out documents.

E. Confirm actual manhole locations on record drawings.

F. Detach fiber reel cut length data sheets and provide with closeout submittals.

G. Submit written accounting identifying test results with closeout documents.

H. Provide test record indicating conductor pairs not meeting test criteria.

I. Provide test results indicating wiring structure meets or exceeds requirements of type of system installed (i.e., Category 5e, Category 6, and related items) according to EIA/TIA-568B and TSB-95.

J. Provide a typed list of wiring runs in an electronic format previously agreed to by Owner in the following method:

1. Building Name.

2. Patch Panel Location (Room No.).

3. Wall Jack Location (Room No.).

4. Wire/Jack Number.

K. Provide tags removed from fiber optic cable reels.

1.9 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Section 26 01 00.

B. Include operational and maintenance data on telecommunications cabling and pathway system.

1.10 QUALITY ASSURANCE

A. Single Source Responsibility: Use only one brand of various component parts and avoid mixing specific parts of different manufactures on Project.

1.11 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products of this Section with five years' experience.

B. Installer: Company specializing in the installation of the products of this Section with a minimum of three years' experience working on projects of comparable complexity. Installer must be qualified to install and be proficient in Systimax Structured Connectivity Solutions.

C. Design telecommunications infrastructure under direct supervision of a BICSI Registered Communications Distribution Designer (RCDD) experienced in design of this Work.

1.12 REGULATORY REQUIREMENTS

A. Perform Work according to latest version of appropriate industry standard including, but not limited to the following:

1. ANSI/ICEA S-83-596-1994.

2. EIA/TIA-568B.

3. EIA/TIA-569A.
4. EIA/TIA-598.
5. EIA/TIA-607.
6. EIA/TIA-606.
7. IEEE 802.3.
8. NEC.
9. State of Tennessee Electrical Code.
10. TIA TSB-67.
11. TDM BICSI.
12. Local, State, and Federal rules, laws, and ordinances.

B. In case of discrepancies between standards, building design, and this document, most stringent and generally the most costly requirement shall apply.

1.13 DELIVERY, STORAGE, AND HANDLING

A. Provide protection from weather, moisture, dirt, dust and other contaminants for telecommunications cabling and pathway equipment placed in storage.

B. Package complete cable for shipment on non-returnable wooden reels or returnable steel reels.

C. Ensure top and bottom ends of cable are available for testing.

D. Each cable reel shall have a durable weatherproof label, which shows actual length of cable of reel.

1.14 ENVIRONMENTAL REQUIREMENTS

A. Do not install indoor wiring or cable until building is enclosed and environmental systems are active.

B. Maintain indicated temperature and humidity requirements during and after installation of products of this Section.

C. Do not leave unsheathed cable located outside buildings or underground exposed. Appropriately cover, encase, or protect cable. Seal both ends of cable to prevent ingress of moisture.

1.15 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.16 WARRANTY

A. Cable and termination equipment shall be manufactured, installed and certified to provide for the Systimax Structured Connectivity Solutions 20 year warranty.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. All cabling to conform to Systimax Structured Connectivity Solutions standards with a minimum twenty (20) year warranty that parts and installation shall meet or exceed TIA/EIA 568-A and ISO/IEC 11801 requirements.

2.2 COMPONENTS - GENERAL

A. Fixed cables and pathway systems for telecommunications systems shall be UL listed or third party independent testing laboratory certified, and shall comply with NFPA 70. Do not use cabling over 12 months old.

B. Do not use screw terminals except where indicated on Drawings.

C. Wiring, General: Provide wiring conforming to Category 6/6A according to EIA/TIA-568B-5 for unshielded twisted pair wiring, solid wire 24 AWG, containing four twisted pair per sheath. Refer to TSB-95 for standards and testing for Category 6 cabling as set in EIA/TIA-568B-5.

1. Data Cable: Blue.

2. Voice Cable: White.

3. Install Category 6/6A cables.

4. Plenum Category: High-speed, high-performance, 250 ohm cable capable of carrying high-bit-rate signaling for extended distances in building distribution systems; 2061 LAN cable; UL Verified Category 5e/6 (4 pair); UL Listed Type CMP for use in air return handling spaces.

D. Modular Jacks: Category 6.

E. Patch Panels: Category 6.

F. Cable Management (Patch) Panels: “1100D2 35-19 VERT MODJCK, Model 106-830-623," Avaya Technologies, Murray Hill, NJ or approved substitution.

G. Data Equipment Racks: Steel distribution racks, silver, 19 inches high by 72 inches high, 47U; size and threading as appropriate for application; Black Box code ordering number 31873, or approved substitution.

2.3 COPPER CABLE - INDOOR

A. General: Meet TIA/EIA 568-B standards.

B. All cabling to be terminated according to 568A wiring sequence.

C. Connect voice and data terminations to 8-pin modular jacks except in Telecommunication rooms, connect terminations to high-density 8-pin modular 19" patch panels with "110" punch blocks mounted on rear.

D. Modular Wall Telephones Wall Plates: Industry standard.

2.4 ACCESSORIES

A. Labeling: Adhesive backed labels, ½" wide; “Model PT-310, P-Touch Extra,” Brother, Bridgewater, NJ, or approved substitution.

B. Plug-in Outlet Center: Metallic, non-adhesive type; “Wiremold Wire Management System” The Wiremold Company, West Hartford, CT, or approved substitution.

C. Firestopping: Refer to section 27 05 28.

D. Outlet Boxes: Desk type and single mounted telephone outlet boxes; 3 11/16" by 3 11/16" standard electrical boxes.

E. Conduit: Metallic EMT.

PART 3 - EXECUTION

3.1 INSTALLERS

A. Installers must be qualified to install and be proficient in Systimax Structured Connectivity Solutions.

3.2 EXAMINATION

A. Communications outlets shall be within 1 stud width of an electrical outlet.

B. Verify exact location of jacks before start of work. When several jacks are close to one another, Owner reserves the right to group up to four jacks into one gang box. Do not group more than four into a gang box.

C. Exercise care in operations around existing structures and equipment, and be responsible for and promptly repair damage and defacement caused by construction operations.

3.3 INSTALLATION, INDOOR - COPPER CABLE

A. Install internal copper cabling according to EIA/TIA 568B and manufacturer’s instructions.

B. Do not exceed manufacturer’s cable pull tensions for copper cables. Provide a device to monitor cable pull tensions. Do not exceed 25 pounds pull tension for four pair copper cables. Do not chafe or damage outer jacket materials. Use only lubricants approved by cable manufacturer. Do not over cinch cables, or crush cables with staples.

C. Install cable management panels between patch panels and above first panel in Telecommunication rooms.

D. Clearly and neatly label wiring jacks, their respective wires, and patch panel locations with adhesive backed labels according to EIA/TIA 606.

E. Numerically base wire/jack numbers upon room number for wall box with an alphabetic character for jack identifier. For example; first jack in room 210A would be 210A-A. If more than 26 jacks were in a room, then 27th would be labeled 210A-AA. Begin numbering from left of main entrance to space and work around room in a clockwise direction.

F. Fill unused spaces on face plates with blank inserts.

G. Pull appropriate number of cables to each location.

H. No cable shall be split between 2 or more jacks, nor shall any cable be spliced.

I. Mount patch panels to appropriate communications racks.

J. Install inside plant cabling and wiring according to REA PE-71.A.

K. Conceal inside plant wiring. Provide concealed, behind the wall conduit, stubbed up into ceiling plenum and recessed outlet boxes in buildings (or sections of it) with interior wall construction of gypsum board over studs or plaster/lathe.

    1. Plug-in outlet centers and surface mounted outlet boxes will be permitted only with prior Owner written approval, in buildings with interiors constructed of concrete block, glazed block or other hard wall construction.

    2. Do not use plug-in outlet centers or cable routing other than as indicated without written permission of Owner or properly processed Change Order.

    3. Do not lay cables directly on suspended ceilings or tie cables to suspended ceiling support hangers.

L. Where installed in open corridors (corridors without suspended ceilings), install cable in conduit or enclosed metal troughs or trays.

M. Where installed in stairways, install cable in conduit or enclosed metal trays or troughs. Route cable over doorways.

N. Do not droop cable over 8" in any length of run. Do not locate cables such that they touch light fixtures or other electrical devices. Do not untwist Category 6/6A UTP cables for more than 1/4" from termination point to maintain cable geometry.

O. Fixed Wall Outlets:

    1. Run conduit vertically from recessed outlet box and stub out above ceiling far enough to permit attachment of bushing or cap.

    2. Mounting Height: Mount outlets in locations as indicated.

a. Standard outlet: Locate outlet 18" from finished floor to centerline of bottom outlet if vertically oriented or to centerline of outlets if horizontally oriented.

b. Wall phone outlet: 48" AFF to centerline of device.

3.4 INSTALLATION, INDOOR - HANGERS AND SUPPORTS

A. Provide required hangers, supports, sleeves, clamps, and related items, as required and as indicated on drawings.

B. Properly group and align horizontal runs of conduits using substantial hangers, straps, and related items. Install hangers and supports at intervals not exceeding NEC recommendations.

C. Thread supporting rods at ends with allowance for adjustments. Wire and strap hangers will not be permitted. Support conduit and fittings with hangers, straps, and related items, using bolts and lead expansion sleeves.

D. Support twisted pair runs using studs or drive pins with metal hangers, D-rings, or J-hooks, spaced at a maximum of 5 feet on center.

E. Cable runs shall maintain a minimum distance of six (6) inches from fluorescent lights, motors, and other sources of EMI radiation.

F. Loosely tie wrap parallel run cables exceeding two in number every 10'-0". Do not exceed twenty (20) cables per bundle.

G. Provide continuous wiring runs without splices. Do not exceed 295 feet distance limitation specified in EIA/TIA 568B standards for wiring runs.

3.5 INTERFACE WITH OTHER PRODUCTS

A. Paint exposed work to match adjacent walls or ceilings.

B. Patch and fire stop openings as required by applicable fire and building codes. Seal openings with firestopping material for cables that penetrate exit corridors and stairways to maintain integrity of corridors and stairways as a safe means of egress according to federal, state and local codes.

C. Hang conduit, raceways, electrical equipment and other similar system components supported by roof joists from top chord or bottom chord panel point. Alternatively, provide a panel point by applying a vertical web member. Do not exceed a maximum load of 250 pounds.

D. Hang conduit, raceways, electrical equipment, and related items, which are supported by roof or floor beams from beams with clamp attachments that engage both edges of beam flange. Locate hangers directly below beam webs. Limit hanger load to 1000 pounds in area above mechanical room and 250 pounds in remaining areas, unless otherwise approved by Designer.

E. Provide additional supports, clamps, web members, and related items, required to comply with above requirements, as applicable.

F. Install telephone back boards where shown on the drawings.

3.6 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section detailing systems testing, except as indicated in this Section. Provide services of an RCDD to oversee intermediate and final inspections for all system segments (e.g., telecommunication rooms, pathways, raceways, voice/data cabling, and related items).

B. For each jack wired, arrange, pay for, and test wiring structure. Ensure that it meets or exceeds requirements of system type installed (i.e., Category 5e, Category 6, and related items) according to EIA/TIA-568B and TSB-95.

C. Copper Pair Testing:

1. Test each pair immediately after installation of cable according to manufacturers' recommendations and industry standards. If more than 1% of pairs in a cable fail any test, entire cable will be deemed unacceptable by Owner. Replace unacceptable material with new material and repeat tests until passing is achieved.

2. Test locations after installation. Send a written accounting identifying test results to Owner. Test pairs for continuity, polarity, and loop resistance. Owner reserves right to require additional testing shall more than 1% of tested stations fail any test.

3.7 ADJUSTING

A. Adjust work under provisions of Section detailing Adjusting.

3.8 CLEANING

A. Clean work under provisions of Section detailing Cleaning.

B. Restore buildings to their prior condition after installation of wire and equipment.

C. Clean Telecommunication rooms of debris.

3.9 DEMONSTRATION / TRAINING

A. Provide systems demonstration and training under provisions of Section regarding systems demonstrations and training.

B. Offer a minimum of four [**4**] hours of on-site training and demonstration to Owner personnel.

END OF SECTION

SECTION 27 05 26 - GROUNDING AND BONDING FOR COMMUNICATIONS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 SUMMARY

A. Provide all services, labor, materials, tools, and equipment required for the complete and proper installation of telecommunications grounding and bonding for the Structured Cabling System as called for in these specifications and related drawings.

1.3 SYSTEM DESCRIPTION

A. Each Telecommunications Room (TR) in a building shall have a Primary Bonding Busbar (PBB) properly connected per ANSI/TIA/EIA-607.

B. Relevant bonding and grounding infrastructure acronyms.

1. EK (Equipment Bonding Conductor): An insulated copper conductor that bonds metallic items and equipment to the PBB.

2. IC (Interconnecting Bonding Conductor) (referred to in TIA/EIA-607 as the Bonding Conductor for Telecommunications): The copper conductor that bonds the PBB to the service equipment (power) ground.

3. TBB (Telecommunications Bonding Backbone): An insulated copper conductor extending from the PBB.

4. PBB (Primary Bonding Busbar): A copper ground reference busbar, typically installed in the entrance facility or entrance room that is bonded to the service equipment (power) ground by the IC.

1.4 SUBMITTALS

A. Submit product data for the following:

1. PBB busbar

2. Equipment rack busbars.

3. Two-hole compression lugs.

4. No. 3/0 AWG and No. 6 AWG conductors.

5. Grounding Pig-tails or leads

B. Submit details of grounding elements for equipment rack applications.

1.5 QUALITY ASSURANCE

A. Comply with section 27 00 00.

B. All work will conform to Article 250-Grounding and Article 800-Communications of the National Electrical Code (NEC) for grounding, bonding, and protecting electrical and communications circuits.

C. Materials and work specified herein shall comply with the applicable requirements of ANSI/TIA/EIA-607 Commercial Building Grounding and Bonding Requirements for Telecommunications.

D. Materials and work specified herein shall comply with the applicable requirements of IEEE-426.

E. If there is a conflict between the grounding standards, follow IEEE-426 as the primary standard.

F. Delivery, Storage, and Handling

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. All material must be UL listed.

B. A single manufacturer will be used for all grounding material.

2.2 MATERIALS AND FABRICATION

A. Primary Bonding Busbar (PBB) shall be 1/4" x 4" x 20" insulated copper ground bar in size.

B. Bonding Conductors

1. All bonding conductors shall be insulated copper. The exception is the use of flat, braided, aluminum ground straps utilized for bonding sections of aluminum cable trays.

2. Unless otherwise specified, size the conductors as required by NEC.

3. Unless otherwise specified, the IC (Interconnecting Bonding Conductor) (referred to in TIA/EIA-607 at the Bonding Conductor for Telecommunications) shall be insulated, copper, No. 3/0 AWG.

4. Unless otherwise specified, the TBB (Telecommunications Bonding Backbone) shall be green-colored (or identified as a grounding wire every 10 feet) insulated, copper, No. 3/0 AWG.

5. Unless otherwise specified, the EK (Equipment Bonding Conductor) shall be green-colored insulated, copper, No. 6 AWG.

C. Bonding conductor terminations acceptable materials

1. Two-hole compression lugs: (Used on conductors at the PBB) Color coded to appropriate cable, high conductivity wrought copper, electro tin plated, or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide all local bonding as specified on the drawings and in the specifications.

B. Bonding conductors shall be continuous and routed in as direct a route as possible to the point of termination.

C. All insulated ground bars must be isolated from the structural support by a 2-inch minimum separation, using manufacturer’s recommended insulating stand-offs and hardware.

D. Clean ground bars prior to terminating conductors.

E. Label all telecommunications bonding conductors as close as possible to their termination point.

F. Confirm that the electrical contractor bonded the PBB to the service equipment (power) ground, typically located in the electrical entrance facility, utilizing the most direct route possible to minimize conductor length.

G. Bond the following when present.

1. Metallic equipment racks.

2. Cable shields.

3. All metal raceways and cable trays.

END OF SECTION

SECTION 27 05 28 - FIRESTOPPING FOR COMMUNICATIONS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 SECTION INCLUDES

A. Firestopping of Through Penetrations in Fire Rated Assemblies.

B. Smoke Seals.

C. Construction enclosing compartmentalized areas.

1.3 RELATED SECTIONS

A. Division 26 – Section 26 05 34 – Electrical – Raceways and Conduit Systems.

B. Division 27 – Section 27 15 00 – Communications – Structured Voice and Data Cabling Infrastructure.

1.4 REFERENCES

A. ASTM E 84, “Surface Burning Characteristics of Building Materials”.

B. ASTM E 119, “Fire Tests of Building Construction and Materials”.

C. ASTM E 814, “Fire Tests of Through Penetration Firestops”.

D. ANSI/UL263, “Fire Tests of Building Construction and Materials”.

E. ANSI/UL723, “Surface Burning Characteristics of Building Materials”.

F. ANSI/UL1479, “Fire Tests of Through Penetration Firestops”.

G. Underwriters Laboratories Inc. (UL) – Fire Resistance Directory

H. National Fire Protection Association (NFPA) – NFPA 101: Life Safety Code.

I. National Fire Protection Association (NFPA) – NFPA 70: National Electrical Code.

1.5 PERFORMANCE REQUIREMENTS

A. Fire rated pathway devices shall be the preferred product and shall be installed in all locations where frequent cable moves, add-ons and changes will occur.

B. Where non- mechanical products are utilized, provide products that upon curing do no re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during or after construction.

C. Where it is not practical to use a mechanical device, openings within floors and walls designed to accommodate telecommunications and data cabling shall be provided with re-enterable products that do not cure or dry.

D. Openings for cable trays shall be sealed using re-enterable firestopping pillows.

1.6 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Product Data: Provide manufacturer’s standard catalog data for specified products demonstrating compliance with referenced standards and listing numbers of systems in which each product is to be used.

C. Shop Drawings: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance ratings.

D. Certificates: Product certificates signed by firestop system manufacturer certifying material compliance with applicable code and specified performance characteristics.

E. Installation Instructions: Submit manufacturer’s printed installation instructions.

1.7 QUALITY ASSURANCE

A. Products/Systems: Provide firestopping systems that comply with the following requirements:

1. Firestopping tests are performed by a qualified, testing and inspection agency. A qualified testing and inspection agency is UL, or another agency performing testing and follow-up inspection services for firestop system acceptable to authorities having jurisdiction.

2. Firestopping products bear the classification marking of qualified testing and inspection agency.

B. Installer Qualifications: Experience in performing work of this section who is qualified by the firestopping manufacturer as having been provided the necessary training to install firestop products in accordance with specified requirements.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Manufacturer’s original, unopened, undamaged containers, identification labels intact identifying product and manufacturer, date of manufacture; lot number; shelf life, if applicable; qualified testing and inspection agency’s classification marking; and mixing instruction for multicomponent products.

2. Handle and store products according to manufacturer’s recommendations published in technical materials. Leave products wrapped or otherwise protected and under clean and dry storage conditions until required for installation.

B. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

1.9 PROJECT CONDITIONS

A. Do not install firestopping products when ambient or substrate temperatures are outside limitations recommended by manufacturer.

B. Do not install firestopping products when substrates are wet due to rain, frost, condensation, or other causes.

C. Maintain minimum temperature before, during, and for a minimum 3 days after installation of materials.

D. Do not use materials that contain flammable solvents.

E. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

F. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

G. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers

1. Specified Technologies Inc., 200 Evans Way, Somerville, NJ 08876. Tel: (800) 992-1180, Fax: (908) 526-9623, Email: specseal@stifirestop.com, Website: www.stifirestop.com.

2. HILTI USA Inc., 5400 S. 122nd East Ave. Tulsa, OK 74146. Phone (866) 445-8827, Fax (800) 879-7000, Website: www.us.hilti.com.

B. Single Source: Obtain firestop systems for each type of penetration and construction condition indicated only from a single manufacturer.

2.2 MATERIALS

A. General: Use only firestopping products that have been tested for specific fire resistance rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire rating involved for each separate instance.

B. Firestop Sealants: STI SpecSeal® Brand single component latex formulations that upon cure do not re-emulsify during exposure to moisture, the following products are acceptable:

1. Specified Technologies Inc. (STI) SpecSeal® Series SSS Sealant.

2. Specified Technologies Inc. (STI) SpecSeal® Series LCI Sealant.

C. Firestop Putty: STI SpecSeal® Brand intumescent, non-hardening, water resistant putties containing no solvents, inorganic fibers or silicone compounds, the following products are acceptable: Specified Technologies Inc. (STI) SpecSeal® Series SSP Putty.

D. Firestop Pillows: STI SpecSeal® Brand re-enterable, non-curing, mineral fiber core encapsulated on six sides with intumescent coating contained in a flame retardant poly bag, the following products are acceptable: Specified Technologies Inc. (STI) SpecSeal® Series SSB Pillows.

E. Fire Rated Cable Pathways: STI EZ-PATH™ Brand device modules comprised of steel raceway with intumescent foam pads allowing 0 to 100 percent cable fill, the following products are acceptable: Specified Technologies Inc. (STI) EZ-PATH™ Fire Rated Pathway.

F. Fire Rated Cable Pathways: HILTI speed sleeve steels pathway allowing 100% cable fill.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before beginning installation, verify that substrate conditions previously installed under other sections are acceptable for installation of firestopping in accordance with manufacturer's installation instructions and technical information.

B. Surfaces shall be free of dirt, grease, oil, scale, laitance, rust, release agents, water repellants, and any other substances that may inhibit optimum adhesion.

C. Provide masking and temporary covering to protect adjacent surfaces.

D. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install through-penetration firestop systems in accordance with Performance Criteria and in accordance with the conditions of testing and classification as specified in the published design.

B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of firestopping products.

3.3 FIELD QUALITY CONTROL

A. Inspections: Owner shall engage qualified independent inspection agency to inspect through-penetration firestop systems.

B. Keep areas of work accessible until inspection by authorities having jurisdiction.

C. Where deficiencies are found, repair firestopping products so they comply with requirements.

3.4 ADJUSTING AND CLEANING

A. Remove equipment, materials, and debris, leaving area in undamaged, clean condition.

B. Clean all surfaces adjacent to sealed openings to be free of excess firestopping materials and soiling as work progresses.

END OF SECTION

SECTION 27 10 08 - MATV ANTENNA CABLE SYSTEM

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. All work specified in this section shall comply with the provisions of Section 26 01 00.

B. The specifications for the MATV System are shown on the drawings. This system to be provided and installed by the Structured cabling contractor under contract with the General Contractor.

C. The TV cable system equipment is to be provided by the cable system Contractor under contract with the Owner.

D. This Electrical Contractor to provide and install rough-in conduit, and boxes as specified and shown on the drawings and Structured Cabling Contractor's wiring schematics.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Contractor to verify manufacturer of equipment with the Owner.

B. Conduits from outlets to dropped ceiling area to conform to requirements of "RACEWAYS" Section of these specifications.

C. Power wiring to be provided to conform with wiring as shown on drawings and specifications section titled "CONDUCTOR" of these specifications and sized as shown on drawings.

D. System special wire to be provided by the Service Provider Contractor and installed and identified by the Service Provider Contractor.

E. Special back boxes are to be provided by the Service Provider Contractor and installed by the Electrical Contractor.

F. Outlet boxes to conform to "OUTLET BOX" section of these specifications and sized as shown on drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Wiring to be run from outlets through conduits to dropped ceiling area thence through dropped ceiling area (not in conduit) to termination points as shown on drawings and vendor wiring schematics.

B. Where open cable is run above dropped ceiling and penetrates a smoke or fire rated wall, this Contractor shall furnish and install a minimum 3/4" empty sleeve, extending 1 foot on each side of wall, with bushing on both ends. Conduit to be sealed with fire resistant thermofibre provided and installed by General Contractor. Sleeves to be coordinated with system supplier as to location, size and quantity.

C. Cables to be supported in accordance with Section 26 05 29 of these specifications.

D. Service Provider Contractor to connect all equipment and leave system in satisfactory operating condition.

E. TV bracket to be installed by others.

F. TV sets to be provided by the Owner.

END OF SECTION

SECTION 27 15 00 - STRUCTURED VOICE AND DATA CABLING INFRASTRUCTURE

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 SUMMARY

A. Section Includes: Equipment, materials, labor, and services to provide telephone and data distribution system including, but not limited to:

1. Conduit, Sleeves, Pathways and cable tray.

2. Telephone and data cabling and terminations.

3. Optical fiber and terminations.

4. Telecommunications outlets.

5. Terminal blocks/cross-connect / patch panel systems.

6. Equipment racks and cabinets.

7. Wire Management

8. System testing.

9. Documentation and submissions.

B. Provide all equipment, materials, labor, and services, not specifically mentioned or shown, which may be necessary to complete turnkey installation. Ensure that they are in compliance with requirements stated or reasonably inferred by the contract documents.

C. Work not included:

1. The following work will be done by others:

a. Service Provider Cabling, terminations, and equipment

b. Providing data switches, hubs, routers, servers, computers, and other active devices.

c. Telephone switch (PBX) and handsets.

2. Painting of all conduit and telecom backboard will be done by the General Contractor.

1.3 REFERENCES

A. Design, test, and install telecommunications cabling infrastructure per manufacturer's requirements and in accordance with NFPA70 (National Electrical Code®), state codes, local codes, requirements of authorities having jurisdiction, and particularly the following standards:

1. ANSI/NECA/BICSI568 - Standard for Installing Commercial Building Telecommunications Cabling.

2. ANSI/TIA/EIA Standards:

a. ANSI/TIA/EIA568B.1 Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements.

b. ANSI/TIA/EIA568B.2 Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted Pair Cabling Components.

c. ANSI/TIA/EIA568B.3 Optical Fiber Cabling Components Standard.

3. ANSI/TIA/EIA569A Commercial Building Standard for Telecommunications Pathways and Spaces.

4. ANSI/TIA/EIA606(A) The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.

5. ANSI/TIA/EIA607(A) Commercial Building Grounding and Bonding Requirements for Telecommunications.

6. Note: These standards can be obtained through BICSI at www.bicsi.com as well as www.tiaonline.org. This manual is based on the version of the standards indicated. In practice, the most recent version should be used.

B. Install cabling in accordance with the most recent edition of BICSI® publications:

1. BICSI Telecommunications Distribution Methods Manual.

2. BICSI Outside Plant Design Reference Manual

3. BICSI Information Technology Systems Installation Methods Manual.

C. Federal, state, and local codes, rules, regulations, and ordinances governing the work, are as fully part of the specifications as if herein repeated or hereto attached. If the contractor should note items in the drawings or the specifications, construction of which would be code violations, promptly call them to the attention of the owner's representative in writing. Where the requirements of other sections of the specifications are more stringent than applicable codes, rules, regulations, and ordinances, the specifications shall apply.

D. RELATED SECTIONS

1. Section 27 05 10 – Firestop for Communication Systems

2. Section 27 05 26 – Grounding and Bonding for Communication Systems

3. Section 27 05 28 – Pathways for Communications

4. Section 26 05 29 – Supporting Devices and Hangers

5. Section 26 05 34 – Raceways and Conduit Systems

6. Section 27 37 00 – Low Voltage Rough-in Specification

7. Section 28 13 00 – Access Control Specification

8. Section 28 23 00 – Video Surveillance Specification

1.4 PERMITS, FEES, AND CERTIFICATES OF APPROVAL

A. The General Contractor will make application and pay for building permit.

B. The Structured Cabling Contractor shall supply a Low Voltage Permit when applicable by the authority having jurisdiction.

C. As prerequisite to final acceptance, supply to the owner certificates of inspection from an inspection agency acceptable to the owner and approved by local municipality and utility company serving the project.

1.5 SYSTEM DESCRIPTION

A. A telecommunications cabling system generally consists of one telecommunications outlet in each workstation.

B. A typical workstation will consist of one voice jack and one or more data jacks. The number of cables per outlet are indicated on the telecommunication drawings.

C. All voice cables will consist of Category 6 cable terminated with a RJ45 jack and terminated on patch panels into the 2 post racks or cabinets in the IDF as noted in the rack elevations found in T-sheet Elevations drawings.

D. All horizontal UTP cabling to be installed for a typical telecommunication outlet shall meet or exceed ANSI/TIA Category 6 or 6A specifications and be blue in color. In certain situations, different cables will be needed, refer to the Telecommunication T- sheets to determine number and types of cables.

E. All horizontal UTP cabling to be installed for a wireless access point outlet shall meet or exceed ANSI/TIA Category 6A specifications and be blue in color.

F. In the telecommunication rooms (TRs) all horizontal cable runs shall be loosely wrapped using Velcro™ type straps. Plastic cable ties are not permitted in the TRs.

G. All Data cables will consist of Category 6 or 6A cable terminated with a RJ45 jack and terminate the cables on rack mounted 110 IDC patch panels located in the IDF.

H. All patch panels shall be installed, terminated and tested in accordance with the manufacturer’s recommendations and as set forth in the standards. Patch panels are to be installed within equipment racks as noted in the rack elevations found in T-sheet Elevations drawings.

I. All voice and data cabling shall be Plenum as defined by the environment in which it is to be installed. Contractor maintains the responsibility to comply with local and jurisdictional code requirements.

1.6 PRE-CONSTRUCTION SUBMITTALS

A. Submit to the engineer/designer shop drawings, and product data (including cut sheets and catalog information), as required by these contract documents. Submit shop drawings and product data with such promptness and in such sequence as to cause no delay in the work or in the activities of separate contractors. The engineer/designer will indicate approval of shop drawings and product data submitted to the engineer by stamping such submittals "APPROVED" with a stamp. Submitted shop drawings shall be initialed or signed by the contractor, showing the date and the contractor's legitimate firm name.

1. By submitting shop drawings, and product data, the contractor represents that he or she has carefully reviewed and verified materials, quantities, field measurements, and field construction criteria related thereto. It also represents that the contractor has checked, coordinated, and verified that information contained within shop drawings, and product data, to conform to the requirements of the work and of the contract documents. The engineer/designer remains responsible for the design concept expressed in the contract documents as defined herein.

2. The engineer's/designer's approval of shop drawings, and product data submitted by the contractor shall not relieve the contractor of responsibility for deviations from requirements of the contract documents, unless the contractor has specifically informed the engineer/designer in writing of such deviation at time of submittal, and the engineer/designer has given written approval of the specific deviation. The contractor shall continue to be responsible for deviations from requirements of the contract documents not specifically noted by the contractor in writing, and specifically approved by the engineer in writing.

3. The engineer's/designer's approval of shop drawings, and product data shall not relieve the contractor of responsibility for errors or omissions in such shop drawings, and product data.

4. The engineer's/designer's review and approval, or other appropriate action upon shop drawings, and product data is for the limited purpose of checking for conformance with information given and design intent expressed in the contract documents. The engineer's/designer's review of such submittals is not conducted for the purpose of determining accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the contractor as required by the contract documents. The review shall not constitute approval of safety precautions or of construction means, methods, techniques, sequences, or procedures. The engineer's/designer's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

B. Perform no portion of the work requiring submittal and review of shop drawings, and product data until the engineer/designer has approved the respective submittal. Such work shall be in accordance with approved submittals.

C. Submit shop drawings, and product data as a complete set within thirty (30) days of award of contract.

1. For initial submission and for resubmission required for approval, submit electronically copies of each item.

2. Illegible submittals will not be checked by the engineer.

D. Product Data: A Bill of Materials shall accompany the product data submittal. Provide catalog cut sheets and information for the following:

1. Wire, cable, and optical fiber.

2. Outlets, jacks, faceplates, and connectors.

3. All metallic and nonmetallic raceways, including surface raceways, J-Hooks, Cable Tray, Ladder Rack and associated hardware.

4. Terminal blocks and patch panels.

5. Enclosures, racks, and equipment housings.

6. Over-voltage protectors.

7. Splice housings.

1.7 PROJECT RECORD DOCUMENTS:

A. Submit project record documents and drawings (As-Built's), at conclusion of the project, to include the following:

1. As-Built Drawings: The drawings are to include outlet locations. Outlet locations shall be identified by their sequential number as defined through coordination with the owner and designer. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. The designer will provide floor plans in electronic AutoCAD formats on which as-built construction information can be added. These documents will be modified accordingly by the Structured Cabling contractor to denote as-built information as defined above and returned to the Designer prior to delivery to the Owner. The Contractors shall annotate the base drawings and return a hard copy (same plot size as originals) and electronic AutoCAD (.dwg) format.

2. Equipment Room (ER), Telecommunication room (TR) and the Demarcation Room (DEMARC) shall include termination detail sheets, and scaled equipment layouts.

3. Cross-connect and/or splice schedules including entrance point, main cross-connects, intermediate cross-connects, and horizontal cross-connects.

4. Warranty documents for equipment, if applicable.

5. Electronic Copper certification test results.

1.8 QUALITY ASSURANCE

A. The following manufacturer's cabling solutions are approved for the work of this section:

1. CommScope Uniprise

2. CommScope Systimax

3. Hubbell

4. Ortronics

5. Panduit

6. Belden

7. Leviton

8. Seimon Company

B. The contractor shall have worked satisfactorily for a minimum of five (5) years on systems of this type and size. The Structured Cabling contractor must be certified and be in good standing with the Manufacturer's partners agreement. Installers must be certified and approved by the manufacturer with a minimum of three years' experience installing that manufacturer.

C. Upon request by the engineer/designer, furnish a list of references with specific information regarding type of project and involvement in providing of equipment and systems.

D. Equipment and materials of the type for which there are independent standard testing requirements, listings, and labels, shall be listed and labeled by the independent testing laboratory.

E. Where equipment and materials have industry certification, labels, or standards (i.e., UL Underwriters Laboratory, NEMA National Electrical Manufacturers Association), this equipment shall be labeled as certified or complying with standards.

F. Material and equipment shall be new, and conform to grade, quality, and performance standards specified. Equipment and materials of the same type shall be a product of the same manufacturer throughout.

G. Subcontractors shall assume all rights and obligations that the contractor assumes toward the owner and engineer/designer.

1.9 WARRANTY

A. Structured Cabling Contractor shall warranty all installed products, for a period of not less than one (1) year from the date of first beneficial use or system acceptance. Acceptance of the product to initiate the one-year warranty, shall be in writing from the engineer/designer or the owner.

B. The Structured Cabling Contractor, through the manufacturer, unconditionally guarantee in writing, the materials, equipment, and workmanship for a period of not less than a twenty (20) year warranty.

C. Contractor shall transfer manufacturer's warranties to the owner in addition to the General System Guarantee. Submit these warranties on each item in list form with shop drawings. Detail specific parts within equipment that are subject to separate conditional warranty. Warranty proprietary equipment and systems involved in this contract during the guarantee period. Final payment shall not relieve you of these obligations.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Protect materials and equipment during transit, storage, and handling to prevent damage, theft, soiling, and misalignment. Coordinate with the owner and/or General Contractor for secure storage of equipment and materials. Do not store equipment where conditions fall outside manufacturer's recommendations for environmental conditions. Do not install damaged equipment; remove from site and replace damaged equipment with new equipment.

1.11 SEQUENCE AND SCHEDULING

A. Structured Cabling Contractor shall be subject to the project schedule defined by the owner or the General Contractor. All efforts shall be made to meet the identified deadlines.

B. Structured Cabling Contractor is required to coordinate with other trades to insure the project requirements are reviewed and met within the timeline defined by the schedule. Lack of coordination with other trades does not relieve the Contractor of meeting the milestone dates.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide products of manufacturers as named in individual articles.

B. Where no manufacturer is specified, provide products from manufacturers in compliance with the specified performance requirements.

2.2 FABRICATION

A. Fabricate custom-made equipment with careful consideration given to aesthetics, technical, and functional aspects of equipment and its installation.

2.3 SUITABILITY

A. Provide products that are suitable for intended use, including, but not limited to environmental, regulatory, and electrical. All cabling, copper riser, and fiber shall be provided with suitable insulation for installing in an air plenum.

2.4 VOICE TELECOMMUNICATIONS STATION CABLE

A. Solid copper, 23 AWG, 100Ω balanced twisted-pair (UTP) Category 6 cables with four individually twisted-pairs, which meet or exceed the mechanical and transmission performance specifications in ANSI/TIA/EIA568B.2 up to 250 MHz.

1. Note: Listed Type CMR, CMP, MPR and/or MPP (as required by local codes or AHJ)

2.5 DATA STATION CABLE (COPPER)

A. Solid copper, 23 AWG, 100Ω balanced twisted-pair (UTP) Category 6 cables with four individually twisted-pairs, which meet or exceed the mechanical and transmission performance specifications in ANSI/TIA/EIA568B.2 up to 250 MHz

1. Note: Listed Type CMR, CMP, MPR and/or MPP (as required by local codes or AHJ)

B. Solid copper, 23 AWG, 100Ω balanced twisted-pair (UTP) Category 6A cables with four individually twisted-pairs, which meet or exceed the mechanical and transmission performance specifications in ANSI/TIA/EIA568B.2 up to 500 MHz

1. Note: Listed Type CMR, CMP, MPR and/or MPP (as required by local codes or AHJ)

2.6 VOICE/DATA WORK AREA OUTLETS (Copper only)

A. Single-gang mounting plate with four (4) openings containing the following devices:

1. Voice and Data Outlet 8pin modular, Category 6, unkeyed, blue, pinned to T568B standards.

2. Wireless Outlet 8pin modular, Category 6, unkeyed, blue, pinned to T568B standards

2.7 WALL VOICE OUTLETS

A. Single-gang polymer/stainless faceplate with eight-conductor jack and wall telephone mounting lugs

2.8 PATCH PANELS

A. 19 in. rack mountable, 24 or 48 port, 8pin modular to insulation displacement connector (IDC) meeting Category 6 performance standards, and pinned to T568 A and B standards.

B. 19 in. rack mountable, 24 or 48 port, 8pin modular to insulation displacement connector (IDC) meeting Category 6A performance standards, and pinned to T568 A and B standards.

2.9 OPEN FRAME EQUIPMENT FOUR POST RACK

A. Open frame, 19 in. equipment rack, 36” deep by 7-ft. overall height with flange base, mounting rails drilled front and back and tapped to EIA standards.

2.10 COPPER AND FIBER PATCH CORDS:

A. The low voltage contractor shall furnish Category 6 or 6A patch cables.

1. Qty equal to the number of used patch panel ports: Blue 3 ft.

2. Qty equal to the number of voice/data outlet jacks: Blue 10 ft.

B. Cables must be factory terminated and classified as Category 6 or 6A.

1. Patch cords shall have bend-relief compliant boots to ensure performance. Patch cords shall have latch guards to protect against snagging.

C. Category 6 Specifications:

1. Four-pair, balanced-twisted pair cable, certified to meet transmission characteristic of Category 6 cable at frequencies up to 250 Mhz.

2. Comply with TIA-568-C.2 for Category 6 cables.

3. Constructed with 100 Ω 23 AWG stranded copper and be Unshielded twisted pair (UTP) cabling.

D. Category 6A specifications:

1. Four-pair, balanced-twisted pair cable, certified to meet transmission characteristic of Category 6A cable at frequencies up to 500 Mhz.

2. Comply with TIA-568-C.2 for category 6A cables.

3. Constructed with 100 Ω 23 AWG stranded copper and be Unshielded twisted pair (UTP) cabling.

E. The low voltage contractor shall furnish 1 roll of Velcro tape (Panduit HLS-75RO or equivalent) for cable management to the owner for the switch to patch panel cabling connectivity.

2.11 LADDER RACK:

A. Products: Subjects to compliance with requirements, provide the following:

1. Chatsworth Products, Inc.

2. Cooper-B-line

3. Cable Management Solutions, Inc.

4. Cablofil Inc.

5. Cope - Tyco/Allied Tube & Conduit.

6. GS Metals Corp.

B. Ladder Rack Specifications:

1. Configuration: 12-inch wide UL Classified Universal Cable Runway, manufactured from 3/8-inch wide by 1-1/2-inch high tubular steel with 0.065-inch wall thickness.

2. Include Junction Splice Kit, Butt Splice Kit, and additional materials to comply with configuration shown on Drawings.

3. Rung Spacing: 9 inches O.C.

4. Minimum Cable-Bearing Surface for Rungs: 7/8-inch width with radius edges.

5. No portion of the rungs shall protrude below the bottom plane of side rails.

6. Structural Performance of Each Rung: Capable of supporting a maximum cable load, with a safety factor of 1.5, plus a 200-lb concentrated load, when tested according to NEMA VE 1.

7. Minimum Usable Load Depth: 4 inches.

8. Straight Section Lengths: 10 feet except where shorter lengths are required to facilitate tray assembly.

9. Fitting Minimum Radius: 24 inches.

C. Ladder Rack Accessories:

1. Splicing Assemblies: Bolted type using serrated flange locknuts.

2. Splice Plate Capacity: Splices located within support span shall not diminish rated loading capacity of cable tray.

3. Cable straps used for attaching cable bundles to the ladder rack cross members must be reusable with a Velcro, at least 3/4-inch wide, and sized for cable bundles that are 2-inches, 3-inches or 4-inches in diameter.

4. Cable retaining posts used to keep cable from falling off of the side of the ladder rack shall be manufactured from 1-inch by ½-inch tubular steel with .065-inch wall thickness. Cable retaining posts will be 8-inches high and will attach to the side stringer of the ladder rack with included hardware. The top of the cable retaining posts will be fitted with a rubberized end cap to protect cables.

5. End caps used to cover the ends of ladder rack will be manufactured from a black fire-retardant rubberized material. End caps will be sized for 3/8-inch wide by 1-1/2 -inches high side stingers and will be sold in pairs.

6. End closing kits used to cover the end of ladder rack will be manufactured from 3/8-inch wide by 1-1/2- inches high tubular steel with .065-inch wall thickness. Kits will consist of a bar cut to match the width of the ladder rack and the hardware required to attach the bar to the end of a length of ladder rack.

7. Radius drops used to create a radius to form cables over as the cables exit or enter the ladder rack will be manufactured from aluminum extrusion. The extrusion will be formed in a 90° arc with a minimum bend radius of 3-inches. Radius drops will attach to either the side stringer or the cross member of the ladder rack using a clevis pin. Radius drops will include 11/2-inch high cable spools that attach to the top of the radius drop to guide cables.

8. Auxiliary support brackets used to support cables that should be physically separated from the cables in the ladder rack will be made from 1/8-inch by 1-inch steel bar. The bracket will be L-shaped and will attach to the side stringer of the ladder rack. The bracket will hang below the ladder rack a minimum of 4-inches. The bracket support surface will be 4-inches long.

2.12 CABLE TRAY:

A. Products: Subjects to compliance with requirements, provide the following:

1. Chatsworth Products, Inc.

2. Cooper-B-line

3. WBT

4. Legrand
5. Snake Tray
6. Hubbell
7. Hoffman
8. Cablofil Inc.
9. TJ Cope - Tyco/Allied Tube & Conduit.

B. Wire-Basket Cable Trays

1. Configuration: Wires are formed into a standard 2-by-4-inch wire mesh pattern with intersecting wires welded together. Mesh sections must have at least one bottom longitudinal wire along entire length of section.
2. Materials: High-strength-steel longitudinal wires with no bends.
3. Safety Provisions: Wire ends along wire-basket sides (flanges) rounded during manufacturing to maintain integrity of cables and installer safety.
4. Sizes:
    a. Straight sections shall be furnished in standard 10ft. lengths.
    b. Wire-Basket Depth: 4-inch usable loading depth by 12 inches wide.
5. Connector Assemblies: Bolt welded to plate shaped to fit around adjoining tray wires and mating plate. Mechanically joins adjacent tray wires to splice sections together or to create horizontal fittings.
6. Connector Assembly Capacity: Splices located within support span shall not diminish rated loading capacity of cable tray.
7. Hardware and Fasteners: ASTM F 593 and ASTM F 594 stainless steel, Type 316.

C. Cable Trays are the preferred pathways for supporting Horizontal telecommunications cables. Cable Trays shall be provided from the Telecommunications Rooms to support the horizontal cabling.

D. Bond each section of the cable tray to the ground bus, or bond each section to the next and then to the ground bus per NEC. There must be a path from each section to ground. Location of the cable tray shall be identified by ICT during the design phase of the project.

E. The actual cable tray size(s) shall be determined during the design phase of the project. The cable tray shall be installed in accordance with the applicable electrical code. The cable tray is to be dedicated for use only by low-voltage cabling systems. Cable tray should be trapeze supported or wall mounted. If wall mounted, additional threaded rod supports should be provided from the ceiling to

the outer edge of the wall mounted tray. Center support cable trays shall not be accepted.

F. Cable Trays should have radius components installed at all inside corners to prevent minimum cable bending radius from being exceeded.

G. Cable Tray Accessories: Fittings: Tees, crosses, risers, elbows, and other fittings as indicated, of same materials and finishes as cable tray

2.13 CABLE MANAGEMENT

A. Manufactures

1. Chatsworth
2. Belden
3. Panduit
4. Ortronics
5. Hubble

B. Vertical Cable Management Channels:

1. The cable manager shall be sized to match cabling requirements. The initial quantity of cables within the cable manager shall not exceed a whole number value equal to 40% of the interior area of the cable manager.
2. Epoxy-polyester hybrid powder coat finish, black in color.
3. Vertical cable management panels shall have front and rear channels, with covers.
4. Double sided 6 inch wide by 78-84 inches tall.

C. Horizontal Cable Management Channels:

1. The cable manager shall be sized to match cabling requirements. The initial quantity of cables within the cable manager shall not exceed a whole number value equal to 40% of the interior area of the cable manager.
2. Epoxy-polyester hybrid powder coat finish, black in color.
3. Provide horizontal crossover cable manager at the top of each relay rack, with a minimum height of two rack units each
4. Double sided 2U wide

D. The front of the vertical cable manager will have cable openings along both sides of the trough. The openings will be formed by evenly-spaced T-shaped cable guides. The T-shaped cable guides will be made from a composite plastic material (not metal) and will have rounded edges to protect cables. When the cable manager is attached to a rack/frame, each cable opening will align with a rack-mount space (RMU) on the rack/frame. Each opening will pass a minimum of 24 each .25” OD patch cords

E. Attach vertical cable managers to the side of the rack/frame using the manufacturer’s installation instructions and included hardware.

F. The color of the rack(s)/frame(s) and cable manager(s) must match.

G. Doors/covers should be attached to the cable manager and in the closed position after cabling is complete.

PART 3 - EXECUTION

3.1 PRE-INSTALLATION SITE SURVEY

A. Prior to start of systems installation, meet at the project site with the owner's representative and representatives of trades performing related work to coordinate efforts. Review areas of potential interference and resolve conflicts before proceeding with the work. Facilitation with the General Contractor will be necessary to plan the crucial scheduled completions of the equipment room and telecommunications closets, as well as primary pathways.

B. Examine areas and conditions under which the system is to be installed. Do not proceed with the work until satisfactory conditions have been achieved.

3.2 HANDLING AND PROTECTION OF EQUIPMENT AND MATERIALS

A. Be responsible for safekeeping of your own and your subcontractors' property, such as equipment and materials, on the job site. The owner assumes no responsibility for protection of above-named property against fire, theft, and environmental conditions.

3.3 PROTECTION OF OWNER'S FACILITIES

A. Effectively protect the owner's facilities, equipment, and materials from dust, dirt, and damage during construction.

B. Remove protection at completion of the work.

3.4 INSTALLATION

A. Receive, check, unload, handle, store, and adequately protect equipment and materials to be installed as part of the contract. Store in areas as directed by the owner's representative. Include delivery, unloading, setting in place, fastening to walls, floors, ceilings, or other structures where required, interconnecting wiring of system components, equipment alignment and adjustment, and other related work whether or not expressly defined herein.

B. Install materials and equipment in accordance with applicable standards, codes, requirements, and recommendations of national, state, and local authorities having jurisdiction, and National Electrical Code® (NEC) and with manufacturer's printed instructions.

C. Adhere to manufacturer's published specifications for pulling tension, minimum bend radii, and sidewall pressure when installing cables.

1. Where manufacturer does not provide bending radii information, minimum-bending radius shall be 15 times cable diameter. Arrange and mount equipment and materials in a manner acceptable to the engineer and the owner.

D. Penetrations through floor and fire-rated walls shall utilize intermediate metallic conduit (IMC) or galvanized rigid conduit (GRC) sleeves and shall be fire stopped after installation and testing, utilizing a firestopping assembly approved for that application.

E. Install station cabling to the nearest Intermediate Distribution Frame unless otherwise noted.

F. Installation shall conform to the following basic guidelines:

1. Use of approved wire, cable, and wiring devices.

2. Neat and uncluttered wire termination.

G. Attach cables to permanent structure with suitable attachments at intervals of 48 to 60 inches. Support cables installed above removable ceilings.

H. Install adequate support structures for 10 foot of service slack at each [**ER, TR(s)**].

I. Support riser cables every three (3) floors and at top of run with cable grip.

1. Limit number of four-pair data riser cables per grip to fifty (50).

J. Install cables in one continuous piece. Splices shall not be allowed except as indicated on the drawings or noted below:

1. Provide over-voltage protection on both ends of cabling exposed to lightning or accidental contact with power conductors.

3.5 GROUNDING

A. Grounding shall conform to section 26 05 26.

B. Grounding shall conform to ANSI/TIA/EIA 607(B) Commercial Building Grounding and Bonding Requirements for Telecommunications, National Electrical Code®, ANSI/NECA/BICSI568 and manufacturer's grounding requirements as minimum.

C. Bond and ground equipment racks, housings, messenger cables, and raceways.

D. Connect cabinets, racks, and frames to single-point ground which is connected to building ground system via #6 AWG green insulated copper grounding conductor.

E. The low-voltage Contractor is responsible for the coordination with the electrical contractor connecting the Primary Bonding Busbar (PBB) to the electrical grounding bar.

3.6 LABELING

A. The administration standard as presented in the ANSI/TIA/EIA-606A addresses the need for an independent and scalable labeling standard in the administration of telecommunications cabling infrastructure. In order to standardize and administer the entirety of the infrastructure it is necessary to have a complete standard for labeling so that technicians do not need to learn new standards as they move from one building to the next. Contractors need a concrete labeling scheme so that they can make their products as useful as possible.

B. According to the ANSI/TIA/EIA-606-A standard, the low voltage contractor shall consider a class 3 labeling standard. Most campuses have multiple buildings and outside pathways that must be documented. All identifiers shall be independent and scalable. All labels read from the general to the specific from left to right.

C. There are three significantly different pieces to consider in developing a system for the administration of any complex system: naming, labeling, and supporting documentation.

D. Naming is the process of assigning every piece of identifiable equipment a unique identifier to differentiate it from others. Unique names enable the use of databases in administration of the supporting documentation. In this system, the style of a name differs based upon the type of equipment named. This allows a quick and easy identification of the hardware.

E. Labeling is the process of affixing tags to the hardware so that their names can be determined. The tag affixed to the hardware is not always the full name of the piece of infrastructure. As will become apparent later, a number of pieces of a name can be determined based upon the location of the hardware. Because of this, it is not necessary to affix the entire name to every piece of hardware. This distinction becomes critical when the piece of equipment is too small to accept a label that contains its full name.

F. Supporting documentation is the key to any successful administration. Naming and labeling assure that everyone on campus can use the same basic keys for accessing information about the infrastructure but the supporting documentation holds all the information that individuals will need to know: fiber-optic strand count, termination points, last test date, copper pair counts, manufacturer of the cable and so on. This document deals primarily with the naming and labeling process in order to support clients understanding of the network infrastructure. Aside from the deliverables required by as built documentation requirements, the contractor is not responsible for maintaining any documentation of campus infrastructure.

G. Naming: All equipment or hardware shall have distinct styles of naming telecommunications infrastructure. They shall all use the same identifiers in the construction of a name but differ in their order and presentation.

H. Every component of the telecommunications infrastructure has a unique and independent identifier.

Label Target	Example	Explanation
Building	0012	Campus building number or name.
Telecommunication room	1A	1-first floor, A – Telecom. room on that floor
Communication cabinet	PCC001	Designates Pathway Communication Cabinet #1
Maintenance Hole	PMH001	Maintenance Hole #1
UTP Communication Panel	A	Designates communication panel A
Other Communication Panel	1	Designates communication panel 1, most commonly a fiber panel
Panel Module	1	Module #1 in a communication panel
Port	1	Port #1 in a module or communication panel

I. Labeling shall conform to ANSI/TIA/EIA606(B) or ISO/IEC 14763-2-1 standards. In addition, provide the following:

1. Label each outlet with permanent self-adhesive label with minimum 3/16 in. high characters.

2. Label each cable with permanent self-adhesive label with minimum, 1/8 in. high characters, in the following locations:

   a. Inside receptacle box at the work area.

   b. Behind the communication closet patch panel or punch block.

3. Use labels on face of data patch panels. Provide facility assignment records in a protective cover at each telecommunications closet location that is specific to the facilities terminated therein.

4. Use color-coded labels for each termination field that conforms to ANSI/TIA/EIA606(B) standard color codes for termination blocks.

5. Labels shall be machine-printed. Hand-lettered labels shall not be acceptable.

6. Label cables, outlets, patch panels, and punch blocks with room number in which outlet is located, followed by a single letter suffix to indicate particular outlet within room, i.e., S2107A, S2107B. Indicate riser cables by an R then pair or cable number. Contractor is to submit labeling scheme for approval.

7. Mark up floor plans showing outlet locations, type, and cable marking of cables. Turn these drawings over to the owner four (4) weeks prior to move in to allow the owner's personnel to connect and test owner-provided equipment in a timely fashion.

8. One (1) set of printed as-built drawings shall be delivered to the owner within four (4) weeks of acceptance of project by the owner. A set of as-built drawings shall be provided to the owner in electronic form and utilizing AutoCAD (.dwg) software that is acceptable to the owner. Note: HAND DRAWN AS-BUILTS ARE NOT ACCEPTABLE.

3.7 TESTING

A. Testing shall conform to ANSI/TIA/EIA568 -1-14 B standard.

B. Test each pair and shield of each cable for opens, shorts, grounds, and pair reversal. Correct grounded, and reversed pairs. Examine open and shorted pairs to determine if problem is caused by improper termination. If termination is proper, tag bad pairs at both ends and note on termination sheets.

   1. Perform testing of copper cables with tester meeting ANSI/TIA/EIA568B.1 requirement.

   2. If horizontal cable contains bad conductors or shield, remove and replace cable.

3.8 FIELD QUALITY CONTROL

A. Employ job superintendent or project manager during the course of the installation to provide coordination of work of this specification and of other trades, and provide technical information when requested by other trades. The contractor shall maintain a current RCDD® (Registered Communications Distribution Designer) on-staff and he/she shall be responsible for the overall quality control during installation, equipment setup, and testing.

B. All installation personnel shall meet manufacturer’s training and education requirements for implementation of extended warranty program.

END OF SECTION

SECTION 27 37 00 - LOW VOLTAGE ROUGH-IN SPECIFICATIONS

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 WORK INCLUDED

A. All work specified in this section shall comply with the provisions of Division 26 or 27.

B. All conduit rough-in and outlet boxes for all low voltage systems/communications shall be provided and installed by Electrical Contractor.

C. All device locations will be as shown on communications systems drawings. Refer to the legend and drawings for height requirements.

1.3 RELATED WORK

A. Raceways: Sections 260534.

B. Supporting Devices and Hangers: Section 26 05 29.

C. Pull and Junction Boxes: Section 26 05 38.

D. Outlet Boxes: Section 26 05 37.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. All low voltage conduits shall be 1” EMT minimum, stubbed to nearest accessible ceiling unless otherwise noted in these specifications or drawings. Conduit shall be terminated with nylon bushing.

B. Contractor to provide standard outlet boxes to conform to "OUTLET BOX" section of these specifications and sized as shown on drawings.

C. The Electrical Contractor is responsible for all hangers, straps, and support structure necessary to properly hang/support conduit.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The General contractor will schedule the installation of the conduit systems.

B. The Electrical Contractor will receive, store and protect all rough-in equipment.

C. The Electrical Contractor shall use building lines or 90° angles when installing conduit.

D. The Electrical Contractor shall work with others trades to coordinate location and installation of bracing for TV brackets.

E. For structured voice and data cabling infrastructure, the Electrical Contractor is to provide all rough-in, sleeves, fire stopping and standard outlet boxes. The Structured Cabling Contractor is to provide and install all cable, low voltage relays, and special backboxes. All equipment, devices, terminations and miscellaneous hardware required for a complete system is to be provided and installed.

F. For television cable system, the Electrical Contractor is to provide all rough-in, sleeves, fire stopping and standard outlet boxes. The Structured Cabling Contractor is to provide and install all cable, low voltage relays, and special backboxes. All equipment, devices, and miscellaneous hardware required for a complete system is to be provided and installed by the respective Owner/Vendor.

G. Where open cable is run above dropped ceilings and penetrates a smoke or fire rated wall, this contractor shall furnish and install a minimum 1" (unless otherwise noted) empty sleeve, extending at least 1' on both sides of the partitions with bushings on both ends. In areas in which penetrations larger than 1” are required, the communications contactor shall install Specified Technologies EZ Path product or approved equivalent.

H. All cable concealed in walls or inaccessible (drywall) ceilings shall be installed in conduit.

END OF SECTION

SECTION 27 41 00 - DIRECT VIEW LED DISPLAY SYSTEM

1. GENERAL

1.1.BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

4. Waivers:

Waivers will not be considered.

1.2.SECTION INCLUDES

A. Large Format Direct View LED Display Systems

1.3.RELATED SECTIONS

A. Division – Electrical.

1.4.REFERENCES

A. National Electrical Manufacturers Association (NEMA).

B. ANSI/InfoComm 10:2013 - Audiovisual Systems Performance Verification.

C. ANSI/UL 879 - Electric Sign Components.

D. CAN/CSA-C22.2 No. 27 - Portable and Stationary Electric Signs and Displays.

1.5.DESIGN / PERFORMANCE REQUIREMENTS

A. Large format direct view LED display system shall be certified for use in the United States and shall bear the ETL Verified Mark. System complies with ANSI/UL 879.

1.6.SUBMITTALS

A. Provide shop drawings and record drawings using the following scales:

Details – not less than 1/4” =1’-0”
Plans – not less than 1/8” =1’-0”

B. Mark all submittal documents to show the project name, date, Architect, Contractor, Sub-Contractor, and this specification Section number.

C. Make each specified submittal as a coordinated package complete with all information.

D. Product Data: Submit manufacturer’s product data sheets for each item of equipment that will be provided as part of this contract. Provide a complete list of proposed equipment broken down by system.

E. Submit heat load calculations showing how loads were derived if requested.

F. Any technical questions shall be submitted by email to the AV Consultant via the Architect.

Walthall & Associates, Inc.
200 Swift Creek Drive; Suite G
Cantonment, FL 32533
chuck@walthall.us
(850) 478-9002

G. Shop Drawings: Provide shop drawings indicating details of construction, fabrication, and installation of direct view LED cabinets, panels, etc., including but not limited to wiring diagrams, cable routing, interconnections between equipment, anchorage details, and relationship with supporting structure and adjacent construction.

H. Custom Mounting: Coordinate with support structure as indicated on the Drawings for custom mounting and support of the large format direct view LED display board system specified.

I. System Reports:

1. Report an inventory of electronic system components, including model number, serial number, and firmware version.

2. Report the verified quantity of panels installed per local control zone.

3. Report all system settings.

4. Report testing and commissioning data.

J. System Settings Backup: Provide an electronic file of all system settings.

K. Security Items:

1. Provide passwords to access control functions for hardware and software user interfaces.

1.7.QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum five years documented experience in work of providing, installing, configuring and commissioning large direct view LED video systems.

B. Certified Manufacturer Representative: System shall be configured and commissioned by a certified manufacturer representative, contractor, installer.

C. Installer Qualifications: Minimum two years documented experience in work of installing large direct view LED displays.

1.8.DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle products in strict compliance with manufacturer's instructions and recommendations and industry standards.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Store materials within absolute limits for temperature and humidity recommended by manufacturer. Protect from damage.

1.9.SEQUENCING

A. Ensure that information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.

1.10.PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's limits.

B. Products shall not be installed until painting and other finish work is complete.

1.11.WARRANTY

A. Manufacturer's standard warranty (includes all components) against defects, materials and workmanship when installed and operated in accordance with the product specifications and manuals.

B. Warranty Period: Manufacturer's standard 2 Year warranty, with available warranty extension up to 5 Years.

2. PRODUCTS

2.1.MANUFACTURERS

A. Acceptable Manufacturers: ClearLED, NanoLumens, Pixelflex, *or equal.*

B. Substitutions during bidding are not allowed.

2.2. DIRECT VIEW LED DISPLAY SYSTEM

A. Large Direct View LED Display for indoor application:

1. Description: The direct view LED board shall be 2.5mm pixel pitch, 41’-4” wide by 7’-9” tall. The panel cabinets shall be mounted securely to the 42’ x 8’ recessed substrate using graded fasteners. The display shall consist of (15) cabinets, housing 2.5mm FC-SMD LED panels with a resolution of 240 x 135.

2. Layout and Configuration: As indicated on Drawings.

    A. System Type: 2.5mm FC-SMD

    B. Basis of design: ClearLED Skypanel HQ2.5

    C. Display Mounting System: Custom wall mount, recessed as indicated on Drawings.

3. Indoor 2.5mm

    a. Pixel Pitch: 2.50mm

    b. Pixel Configuration: Flip Chip SMD

    c. Resolution: 240 x 136

    d. Brightness: 1,200 or 4,000 nits

    e. Contrast Ratio: 10,000:1

    f. Color Capacity: <=65,536

    g. Color Temp: 9,000k

h. Color Temp Adj: 2,500k - 10,000k

i. Refresh rate: 3,840 - 7,680

j. Working Temp Enviro: -10c - +50c

k. LED Lifetime Exp: 100,000 hrs

l. Service: Front

4. Display Processor – Rack Mounted I/O Hardware Component (Novastar H5)

a. Physical Configuration: 5U 19” Mountable Chassis

b.I/O: 8 HDMI input / 20 RJ45 output

c. Network Configuration: Hardline RJ45 (10/100/1000), internet connection required for remote diagnostics, troubleshooting.

d. Video Signal Inputs: (8) HDMI 2.x

e.Video Signal Outputs: (20) RJ45

5. Display Graphic Content (PC)

A. Hardware Specifications:

Intel® Core™ Ultra 9 285 (36 MB cache, 24 cores, 24 threads, 1.9 GHz to 5.6 GHz, 65W)

Windows 11 Pro

NVIDIA® RTX™ 2000 ADA, 16 GB GDDR6, 4 mDP to DP adapters

32GB: 2 x 16 GB, DDR5, 5600 MT/s, non-ECC

1 TB, M.2 2280, TLC PCIe Gen4, SSD, SED Ready

Video Output: 2 x DP

Audio: Analog Stereo

Ports: 4 x USB

Ethernet: 1 x 10/100/1000 Mbps

RS-232: 1 x

Wired keyboard & mouse

Rack shelf as required

Marshall Electronics V-LCD171MD-3G 17.3" Full HD Rackmount Monitor

6. Audio Reinforcement System

A. Amplifier: QSC MP-A20v or equivalent

B. Loudspeakers: JBL COL600 or equivalent (size critical) - 8 total.

3. EXECUTION

3.1.EXAMINATION

A. Do not commence installation until substrates and support structure is in place and properly prepared.

B. Ensure required power and data sources have been provided at display cabinets.

C. Test all data cabling terminations using industry standard testing methods.

3.2.PREPARATION

A. Prepare substrates using the methods recommended by the manufacturer for achieving the best result under the project conditions.

B. Do not proceed with installation until support structure and substrates have been prepared using the methods recommended by the manufacturer and deviations from manufacturer's recommended tolerances are corrected. Commencement of installation constitutes acceptance of conditions.

3.3.INSTALLATION

A.Install in accordance with manufacturer's written instructions and recommendations and in proper relationship with adjacent work.

B. Rigidly mount display(s) level and plumb with fasteners recommended by the manufacturer.

C. Record any necessary changes to the system design.

D. Startup equipment in accordance with manufacturer's instructions.

3.4.CLEANING

A. Clean system components where required.

B. Clean systems per manufacturer’s suggestion.

3.5.CLOSEOUT ACTIVITIES

A. Demonstrate operational system to Owner/End User representative.

B. Instruct Owner/End User representative to maintain system and use any occupant controls or interfaces, as required.

C. Review service and support contact, ticketing and communication plan.

3.6.PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 28 31 00 - FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer’s certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers:

1. **Waivers will not be considered**.

1.2 SCOPE AND RELATED DOCUMENTS

A. The work covered by this section of the specifications includes the furnishing of all labor, equipment, materials, and performance of all operations associated with the installation of the fire alarm system as shown on the drawings and as herein specified.

B. The requirements of the conditions of the Contract, Supplementary Conditions, and General Requirements apply to the work specified in this section.

C. The complete installation shall conform to the applicable sections of NFPA-72, local code requirements, and National Electrical Code with particular attention to Article 760.

D. The work covered by this section of the specifications shall be coordinated with the related work as specified elsewhere under the project specifications.

1.3 QUALITY ASSURANCE

A. Each and all items of the fire alarm system shall be listed as a product of a single fire alarm system manufacturer under the appropriate category by Underwriters' Laboratories, Inc. (UL), and shall bear the UL label. All control equipment shall be listed under UL category UOJZ as a single control unit. Partial listing shall not be acceptable.

B. All control equipment must have transient protection to comply with UL864 requirements.

C. Where fire alarm circuits leave the building, additional transient protection must be provided for each circuit. Devices must be UL listed under Standard 497B, Isolated Loop Circuit Protectors.

1.4 GENERAL

A. Furnish and install a complete fire alarm system as described herein and as shown on the plans, to be wired, connected, and left in first class operating condition. Include sufficient control panel(s), annunciator(s), manual stations, automatic fire detectors, smoke detectors, alarm indicating appliances, wiring, terminations, electrical boxes, and all other necessary material for a complete operating system.

1. The fire alarm system shall allow for loading and editing special instructions and operating sequences as required. The system shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control panel. Loss of primary and secondary power shall not erase the instructions stored in memory.

2. Full flexibility for selective input/output control functions based on anding, oring, noting, timing, and special coded operations shall also be incorporated in the resident software programming of the system.

B. Resident software shall allow for full configuration of initiating circuits so that additional hardware shall not be necessary to accommodate changes in, for instance, sensing of normally open contact devices to sensing of normally closed contact devices, or from sensing of normally open contact devices to sensing a combination of current limited and non-current limited devices on the same circuit and being able to differentiate between the two, or changing from a non-verification circuit to a verification circuit or vice-versa.

C. Resident software shall also allow for configuration of indicating appliance and control circuits so that additional hardware shall not be necessary to accommodate changes in, for instance, changing a non-coded indicating appliance circuit to a coded circuit, or from a slow march time (20 BPM) to a fast march time (120 BPM).

D. The system shall have the capability of recalling alarms and trouble conditions in chronological order for the purpose of recreating an event history.

E. All panels and peripheral devices shall be the standard product of a single manufacturer and shall display the manufacturer's name on each component. The catalog numbers specified under this section are those of Simplex Time Recorder Company and constitute the type, product quality, material, and desired operating features.

F. If equipment of another manufacturer is submitted for approval, the contractor shall state how much is to be deducted from his base bid for the substitution, and also shall state what, if any, specific points of system operation differ from the specified points of the system operation. This differentiation report must reference every paragraph of this specification.

1.5 OPERATION

A. The system alarm operation subsequent to the alarm activation of any manual station, automatic detection device, or sprinkler flow switch shall be as follows:

1. All audible alarm indicating appliances shall:

a. Sound a continuous fire alarm signal until silenced by the alarm silence switch .

b. Sound a selective positive non-interfering successive zone code. Interference of this code shall not be permitted until a completed transmission of its assigned number of rounds. Should coding be completed, a continuous master code or march time pattern shall sound until silenced by the alarm silence switch at the control panel.

c. Sound a march time pattern until silenced by the alarm silence switch at the control panel.

d. Sound a master code until silenced by the alarm silence switch at the control panel. The master code will consist of a common code, e.g., 4-4-4.

2. All visible alarm indicating appliances shall flash continuously until the system is reset.

3. Any subsequent zone alarm shall reactivate the alarm indicating appliances.

4. All doors normally held open by door control devices shall release after no time delay.

5. A supervised signal to notify an approved central station shall be activated.

6. The mechanical controls shall activate the air handling systems in accordance with NFPA 90.

B. Upon reset of the fire alarm control panel, air handling units shall sequentially start up to minimize power demand.

C. The alarm shall be displayed on an 80 character LCD display. The top line of 40 characters shall be the point label and the second line shall be the device type identifier. The system alarm LED shall flash on the control panel and the remote annunciator until the alarm has been acknowledged. Once acknowledged, this same LED shall latch on. A subsequent alarm received from another zone shall flash the system alarm LED on the control panel and remote annunciator. The LCD display shall show the new alarm information.

D. A pulsing alarm tone shall occur within the control panel and the remote annunciator until the event has been acknowledged.

E. The alarm activation of any elevator lobby smoke detector shall, in addition to the operations listed above, cause the elevator cabs to be recalled according to the following sequence:

1. If the alarmed detector is on any floor other than the main level of egress, the elevator cabs shall be recalled to the main level of egress.

2. If the alarmed detector is on the main egress level, the elevator cabs shall be recalled to the predetermined alternate recall level as determined by the local authority having jurisdiction.

F. The activation of any system smoke detector shall initiate an alarm verification operation whereby the panel will reset the activated detector and wait for a second alarm activation. If, within one (1) minute after resetting, a second alarm is reported from the same or any other smoke detector, the system shall process the alarm as described previously. If no second alarm occurs within one minute, the system shall resume normal operation. The alarm verification shall operate only on smoke detector alarms. Other activated initiating devices shall be processed immediately. The alarm verification operation shall be selectable by zone.

1. The control panel shall have the capability to display the number of times (tally) a zone has gone into a verification mode. Should this smoke verification tally reach a pre-programmed number, a trouble condition shall occur.

2. Alarm verification zones shall be able to be divided into eight separate groups whereby only verification zones from the same group will confirm the first activation and cause the alarm sequence to occur.

G. The control panel shall have a dedicated supervisory service LED and a dedicated supervisory service acknowledge switch.

1. The activation of any standpipe or sprinkler valve supervisory (tamper) switch shall activate the system supervisory service audible signal and illuminate the LED at the control panel and the remote annunciator. Differentiation between valve tamper activation and opens and/or grounds on the initiation circuit wiring shall be provided.

2. Pressing the supervisory service acknowledge key will silence the supervisory audible signal while maintaining the supervisory service LED "ON" indicating the off-normal condition.

3. Restoring the valve to the normal position shall cause the supervisory service LED to extinguish, indicating restoration to normal.

4. Restoring the valve to the normal position shall cause the supervisory service audible signal to pulse indicating the restoration to normal position. The supervisory service acknowledge key shall silence the audible signal.

H. The alarm activation by either a manual or an electrically-operated coded station shall pulse the alarm indicating appliance to follow that code. The coded input signal shall take priority over all other input signals. All other alarm inputs shall be processed accordingly after coding is completed. If PNIS code is interrupted, it must be restarted and completed in its entirety without missing any portion of the code. Activation of control circuits for door release and air handling system shall not be delayed.

I. A manual evacuation (drill) switch shall be provided to operate the alarm indicating appliances without causing other control circuits to be activated. However, should a true alarm occur, all alarm functions would occur as described previously.

J. The system shall have a single key that will allow the operator to display all alarms, troubles, and supervisory service conditions including the time of each occurrence.

K. All doors normally held open by door control devices shall release upon AC power failure.

L. The actuation of the "enable walk test" program at the control panel shall activate the "walk test" mode of the system which shall cause the following to occur:

1. The city circuit connection shall be bypassed.

2. Control relay functions shall be bypassed.

3. The control panel shall show a trouble condition.

4. The panel shall automatically reset itself after signaling is complete.

5. Any momentary opening of an initiating or indicating appliance circuit wiring shall cause the audible signals to sound for four seconds indicating a trouble condition.

1.6 SUPERVISION

A. The system shall contain Class "B", Style "B" independently supervised initiating device circuits. The alarm activation of any initiation circuit shall not prevent the subsequent alarm operation of any other initiation circuit.

B. There shall be supervisory service initiation device circuits for connection of all sprinkler valve supervisory (tamper). Device activation shall cause a supervisory alarm at the control panel.

C. There shall be 2 independently supervised and independently fused indicating appliance circuits for alarm chimes. Disarrangement conditions of any circuit shall not affect the operation of other circuits.

D. Auxiliary manual controls shall be supervised so that an "off normal" position of any switch shall cause an "off normal" system trouble.

E. Each independently supervised circuit shall include a discrete LCD readout to indicate disarrangement conditions per circuit.

F. The incoming power to the system shall be supervised so that any power failure must be audibly and visually indicated at the control panel and the remote annunciator. A green "power on" LED shall be displayed continuously while incoming power is present.

G. The system batteries shall be supervised so that a low battery condition or disconnection of the battery shall be audibly and visually indicated at the control panel and the remote annunciator.

H. The system modules shall be electrically supervised for module placement. Should a module become disconnected, the system trouble indicator shall illuminate and the audible trouble signal shall sound.

I. The system shall have provisions for disabling and enabling all circuits individually for maintenance or testing purposes.

J. Wiring to a hardwired (non-serial) remote annunciator shall be supervised for open and ground conditions. A separate annunciator trouble LCD readout must be provided. It shall illuminate and an audible trouble signal shall sound at the control panel upon the detection of an open or ground condition.

K. There shall be independent supervision for opens of the air handling on/off/auto switch control output wiring. A discrete trouble LCD readout per output circuit will be provided for indication. A ground condition of the air handling control output wiring shall indicate a common ground trouble on the control panel.

1.7 POWER REQUIREMENTS

A. The control panel shall receive 120 VAC power (as noted on the plans) via a dedicated fused disconnect circuit.

B. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal 120 VAC power in a normal supervisory mode for a period of twenty-four (24) hours with 15 minutes of alarm operation at the end of this period. The system shall automatically transfer to the standby batteries upon power failure. All battery charging and recharging operations shall be automatic.

C. All external circuits requiring system operating power shall be 24 VDC and shall be individually fused at the control panel.

PART 2 - PRODUCTS

2.1 FIRE ALARM CONTROL PANEL - SIMPLEX TYPE 4017ES

A. Control panel construction shall be modular with solid-state, microprocessor-based electronics. It shall display only those primary controls and displays essential to operation during a fire alarm condition. Keyboards or keypads shall not be required to operate the system during fire alarm conditions.

1. A local audible device shall sound during alarm, trouble, or supervisory conditions. This audible device shall sound differently during each condition to distinguish one condition from another without having to view the panel. This audible device shall also sound during each keypress to provide an audible feedback to ensure that the key has been pressed properly.

B. The following primary controls shall be visible through a front access panel:

1. Eighty character liquid crystal display.

2. Individual red system alarm LED.

3. Individual yellow supervisory service LED.

4. Individual yellow trouble LED.

5. Green "power on" LED.

6. Alarm Acknowledge key.

7. Supervisory Acknowledge key.

8. Trouble Acknowledge key.

9. Alarm Silence key.

10. System Reset key.

C. The following secondary control switches and LEDs shall be available behind an access door:

1. City disconnect/switch.

2. Manual evacuation (drill).

3. Elevator bypass.

4. Door holder release bypass.

5. Future.

D. The control panel shall provide the following:

1. Setting of time and date.

2. LED testing.
3. Alarm, Trouble, and Abnormal condition listing.
4. Enabling and disabling of each monitor point separately.
5. Activation and deactivation of each control point separately.
6. Changing operator access levels.
7. Walk Test enable.
8. Running diagnostic functions.
9. Displaying software revision level.
10. Displaying historical logs.
11. Displaying card status.
12. Point listing.

E. For maintenance purposes, the following lists shall be available from the point lists menu:

1. All points list by address.
2. Monitor point list.
3. Signal/speaker list.
4. Auxiliary control list.
5. Feedback point list.
6. Psuedo point list.
7. LED/switch status list.

F. Scrolling through menu options or lists shall be accomplished in a self-directing manner in which prompting messages shall direct the user. These controls shall be located behind an access door.

G. Primary Keys, LEDs, and LCD Display:

1. The control panel shall have a 2 line x 40 character liquid crystal display which shall be backlit for enhanced readability. So as to conserve battery standby power, it shall not be lit during an AC power failure unless an alarm condition occurs or there is keypad activity.

2. The display shall support both upper and lower case letters. Lowercase letters shall be used for softkey titles and prompting the user. Uppercase letters shall be used for system status information. A cursor shall be visible when entering information.

2.2 SYSTEM FRONT PANEL OPERATION AND CAPABILITIES

A. Under normal condition, the front panel shall display a "System is Normal" message and the current time and date.

B. Should an abnormal condition be detected, the appropriate LED (Alarm, Supervisory, or Trouble) shall flash. The panel audible signal shall pulse for alarm conditions and sound steady for trouble and supervisory conditions.

C. The LCD shall display the following information relative to the abnormal condition of a point in the system.

1. 40 character custom location label.

2. Type of device (i.e., smoke, pull station, water flow).

3. Point status (i.e., alarm, trouble).

D. Two methods of acknowledgment for each abnormal condition shall be provided. One may be chosen depending on the NFPA requirements.

1. For NFPA 72D requirements: Pressing the appropriate acknowledge button shall display the first unacknowledged condition in the appropriate list (either alarm, supervisory, or trouble), and require another acknowledge button. Press to acknowledge only the displayed point.

2. For NFPA 72A, B, or C requirements: Pressing the appropriate acknowledge button shall globally acknowledge every point in the list.

E. These acknowledge functions may be passcode protected if the user has insufficient privilege to acknowledge such conditions. A message shall indicate insufficient privilege but allow the user to view the points without acknowledging them. Should the user have sufficient privilege to acknowledge, a message will be displayed informing the user that the condition has been acknowledged.

F. After all points have been acknowledged, the LEDs shall glow steady and the Sonalert will be silenced. The total number of alarms, supervisory, and trouble conditions shall be displayed along with a prompt to review each list chronologically. The end of the list shall be indicated by an end-of-list message "END OF LIST."

G. Alarm Silencing:

1. Should the Alarm Silence button be pressed, all audible alarm signals shall cease to operate.

2. Signals shall not be silenced during alarm silence inhibit mode.

H. System Reset:

1. The System Reset button shall be used to return the system to its normal state after an alarm condition has been remedied. The LCD display shall step the user through the reset process with simple English Language messages. Messages "SYSTEM RESET IN PROGRESS" will first be displayed followed by the message "SYSTEM RESET COMPLETED" and finally "SYSTEM IS NORMAL" should all alarm conditions be cleared.

2. Should an alarm condition continue to exist the message "SYSTEM RESET IN PROGRESS" will be followed by the message "SYSTEM RESET ABORTED" and the system will remain in an abnormal state. System control relays shall not reset. The Sonalert and the alarm LED will be on. The display will indicate the total number of alarms and troubles present in the system along with a prompt to use the ACK keys to review the points. These points will not require acknowledgment, if they were previously acknowledged.

3. Should the Alarm Silence Inhibit function be active, the SYSTEM RESET key press will be ignored. The message "SYSTEM RESET INHIBITED" will be displayed for a short time to indicate the action was not taken. As feedback to the operator, the message "SYSTEM RESET NO LONGER INHIBITED" will be displayed when the inhibit function times out.

I. Function Keys:

1. Additional function keys shall be provided to access status data for the following points:

   a. Initiating device circuits.

   b. Indicating appliance circuits.

   c. Auxiliary relays.

   d. Feedback points.

   e. All other input/output points.

2. The following status data shall be available.

   a. Primary state of point.

   b. Zone, PID and Card type information.

   c. Class "A" status.

   d. Current priority of outputs.

   e. Disable/Enable status.

   f. Verification tallies of initiating devices.

   g. Automatic/Manual Control Status of output points.

   h. Acknowledge status.

i. Relay status.

J. History Logging:

1. The system shall be capable of logging and storing 300 events in an alarm log and 300 events in a trouble log. These events shall be stored in a battery-protected random access memory. Each recorded event shall include the time and date of that event's occurrence.

2. The following Historical Alarm log events shall be stored:

a. Alarms.

b. Alarm Acknowledgment.

c. Alarm Silence.

d. System Reset.

e. Alarm Historical log cleared.

3. The following Historical Trouble log events shall be stored:

a. Trouble conditions.

b. Supervisory alarms.

c. Trouble acknowledgment.

d. Supervisory acknowledgment.

e. Alarm Verification tallies.

f. Walk Test results.

g. Trouble Historical log cleared.

4. Silent Walk Test with History Logging:

a. The system shall be capable of being tested by one person. While in testing mode, the alarm activation of an initiating device circuit shall be silently logged as an alarm condition in the historical data file. The panel shall automatically reset itself after logging of the alarm.

b. The momentary disconnection of an initiating or indicating device circuit shall be silently logged as a trouble condition in the historical data file. The panel shall automatically reset itself after logging of the trouble condition.

c. Should the walk test feature be on for an inappropriate amount of time, it shall revert to the normal mode automatically.

d. The control panel shall be capable of supporting up to 8 separate testing groups whereby one group of points may be in a testing mode and the other (non-testing) groups may be active and operate as programmed per normal system operation. After testing is considered complete, testing data may be retrieved from the system in chronological order to ensure device/circuit activation.

e. Should an alarm condition occur from an active point, not in walk test mode, it shall perform operations described in Section 1.4.

K. LED Supervision: All slave module LEDs shall be supervised for burnout or disarrangement. Should a problem occur, the LCD shall display the module and LED location numbers to facilitate location of that LED.

L. System Trouble Reminder: Should a trouble condition be present within the system and the audible trouble signal silenced, the trouble signal shall resound at preprogrammed time intervals to act as reminder that the fire alarm system is not 100% operational. Both the time interval and the trouble reminder signal shall be programmed to suit the owner's application.

M. Access Levels:

1. There shall be four (4) access levels with level 4 being the highest level. Level 1 actions shall not require a passcode. Passcodes shall consist of up to ten (10) digits. Changes to passcodes shall only be made by authorized personnel.

2. In order to maintain security when entering a passcode, the digits entered will not be displayed, but a cursor will move along filling the position with an X to indicate that the digit has been accepted. All key presses will be acknowledged by a local audible sound.

3. When a correct passcode is entered, the message "Access Granted" shall be displayed. The new access level shall be in effect until the operator manually logs out or the keypad has been inactive for ten (10) minutes.

4. Should an invalid code be inputted, the operator shall be notified with the message "ERROR...INCORRECT PASSCODE" and shall be allowed up to three chances to enter a valid code. After three unsuccessful tries, the message "ACCESS DENIED" shall be displayed. The level shall not be altered, and the operator shall no longer be in the menu option.

5. Access to a level will only allow the operator to perform all actions within that level plus all actions of lower levels, not higher levels.

6. The following keys/switches shall have access levels associated with them:

a. Alarm Silence

b. System Reset

c. Set Time/Date

d. Manual Control

e. On/Off/Auto Control

f. Disable/Enable

g. Clear Historical Alarm Log

h. Clear Historical Trouble Log

i. Walk Test

j. Change Alarm Verification

7. Acknowledge keys shall also require privileged access to acknowledge points. If the operator presses an (ACK) key with insufficient access, an error message will be displayed. The points will scroll with (ACK) key presses to view the points on the list, but the points will not get acknowledged in the database.

N. Equipment Enclosures: Provide cabinets of sufficient size to accommodate the aforementioned equipment. Cabinet shall be equipped with locks and transparent door panel providing freedom from tampering yet allowing full view of the various lights and controls.

2.3 REMOTE ANNUNCIATOR(S) - SIMPLEX TYPE 4606-9205 with Platinum Trim

A. Where shown on the plans, provide and install an LCD annunciator. The annunciator(s) shall have a beige enamel finish and shall communicate to the control panel over one twisted shielded pair of wire and operating power shall be 24 VDC and be fused at the control panel. Point-wired annunciators will not be considered as equal. The LCD display shall mimic the LCD display on the control panel.

B. The serial annunciator shall provide a common alarm and trouble circuit consist of:

1. Control Push-Button Switches - for: alarm silence, trouble silence, system reset, and manual evacuation duplicating the control panel switches. A key "enable" switch shall be provided to activate or deactivate the control switches.

2. Tone Alert - Duplicates the control panel tone alert during alarm and trouble conditions.

3. System trouble English language display.

4. Power on LED.

5. To accommodate and facilitate job site changes, the control switches shall have the capability to be programmed on-site to provide for manual switch input operation other than their standard purpose.

2.4 MULTIPLE ADDRESSABLE PERIPHERAL NETWORK (MAPNET)

A. Communication with addressable devices. The system must provide communication with initiating and control devices individually. All of these devices will be individually annunciated at the control panel. Annunciation shall include the following conditions for each point:

1. Alarm.

2. Trouble.

3. Open.

4. Short.

5. Device missing/failed.

B. All addressable devices shall have the capability of being disabled or enabled individually.

C. Up to 127 addressable devices may be multi-dropped from a single pair of wires. Systems that require factory reprogramming to add or delete devices are unacceptable.

D. Format: The communication format must be a completely digital poll/response protocol to allow t-tapping of the circuit wiring. A high degree of communication reliability must be obtained by using parity data bit error checking routines for address codes and check sum routines for the data transmission portion of the protocol. Systems that do not utilize full digital transmission protocol are not acceptable.

E. Identification of Addressable Devices: Each addressable device must be uniquely identified by an address code entered on each device at time of installation. The use of jumpers to set address will not be acceptable due to the potential of vibration and poor contact. Device identification schemes that do not use uniquely set addresses, but rely on electrical position along the communication channel are unacceptable. These systems cannot accommodate t-tapping the addition of an addressable device between existing devices requires reprogramming all existing electrically further devices. The system must verify that proper type device is in place and matches the desired software configuration.

F. Wiring Type, Distances, Survivability, and Configurations: Wiring types will be approved by the equipment manufacturer. Existing wiring will be utilized in retrofit applications. The system shall allow a line distance of up to 2,500 feet to the furthest addressable device on a Class B circuit. (Class A communications will be provided where shown on the drawings. Wire will be so routed to maintain sufficient distance between the forward and return loop as called for by the authority having jurisdiction.) To minimize wire routing and to facilitate future additions, t-tapping of the communications channel will be supported except where Class A wiring is required.

G. Addressable Device Types:

1. General: The system control panel, must be capable of communicating with the types of addressable devices specified below.

2. TrueAlarm Addressable Detector Bases - Simplex Type 4098-9781: All addressable smoke and heat detector heads as specified below will be pluggable into their bases. The base will contain electronics that communicate the detector status (normal, alarm, trouble) to the control panel over two wires. The same two wires shall also provide power to the base and detector. Different detector heads (smoke or heat) must be interchangeable. Upon removal of the head, a trouble signal will be transmitted to the control panel.

3. Photoelectric TrueAlarm Sensor - Simplex Type 4098-9701:

   a. The photoelectric type detector shall be a plug-in unit which mounts to a twist-lock base, and shall be UL approved.

   b. The detectors shall be of the solid-state photoelectric type and shall contain no radioactive material. They will use a pulsed infrared LED light source and be sealed against rear airflow entry.

   c. The detector shall fit into a base that is common with both the heat detector and photoelectric type detector and shall be compatible with other addressable detectors, addressable manual stations, and addressable zone adapter modules on the same circuit. There shall be no limit to the number of detectors or zone adapter modules which may be activated or "in alarm" simultaneously.

4. Addressable Thermal Detector Head - Simplex 4098-9731: Thermal detector heads must be UL listed. They will be a combination rate-of-rise and fixed temperature (135 F) type, automatically restorable.

5. Addressable Pull Stations - Simplex Type 2099-9784:

   a. Addressable pull stations will contain electronics that communicate the station's status (alarm, normal) to the transponder over two wires which also provide power to the pull station. The address will be set on the station. They will be manufactured from high impact red Lexan. Station will mechanically latch upon operation and remain so until manually reset by opening with a key common to all system locks. Pull stations will be single action.

   b. The front of the station is to be hinged to a backplate assembly and must be opened with a key to reset the station. The key shall be common with the control panels. Stations which use Allen wrenches or special tools to reset, will not be accepted. The station shall consist of high impact Lexan plastic, red in color.

   c. The addressable manual station shall be capable of field programming of its "address" location on an addressable initiating circuit. The manual station shall be fitted with screw terminals for field wire attachment.

d. There shall be no limit to the number of stations, detectors or zone adapter modules, which may be activated or "in alarm" simultaneously.

e. The addressable manual station shall be UL listed.

6. Addressable Photoelectric Duct Detector TrueAlarm - Simplex Type 4098-9702 with 4098-9701 Smoke Sensor:

   a. The detector shall be a non-polarized 24 VDC type which is compatible with the fire alarm panel and obtains its operating power from the supervisory current in the fire alarm detection loop.

   b. Detectors shall be of the solid-state photoelectric type and shall operate on the light scattering, photodiode principle. To minimize nuisance alarms, detectors shall have an insect screen and be designed to ignore invisible airborne particles or smoke densities that are below the factory set alarm point. No radioactive material shall be used.

   c. The 24 VDC detector may be reset by actuating the control panel reset switch.

   d. Detector construction shall have a mounting base with a twist-lock detecting head that is lockable. The locking feature must be field removable when not required. Contact between the base and head shall be of the bifurcated type utilizing spring type, self-wiping contacts. Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal at the control panel. Detector design shall provide compatibility with other normally open fire alarm detection loop devices (heat detectors, pull stations, etc.).

   e. It shall be possible to alarm the duct housing by using a test switch. Simplex Type 2098-9786 test LED alarm indicator.

   f. For maintenance purposes, it shall be possible to clean the duct housing sampling tubes by accessing them through the duct housings front cover.

   g. To minimize false alarms, voltage and RF transient suppression techniques shall be employed as-well-as smoke signal verification circuit and an insect screen.

   h. Auxiliary SPDT relays and or remote LED alarm indicators and key-operated test stations shall be installed where indicated.

7. Zone Adaptor Module - Simplex Type MAPNET II 2190-9155: Zone adapter modules shall be used for monitoring of water flow, valve tamper, Halon control panels, non-addressable detectors, and for control of evacuation indicating appliances and AHU systems:

   a. An addressable interface module shall be provided for interfacing normally open direct contact devices to an addressable initiating circuit. The device shall be a Simplex Type Zone Adapter Module (ZAM).

b. ZAMs will be capable of mounting in a standard electric outlet box. ZAMs will include cover plates to allow surface or flush mounting. ZAMs will receive their 24 VDC power from a separate two-wire pair running from an appropriate power supply.

c. There shall be two types of devices:

d. For Type 1 above:

1) For conventional 2-wire smoke detector and/or contact device monitoring with class B or class A wiring supervision.

a) This type of addressable device module will provide power to and monitor the status of a zone consisting of conventional 2-wire smoke detectors and/or N/O contact devices as specified elsewhere. The supervision of the zone wiring will be. These ZAMs will communicate the zone's status (normal, alarm, trouble) to the transponder.

2) For conventional 4-wire smoke detector with Class B wiring supervision - 2190-9158.

a) This type of addressable device will provide power to and monitor the contact status of a zone consisting of conventional 4-wire smoke detectors as specified else. The ZAM will provide detector reset capability and a 2-amp fuse to provide over-current power protection for the 4-wire detector. These ZAMs will communicate the zone's status (normal, alarm, trouble) to the transponder.

e. For Type 2 above:

1) Zone Adaptor Module - Simplex Type 2190-9161.

a) For signals, speakers, fire fighter phone jacks and other device control with Class B or Class A wiring supervision.

b) This type of addressable device will provide double-pole, double-throw relay switching that can be used to connect through easily replaceable 2-amp fuses: a zone of signals to a power source, speakers to an audio source, fire fighter phone jacks to a communications channel, or activate a variety of controlled devices. The module will be available in either a Class B or Class A supervision version. In the Class B version, the wiring will be supervised by an end-of-line device. In the Class A version, the wiring will be looped back and connected to the module to allow continual operation of the controlled devices even if the wiring sustains a single break. Class B devices will be provided. These ZAMs will communicate the supervised wiring status (normal, trouble) to the fire alarm control panel and will receive a command to transfer the relay from the fire alarm control panel.

2) Zone Adaptor Module. For non-supervised control - Simplex Type 2190-9163. This type of addressable device will provide double-pole, double-throw relay switching for loads up to 120 VAC. It will contain easily replaceable 2-amp fuses, one on each common leg of the relay.

f. The ZAM shall be supervised and uniquely identified by the control panel. Device identification shall be transmitted to the control panel for processing according to the program instructions. Should the ZAM become non-operational, tampered with, or removed, a discrete trouble signal, unique to the device, shall be transmitted to, and annunciated at, the control panel.

g. The ZAM shall be capable of being programmed for its "address" location on the addressable device initiating circuit. The ZAM shall be compatible with addressable manual stations and addressable detectors on the same addressable initiating circuit.

8. Addressable Device Supervision:

a. All devices shall be supervised for trouble conditions. The system control panel will be capable of displaying the type of trouble condition (open, short, device missing/failed).

b. Should a device fail, it will not hinder the operation of other system devices.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide and install the system in accordance with the plans and specifications, all applicable codes and the manufacturer's recommendations. All wiring shall be installed in strict compliance with all the provisions of NEC article 760 A and C, Power-Limited Fire Protective Signaling Circuits or if required may be reclassified as non-power limited and wired in accordance with NEC-Article 760 A and B. Upon completion, the contractor shall so certify in writing to the owner and general contractor.

1. All junction boxes shall be sprayed red and labeled "Fire Alarm." Wiring color code shall be maintained throughout the installation.

B. Installation of equipment and devices that pertain to other work in the contract shall be closely coordinated with the appropriate subcontractors.

C. The contractor shall clean all dirt and debris from the inside and the outside of the fire alarm equipment after completion of the installation.

D. The manufacturer's authorized representative shall provide on-site supervision of installation.

E. All wiring shall be installed in conduit.

3.2 TESTING

A. The completed fire alarm system shall be fully tested in accordance with NFPA-72 by the contractor in the presence of the owner's representative and the local Fire Marshal. Upon completion of a successful test, the contractor shall so certify in writing to the owner and general contractor.

3.3 WARRANTY

A. The contractor shall warrant the completed fire alarm system wiring and equipment to be free from inherent mechanical and electrical defects for a period of one (1) year from the date of the completed and certified test or from the date of first beneficial use.

B. The equipment manufacturer shall make available to the owner a maintenance contract proposal to provide required inspections and tests per year in compliance with NFPA-72, Chapter 14 guidelines.

END OF SECTION

SECTION 31 23 00 - EXCAVATION AND FILL FOR STRUCTURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Earthwork beneath building, picnic pavilion, and structure footprints is anticipated to consist of shallow stripping, subgrade preparation, proofrolling, and controlled fill placement only.

2. The provisions of this Section related to limitations on excavation depth, treatment of compressible soils, and exclusion of differing site conditions apply exclusively to building, picnic pavilion, and structure footprints and do not apply to adjacent sidewalks, pavements, roadways, parking areas, utilities, or other site improvements.

3. Conditions described in the Geotechnical Report, including the presence of compressible or weak soils at depth, are acknowledged as known project conditions and shall not be considered unforeseen or concealed for purposes of adjustment under the Contract.

1.03 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation. Soil material shall meet the requirements as specified by the geotechnical report.

B. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill. Soil material shall meet the requirements as specified by the geotechnical report.

C. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated. Limits of removal shall be as directed by the geotechnical report.

D. Fill: Soil materials used to raise existing grades. Soil material shall meet the requirements as specified by the geotechnical report.

E. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

F. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

G. Building Footprint: Area directly beneath buildings, picnic pavilions, and other structural elements supported on foundations or slabs-on-grade, excluding adjacent sidewalks, pavements, roadways, parking areas, and other site improvements.

1.04 INFORMATIONAL SUBMITTALS

A. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:

1. Classification according to ASTM D 2487.
2. Laboratory compaction curve according to ASTM D 1557.

B. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earth moving operations. Submit before earth moving begins.

1.05 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations. Coordinate with Civil plans.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.

C. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, specified in are in place.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations. Soil material shall meet the requirements as specified by the geotechnical report.

B. Satisfactory Soils: Soil Classification Groups CL, GW, GP, GM, SW, SP, SM, and SC according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter. Soil Classification Group SC (Clayey Sand classified as an A-2-4 material by AASHTO Soil Classification system) may be used; however, this material is moisture sensitive and may require greater efforts (than other satisfactory soils) to process

and compact. Soil material shall meet the requirements as specified by the geotechnical report.

C. Unsatisfactory Soils: Soil Classification Groups GC, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
   1. Unsatisfactory soils also include satisfactory soils not maintained within 3% of optimum moisture content at time of compaction.

D. Engineered Fill: Refer to Geotech Report Section 6.3.3 Table 5 for fill material properties under building.

E. Sand: ASTM C 33; fine aggregate.

PART 3 - EXECUTION

3.01 PREPARATION

A. Protect structures and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.

B. Protect and maintain erosion and sedimentation controls during earth moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.02 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
   1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.03 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for removal of obstructions. Excavation beneath building and structure footprints shall be limited to removal of unsuitable surface or near-surface soils necessary to achieve stable subgrade conditions at design elevations.

B. Excavation into deeper natural soils identified as compressible in the Geotechnical Report is expressly excluded unless specifically directed in writing by the Geotechnical Engineer. Excavation performed beyond the limits described herein without prior written authorization from the Geotechnical Engineer and Architect shall be at the Contractor’s sole risk and expense.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials, replace with satisfactory soil materials.

C. Where unstable soils extend beyond practical excavation limits, stabilization shall be achieved using bridge lifts or other approved methods rather than continued excavation.

D. If unstable near-surface soils are encountered within building and structure footprints, as evidenced by pumping, yielding, or instability during proofrolling or compaction, the Geotechnical Engineer shall evaluate the condition and may direct localized muck-out or alternative stabilization measures.

E. Quantities and locations of any directed muck-out cannot be predetermined and are not included in the base bid.Limitations on excavation depth and requirements for stabilization methods described herein are applicable only to excavation within building and structure footprints. Excavation associated with sidewalks, pavements, roadways, parking areas, and other site improvements shall be governed by applicable Civil Drawings, specifications, and geotechnical recommendations specific to those elements.

3.04 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

3.05 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.06 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:
1. Construction below finish grade including, where applicable, sub-drainage, damp-proofing, waterproofing, and perimeter insulation.
2. Removing concrete formwork.
3. Removing trash and debris.
4. Removing temporary shoring and bracing, and sheeting.
5. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.07 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material unless otherwise directed by the geotechnical report.

B. Place and compact fill material in layers per the requirements of the geotechnical report to required elevations.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.08 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers unless otherwise directed by the geotechnical report..

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Each lift within the uppermost 2 feet beneath pavements and slabs or within the uppermost 3 feet below footings should be compacted to at least 95% of its maximum dry density within +/-3% of optimum water content in accordance with ASTM D 698, unless otherwise directed by the geotechnical report.. Structural fill or backfill placed with the top lift more than 2 feet below the proposed pavements or slabs, and more than 3 feet below any proposed footings, should be compacted to at least 95% of its maximum dry density near optimum moisture in accordance with ASTM D 698, unless otherwise directed by the geotechnical report.

3.09 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between adjacent existing grades and new grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.10 FIELD QUALITY CONTROL

A. Testing and Inspecting: A Special Inspector shall be employed by the Owner to perform inspections per Section 1704 and Section 1705 in accordance with the International Building Code. A Testing Agency shall be employed per Section 1703 in accordance with the International Building Code to perform field tests as required and outlined in the Contract Documents.
   1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
   2. Determine that fill material and maximum lift thickness comply with requirements.
   3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.

B. Testing Agency: The testing agency shall meet the requirements of ASTM E 329, Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.

C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM 2937 or ASTM D 6938, as applicable.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; re-compact and retest until specified compaction is obtained.

3.11 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and re-compact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.12 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 31 23 19
DEWATERING

1.0 GENERAL

1.1 This Section shall include supplying materials, equipment, services, and labor necessary to prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area. The Contractor shall dewater and dispose of the water so as not to cause injury to public or private property, or to cause a nuisance or a menace to the public. It shall be the sole responsibility of the Contractor to have adequate equipment and personnel at the site at all times to comply with these requirements.

1.2 RELATED SECTIONS

01 72 00	General Conditions
31 23 33	Earthwork, Excavation, and Backfill for Utilities.

1.3 MEASUREMENT AND PAYMENT

Payment shall be included as part of the appropriate lump sum or unit price item in the Bid. Any Work associated with this Section shall be considered incidental, unless a specific line item has been provided in the Bid Form.

1.4 SUBMITTALS

The following shall be submitted in accordance with the General Conditions, in sufficient detail to show full compliance with the specification:

SD-01 Pre-construction: Prior to beginning dewatering operations, the Contractor shall submit, in writing to the Engineer, his proposed plan to comply with the requirements of this Section. Submittal shall contain proposed equipment, methods of conveyance, and discharge point for water removed from excavations.

1.5 PROJECT/SITE CONDITIONS

1.5.1 Existing Conditions

1.5.1.1 Logs of soil borings that are contained in these Contract Documents, if available, briefly address ground water levels. These soil borings were taken for design purposes and informative purposes and should not be considered to be 100% representative of all locations within the project limits..

2.0 PRODUCTS (NOT USED)

3.0 EXECUTION

3.1 INSTALLATION

3.1.1 The Contractor shall install all equipment necessary for dewatering. He shall have on hand, at all times, sufficient pumping equipment and machinery in good working condition and shall have available, at all times, competent workmen for the operation of the pumping equipment. Adequate standby equipment shall be kept available at all times to insure efficient dewatering and maintenance of dewatering operation during power failures.

3.1.2 The Contractor is responsible for providing whatever equipment is necessary to adequately dewater the sites in accordance with the requirements of this section, should that equipment be wells, wellpoints, sump pumps, or other operations of the Contractor’s choosing.

3.2 PERFORMANCE

3.2.1 The control of groundwater shall be such that softening of the bottom of excavations or formation of unstable conditions during excavation shall be prevented. Contractor shall develop and implement dewatering systems to prevent erosion of the natural soils.

3.2.2 During excavation, construction of structures, installation of pipelines and sewers, placement of the structure and trench backfill, and the placing and setting of concrete, excavations shall be kept free of water. The Contractor shall control surface runoff to prevent entry or collection of water in excavations. The static water level shall be controlled in the vicinity of the excavation to maintain the undisturbed state of the foundation soils and allow the placement of any fill or backfill to the required density. The dewatering system shall be installed and operated so that the groundwater level outside the excavation is not altered to an extent that would damage or endanger adjacent structures or property.

3.3 RELEASE OF GROUNDWATER

3.3.1 The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted backfill, and prevent flotation or movement of structures, pipelines, and sewers.

*** END OF SECTION ***

SECTION 31 23 33
EARTHWORK, EXCAVATION, AND BACKFILL FOR UTILITIES

1.0 GENERAL

1.1 The Work IN this Section shall include furnishing all materials, equipment, and labor necessary for performing all excavating, bedding, backfilling, compaction, grading, and disposing of earth materials required for installing underground piping, culverts, and associated appurtenances as shown on the Drawings and specified herein. All temporary means needed to prevent discharge of sediment to water courses because of dewatering systems or erosion are included.

1.2 RELATED SECTIONS
MDOT Section 201, Clearing and Grubbing
Section 33 11 00, Pipe Installation
Section 31 23 19, Dewatering

1.3 MEASUREMENT AND PAYMENT

Payment for Work in this Section will not be measured separately for payment but shall be included in the unit price/lump sum price of the water or sewer piping being installed.

1.4 REFERENCES

The publications listed below form part of this specification. Each publication shall be the latest revision and addendum in effect on the date this specification is issued for construction unless noted otherwise. Except as modified by the requirements specified herein or the details of the drawings, Work included in this specification shall conform to the applicable provisions of these publications. The work, materials, and related activities shall be in accordance with the latest standards of the American Water Works Association (AWWA), American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), Uni-Bell Pipe Association, Mississippi Department of Health, Mississippi Department of Environmental Quality, and any other related State or Federal standards or requirements.

ASTM A 36, Structural Steel.
ASTM A 328, Steel Sheet Piling
ASTM D 422, Particle-Size Analysis of Soils
ASTM D 423, Liquid Limit of Soils
ASTM D 424, Plastic Limit and Plasticity Index of Soils
ASTM D 448, Standard Sizes of Aggregate for Road and Bridge Construction
ASTM D 698, Moisture-Density Relations of Soils, Using 5.5 lb (2.5 kg) Rammer and 12 inch (304.8 mm) Drop
ASTM D 1556, Density of Soil in Place by the Sand-Cone Method
ASTM D 2487, Classification of Soils for Engineering Purposes
ASTM D 2922, Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

1.5 SUBMITTALS

The following shall be submitted in accordance with the General Conditions, in sufficient detail to show full compliance with the specification:

SD-01 Samples: The CONTRACTOR shall submit samples of all general and select backfill and fill, and pipe bedding materials required.

1.6 QUALITY ASSURANCE

1.6.1 Tests:

1.6.1.1 The Contractor shall retain the services of a qualified testing laboratory to make tests and determine acceptability of the soil as listed below.

1.6.2 The Contractor shall give full cooperation to the testing lab personnel so that the required soil tests can be taken in an efficient and timely manner.

1.6.3 Required Tests:

1.6.3.1 Select Fill and Backfill Samples:
1. Gradation, ASTM D 422
2. Liquid Limit, ASTM D 423
3. Plastic Limit and Plasticity Index, ASTM D 424

1.6.3.2 Compacted Select Fill and Backfill: Compaction, ASTM D 698

1.6.4 Permits and Regulations:

1.6.4.1 The Contractor shall obtain any necessary permits for work in roads, rights-of-way, railroads, etc. which have not already been obtained by Owner.

1.6.5 The Contractor shall obtain permits as required by local, state and federal agencies for discharging water from excavations to rivers and streams.

1.6.6 The Contractor shall perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

1.7 JOB CONDITIONS

1.7.1 Subsurface Information:

1.7.1.1 Test borings and other exploratory operations may be made by Contractor at no cost to Owner.

1.7.1.2 Existing Structures and Utilities:

1.7.1.2.1 Shown on the Drawings are certain surface and underground structures adjacent to the Work. This information has been obtained from existing records. It is not guaranteed to be correct or complete and is shown for the convenience of the Contractor. Contractor shall explore ahead of the required excavation to determine the exact location of all structures. All structures shall be supported and protected from injury by the Contractor. If they are broken or injured, they shall be restored immediately by the Contractor at his expense.

1.7.1.2.2 The Contractor shall locate existing underground utilities in the areas of Work. If utilities are to remain in place, the Contractor shall provide adequate means of protection during earthwork operations. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult the Engineer immediately for directions as to procedure. Cooperate with the Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

1.7.2 Do not interrupt existing utilities serving facilities occupied and used by the Owner or others, except when permitted in writing by the Engineer and then only after acceptable temporary utility services have been provided.

1.7.3 If it is determined that existing utilities are to be relocated by the Owner, the Contractor shall be responsible for the coordination of the relocation. Contractor shall notify utility owner in sufficient time to avoid delays to the Contractor's schedule.

1.7.4 Use of Explosives: Not permitted on the job site.

1.8 PROTECTION OF PROPERTY:

1.8.1 Barricade open excavations occurring as part of this Work and post with warning lights.

1.8.2 Operate warning lights during hours from dusk to dawn each day and as otherwise required.

1.8.3 Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

1.8.4 Protect work from ground and surface water which may damage work or infrastructure. Locate existing underground utilities prior to work. Underground utilities which are to remain shall be protected from damage. Damaged infrastructure shall be replaced at no expense to the Owner.

1.9 POLLUTION CONTROL

1.9.1 The Contractor shall take all necessary precautions and measures to control, minimize, and remedy the generation of objectional dust or materials/spoils spillage. Such measures shall include but not be limited to water spraying of aggregate stockpiles, tarpaulin-covered truck beds, minimizing of mud tracking by haul vehicle tires, and maintenance/cleaning of access roads, entry areas, and connecting roadways. No separate payment will be made for control of dust and materials/spoils spillage.

1.9.2 The Contractor shall clean adjacent structures and improvements of all dust, dirt, and debris caused by operations as directed by the Owner's Representative. Areas shall be returned to conditions existing prior to the start of work.

1.9.3 The Contractor shall provide stone roadways on site and for exiting the site when necessary to prevent tracking of mud and debris onto roadways.

1.9.4 Dust Control: Conduct all operations and maintain the area of activities, including sweeping sprinkling of roadways, so as to minimize creation and dispersion of dust. Use calcium chloride to control serious or prolonged dust problems.

2.0 PRODUCTS

2.1 SOIL MATERIALS

2.1.1 Select Backfill and Fill Material

2.1.1.1 Select Backfill of trenches material shall be Class II, or III as classified by ASTM D2321.
a. Class II shall be coarse-grained soils borderline clean to with fines. (e.g. GW-GC, SP-SM)
b. Class III shall be coarse grained soils with fines. (e.g. GM, GC, SM & SC)

2.1.1.2 Select Fill: Class B5 per the Mississippi Standard Specifications for Road and Bridge Construction, 2004 edition, unless otherwise noted on drawings.

2.1.2 General Backfill and Fill Material: Provide approved soil materials for backfill and fill that meet the following requirements.

2.1.2.1 Free of clay, rock or gravel larger than 6" in any dimensions, debris, waste, frozen materials, vegetable and other deleterious matter.

2.1.2.2 Fill shall consist of any non-organic soil, free of debris and capable of being placed and compacted to the specified densities.

2.1.2.3 Unsuitable soil material shall include soils which contain: vegetative matter, sod, roots, rubbish, highly clay soils of the CH and MH descriptions, borderline soils of SH-CH descriptions, and organic soils.

2.1.3 Structure Foundation Material: Material used for foundations under manholes, wetwells and other structures shall be size 67 as specified in the "Mississippi Standard Specifications for Road and Bridge Construction", 2004 Edition.

2.1.4 Driveway Material: Material used for temporary driveway repair or access drives shall be size 57 or 67 as specified in the "Mississippi Standard Specifications for Road and Bridge Construction", 2004 Edition.

2.1.5 Flowable Backfill: Flowable Backfill shall be used only as directed by the Engineer and shall be made from a cement mixture of cement (ASTM C150, Type II), sand (ASTM C33), Fly Ash (ASTM C613, Class C) and water. The compressive strength of the flowable backfill shall not exceed 500psi. When flowable backfill is used to abandon a structure within the roadway a penetration resistance test (ASTM 403) will be required to assess the setting and early strength development of the backfill.

2.1.6 Pipe Bedding:

2.1.6.1 Select bedding material used around and under flexible and rigid pipes shall be Class IB as classified by ASTM D2321, conforming to the gradation set out below, unless otherwise approved by the Owner or as recommended by the pipe manufacturer:

Sieve Size	**% Passing by Weight**
1 ½"	100%
No. 4	≤ 50%
No. 200	< 5%

In addition, should ground water be encountered in the trench, the Class IB material shall be provided as a filter material in accordance with Section XI.8 of ASTM D2321 and shall have the following gradation requirements:

1. D15/d85 < 5 where D15 is the sieve opening size passing 15% by weight of the coarser material (bedding) and d85 is the sieve opening size passing 85% by weight of the finer material.
2. D50/d50 < 25 where D50 is the sieve opening size passing 50% by weight of the coarser material (bedding) and d50 is the sieve opening size passing 50% by weight of the finer material.
3. If the finer material is a medium to highly plastic clay without sand or silt partings (CL or CH) then the following criteria may be used in lieu of the above:

D15 < 0.02, where D14 is the sieve opening size passing
15% by weight of the coarser material.

3.0 EXECUTION

3.1 INSPECTION

The Contractor will examine the areas and conditions under which excavating, filling, and grading are to be performed and notify the Engineer of conditions the Contractor may find that are detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in an acceptable manner.

3.2 SITE PREPARATION

3.2.1 Clear all areas to be occupied by permanent construction of all trees, brush, roots, stumps, logs, wood, and other materials and debris in accordance with MDOT Section 201. Subgrades for fills shall be cleaned and stripped of vegetation, sod, topsoil, and organic matter. Infrastructure shall be staked in the field prior to installation. At a minimum, stake work lines, property lines, easements, and rights-of-way.

3.2.2 Lay out and maintain grade stakes as required. Reference layout work to base lines, property lines, easement and/or right-of-way as indicated.

3.2.3 Where new grades tie into existing grades, verify existing grades. If existing conditions are at variance with the Drawings, notify the Engineer before proceeding with the Work and make adjustments only as directed by the Engineer.

3.2.4 The Engineer shall approve all fill materials. The Contractor shall remove from site any Contractor supplied material found unsuitable by Owner at no additional cost to the Owner.

3.3 TEST PITS

3.3.1 Where ordered by the Engineer, the Contractor shall excavate and backfill, in advance of construction, test pits to determine conditions or location of existing facilities.

3.3.2 The Contractor shall perform all work required in connection with excavating, stockpiling, maintaining, sheeting, shoring, backfilling and replacing pavement for the test pits.

3.3.3 Test pits made by the Contractor for his own use at his option shall not be a pay item.

3.4 EXCAVATION

3.4.1 General

3.4.1.1 Scope: Perform all excavation required to complete the Work as shown and specified.

3.4.1.2 Excavated Materials: Earth, sand, clay, gravel, hardpan, boulders not requiring drilling or jackhammering to remove, decomposed rock, pavements, sediment, rubbish and all other materials within the excavation limits.

3.4.1.3 Excavation shall be carried to the contours and dimensions indicated on plans and typical sections in the Drawings. Excavations shall be kept free from water while construction therein is in progress. All excavated material which is unsatisfactory for backfill or site grading shall be removed from the site. In the event it is necessary to excavate unsuitable material in addition to that specified or indicated, the Owner shall be notified and a negotiated adjustment in the contract price made, in accordance

with the Contract, prior to excavations. Excavations carried below the depths indicated, without specific directions, shall, except as otherwise specified, be backfilled to the proper grade with suitable material and compacted as specified hereinafter; all at the Contractor's expense.

3.4.1.4 In excavations below the water table, it shall also be the Contractor's responsibility to provide adequate dewatering of excavations at no extra cost to the Owner.

3.4.2 Structures and Pipelines:

3.4.2.1 Excavations: Open excavations shall be shored and braced where necessary. All open excavation shall comply with current OSHA requirements.

3.4.3 Dewatering:

3.4.3.1 Placement Below Groundwater Table: Use well points, cofferdams or other acceptable methods to permit construction of said structure or pipeline under dry conditions.

3.4.3.2 Structural Excavations and Pipelines: Maintain dry conditions until concrete for foundations has reached sufficient strength to withstand earth and hydrostatic loads and until the pipelines are properly jointed, tested, and backfilled.

3.4.3.3 Water Level: Maintain water level below trench bottom at all times to provide a stable surface for construction operations, a stable subgrade for the permanent work, and to prevent damage to the work.

3.4.3.4 Under no conditions shall water be permitted to stand in the bottom of an excavation for more than 24 hours.

3.4.3.5 Prevent surface and subsurface water from flowing into excavations and flooding adjacent areas. Remove all water entering excavations as fast as it collects.

3.4.3.6 The use of sanitary sewers for disposal of water from dewatering operations is prohibited.

3.4.3.7 Dispose of all water removed from the excavations in such a manner as not to endanger public health, property or any portion of the work.

3.4.3.8 See Section 31 23 19, Dewatering for additional requirements.

3.4.4 Footings:

3.4.4.1 Consider the elevation of the bottom of footings shown are approximate and the Engineer may order such changes in dimensions and elevations as may be required to secure a satisfactory footing.

3.4.4.2 Hand trim all structure excavations to permit the placing of full widths and lengths of footings on horizontal beds. Rounded and undercut edges will not be permitted.

3.4.4.3 When excavations are made below the required grades, without the written order of the Engineer, backfill with compacted gravel or concrete as directed by the Engineer at the expense of the Contractor.

3.4.5 Pumping: Pump excavations in such a manner to prevent the carrying away of unsolidified concrete materials and to prevent damage to the existing subgrade.

3.4.6 Size of Excavations: Extend excavation sufficiently on each side of structures, footings, and all other similar items, to permit setting of forms, installation of sheeting, the safe sloping of banks, and all other similar activities.

3.4.7 Subgrades:

3.4.7.1 Subgrade Requirements for Fill Areas, Roadways, Structures and Trench Bottoms:

a. Strong, dense, and thoroughly compacted and consolidated
b. Free from mud, muck and other soft or unsuitable materials
c. Remain firm and intact under all construction operations
d. The Contractor shall excavate to the lines and grades shown on plans and typical sections in the Drawings

3.4.7.2 All subgrades shall be proof-rolled with a loaded dump truck or other suitable equipment approved by the ENGINEER. Any area that "pumps" is considered a soft subgrade and shall be corrected as specified in paragraph 3.04.G.3.

3.4.7.3 Soft Subgrades: Subgrades which are otherwise solid, but which become soft or mucky on top due to construction operations, shall be removed and replaced or processed to establish a stable surface or overlay with geotextile fabric prior to placement of crushed stone or gravel. Soft area shall be proof-rolled after corrective action has been taken. Geotextile fabric shall be manufactured by one of the following: 1.) Marifi 600x by Marifi, Inc; 2.) Typar Style 3601 by Dupont Co.; or 3.) equal. Install fabric per manufacturer's recommendations.

3.4.7.4 Use "Mud-Mat" for subgrades as shown on the drawings.

3.4.7.5 All submerged roots, stumps, or other perishable matter encountered in the preparation of the subgrade shall be completely removed down to natural undisturbed soil and backfilled in controlled compacted lifts with fill material.

3.4.7.6 After the subgrade has been prepared as specified above, it shall be maintained in such condition so as to drain. If damaged by the Contractor's subsequent operations, the subgrade shall be scarified and recompacted. Subsequent courses shall not be placed until the subgrade has been approved by the Engineer.

3.4.7.7 Finished Elevation of Stabilized Subgrades: Do not place finished elevation of stabilized subgrades above subgrade elevations shown on the Drawings.

3.4.8 Pipe Trench Excavation and Preparation:

3.4.8.1 Trenches shall be excavated so that pipes can be laid straight at uniform grade, without dips or humps, between the terminal elevations indicated on the drawing. Pressure Sewer Force Mains shall be installed as to alleviate high points along the pipe alignment except where shown on the drawings.

3.4.8.2 The Contractor shall not open more trench in advance of culvert or pipeline laying than is necessary to expedite the Work nor shall unfilled trench be more than can be properly backfilled at the end of each workday. Furthermore, the maximum length of trench left open shall not exceed 100′.

3.4.8.3 Except where jacking and boring or directional drilling is indicated on the drawings, is specified, or is permitted by the Engineer, all trench excavation shall be open cut from the surface.

3.4.8.4 Alignment, Grade, and Minimum Cover: The Alignment and grade or elevation of each pipeline shall be as indicated on the Contract Drawings. Vertical and horizontal alignment of pipes and the maximum joint deflection used in connection therewith, shall be in conformity with requirements of the section covering installation of pipe. Where culvert or pipeline grade or elevation are not

definitely fixed by the Contract Drawings, trenches shall be excavated to a depth sufficient to provide a minimum depth of backfill cover over the top of the pipe of 36″.

3.4.8.5 Minimum Trench Width. Trenches shall be excavated to a width which will provide adequate working space and sidewall clearances for proper culvert installation, jointing, and embedment. Minimum trench widths from the bottom of the trench to an elevation 12″ above the top of the installed culvert shall be as shown on the plans. Trench width shall be minimized to the greatest extent practical but shall conform to the following:

a. Sufficient to provide room for installing, joining and inspecting piping, but in no case wider at top of pipe than barrel O.D. plus two feet.
b. Enlargements at pipe joints may be made if required and approved by the Engineer.
c. Sufficient to allow thorough compaction of the pipe bedding materials.
d. Excavating equipment which requires the trench to be excavated to excessive width shall not be used.

3.4.8.6 Mechanical Excavation. The use of mechanical equipment will not be permitted in locations where its operation would cause damage to trees, buildings, culverts, or other existing property, utilities, or structures above or below ground. In all such locations, manual excavating methods shall be used.

3.4.8.7 Mechanical equipment used for trench excavation shall be of a type, design, and construction, and shall be so operated that the rough trench excavation bottom elevation can be controlled, that uniform trench widths and vertical sidewalls are obtained at least from an elevation one foot above the top of the installed culvert or pipeline to the bottom of the trench, and the trench alignment is such that culvert or pipeline when accurately laid to specified alignment will be centered in the trench with adequate clearance between the culvert and sidewalls of the trench. Undercutting the trench sidewall to obtain clearance will not be permitted.

3.4.8.8 Cutting Surface Construction. Cuts in asphalt and concrete pavement and base pavements shall be no larger than necessary to provide adequate working space for proper installation of culvert or pipeline and appurtenances. Pavement and base pavement over trenches excavated for culvert lines shall be removed so that a shoulder not less than 6″ in width at any point is left between the cut edge of the pavement and top edge of the trench. Trench width at the bottom shall not be greater than at the top and no undercutting shall be permitted. Pavement cuts shall be made to and between straight or accurately marked curved lines which, unless otherwise required, shall be parallel to the centerline of the trench.

3.4.8.9 Pavement removed for connections to existing lines or structures shall not be of greater extent than necessary for the installation.

3.4.8.10 Where the trench parallels the length of walks and trench location is all or partially under the walk, the entire walk shall be removed and replaced. Where the trench crosses drives, walks, curbs, and other surface construction, the surface construction shall be removed and replaced between existing joints or between saw cuts as specified for pavement.

3.4.8.11 Excavation Below Pipe Subgrade. Only as directed by the Engineer, pipe trenches shall be excavated below the underside of the pipe to provide for the installation of pipe embedment material.

3.4.8.12 Artificial Foundations in Trenches. Whenever unsuitable or unstable soil conditions are encountered, trenches shall be excavated below grade and the trench bottom shall be brought to grade with additional embedment material. All timber, concrete, or other foundations made necessary by unstable soil shall be installed as indicated on the drawings or directed by the Engineer.

3.4.8.13 Bell Holes. Bell holes shall provide adequate clearance for tools and methods used in installing pipe. No part of any bell or coupling shall be in contact with the trench bottom, trench walls, or embedment material when the pipe is jointed.

3.4.8.14 Excavation to Remove Stumps, etc. If any stumps, roots logs or other hard solid masses of matter are encountered at or near the authorized subgrade within the trench area, such stumps, or other material shall be cut or removed to a further depth of 2′ feet, unless otherwise authorized by the Engineer. The Contractor shall fill this excavated space with embedment material as specified herein elsewhere. No additional compensation shall be made for this work.

3.4.8.15 When so required by the Engineer, the Contractor shall probe 2′ below the established bottom of the trench and if any stumps, roots logs, etc., are discovered by this probing, the Contractor shall cut them out just as if they had been visible in the trench.

3.4.8.16 Where pipe is laid in rock, provide a minimum of four (4) inches of bedding under pipes smaller than four (4) inches in nominal diameter and a minimum of six (6) inches of bedding under pipes four (4) inches and larger in nominal diameter.

3.4.9 Material Storage:

3.4.9.1 Stockpile satisfactory excavated materials in approved areas, until required for backfill or fill.

3.4.9.2 Place, grade and shape stockpiles for proper drainage.

3.4.9.3 Locate and retain soil materials away from edge of excavation.

3.4.9.4 Dispose of excess soil and waste materials as specified hereinafter.

3.4.10 Unsuitable Material: Where the existing material beneath the subgrade or trench is considered unsuitable by the Engineer, remove and replace it with select fill, backfill or bedding material.

3.5 UNAUTHORIZED EXCAVATION

3.5.1 Limits: All excavation outside the lines and grades shown on the Drawings.

3.5.2 Responsibility: All unauthorized excavation together with the removal and disposal of the associated materials is at the Contractor’s expense.

3.5.3 Backfill and compact the unauthorized excavation with select backfill and at the Contractor’s expense.

3.6 BACKFILL, FILL AND EMBANKMENTS

3.6.1 General: Furnish, place and compact all backfill required for embankments and trenches as required to provide the finished grades as required by the project plans and the Engineer. Select backfill and fill shall be installed as support for structure foundations, where the contractor excavates below design subgrade, around and below wetwells, manholes, and valve vaults, in utility trenches through pavements, or as directed by the Engineer. General backfill and fill shall be installed in all other locations, unless select fill or backfill is required by the Engineer. Backfill and fill shall be brought up in even lifts on all sides and around structures and piping.

3.6.2 Backfill and fill shall only be placed on level, dry and firm subgrades approved by the Engineer. No fill or backfill shall be placed if water is on the surface of the area to receive the fill or backfill. No fill or backfill shall be placed in a frozen condition or on top of frozen subgrade or previously placed material. All excavations shall be backfilled promptly as work permits but not until the following are completed:

1. Construction below finish grade including dampproofing, waterproofing, and meter insulation.
2. Inspection, testing, approval, and recording of locations of underground utilities.
3. Removal of concrete formwork.
4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials.
5. Removal of trash and debris.
6. Permanent or temporary horizontal bracing is in place on horizontally supported structures.

3.6.3 If pipes are installed in fill sections, prior to installation of the pipe fill shall be placed and compacted until it is a minimum of two (2) feet above the top of the proposed pipe. The fill shall then be excavated for the trench width and the pipe installed and backfilled. Then the remainder of the fill shall be placed.

3.6.4 Place fill and backfill in horizontal loose lifts not exceeding 6 inches in thickness and mix and spread in a manner assuring uniform lift thickness after placing. Compact each layer of fill or backfill before placement of the next layer.

3.6.5 Control the water content of fill and backfill material during placement within the range necessary to obtain the compaction specified. For general fill and backfill maintain the moisture content of the fill within 3 percent of the optimum moisture content for compaction as determined by laboratory tests. For select fill and backfill maintain the moisture content of the fill within 4 percentage points from the optimum moisture content of the material unless otherwise specified. Wet the fill as needed during placement to achieve moisture content for effective compaction. No compaction of fill will be permitted with free water on any portion of the fill to be compacted.

3.6.6 Remove fill and backfill containing organic materials or other unacceptable material and replace with approved fill or backfill material. Unacceptable material is material containing rubble, debris, wood, other organic matter, and unsuitable soils as described in Paragraph 2.01.B.3.

3.6.7 Compact fill and backfill by at least two coverages of all portions of the surface of each lift by compaction equipment. One-coverage is defined as the condition obtained when all portions of the surface of the fill material have been subjected to the direct contact of the compactor.

3.6.8 Follow the specified procedures for backfill around structures except that within 10 feet of foundations and underground structures, use light compaction equipment with the gross weight of the equipment not exceeding 7,000 pounds. Provide equipment that is capable of the required compaction within restricted areas next to structures and around piping.

3.6.9 Compaction:

3.6.9.1 Minimum Density for General Backfill and Fill: CONTRACTOR shall provide independent analysis to demonstrate 90 percent of maximum density obtained in the laboratory in accordance with ASTM D 698 Method C including Note 2. This percentage is of standard Proctor density.

3.6.9.2 Minimum Density for Select Backfill and Fill: The minimum density to be obtained in compacting the select backfill or fill shall be 95 percent of the maximum density obtained in the laboratory in accordance with ASTM D 698 Method C including This percentage is of standard Proctor Density.

3.6.9.3 All fill and backfill shall be tested by an independent lab during construction for compaction. At a minimum all fill shall be have one field density test for every layer for each 2500 square feet of surface area of material installed. Trench backfill shall have one field density test for each of the top 4 layers of backfill for every 500 linear feet of trench backfilled. If trench is located under pavement test shall be completed by an AASHTO certified lab and two additional tests shall be taken at different depths for every 200 linear feet of pipe located under pavement.

3.6.9.4 If the specified densities are not obtained, perform whatever work is required to provide required densities. This shall include removing unacceptable fill or backfill and replacing with compacted acceptable material at no expense to the Owner.

3.6.10 Repair any settlement that occurs during construction or within warranty period that follows acceptance of infrastructure by the Owner within thirty (30) calendar days of notification from the Owner. Repairs of settlement shall be at no expense to the Owner.

3.6.11 If subgrade is disturbed and becomes soft as a result of construction, then remove soft subgrade material and replace with compacted select backfill or fill to provide a subgrade that meets these specifications at no expense to the Owner.

3.7 EXCAVATION IN THE VICINTY OF TREES

Except where the Engineer directs or where trees are shown on the Drawings to be removed, trees shall be protected from injury during construction operations. No tree roots over 2″ in diameter shall be cut. Trees shall be supported during excavation as necessary.

3.8 GRADING

3.8.1 General:

3.8.1.1 Uniformly grade areas within limits of grading under this Section, including adjacent transition areas.

3.8.1.2 Smooth subgrade surfaces within specified tolerances.

3.8.1.3 Grade areas adjacent to structures away from the structure. **No grading shall be accepted that ponds water**.

3.8.1.4 Compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

3.8.1.5 Finished surfaces shall be free of irregular surface changes.

3.8.2 Compaction: After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

3.8.3 Place crushed stone material for foundations and driveways over prepared subgrade as required in these specifications and standard drawings. Minimum thickness of crushed stone for foundations is four (4) inches and for driveways is six (6) inches. During construction maintain lines and grades including crown and cross slope.

3.8.4 Limits: Maximum vertical deviation from grades shown on plans.

3.8.4.1 Under pavements, structures, and foundations ± 1/4"

3.8.4.2 General site grading areas ± 2"

3.8.4.3 No vertical deviation will be accepted that ponds water.

3.9 DISPOSAL OF EXCAVATED MATERIALS

3.9.1 Haul away from the project site all material removed from the excavations which does not conform to the requirements for fill or backfill or is in excess of that required for backfill.

3.9.2 Dispose of excess or unsuitable material in compliance with municipal, county, state, federal or other applicable regulations at no additional cost to the Owner.

*** END OF SECTION ***

SECTION 31 31 16 – TERMITE CONTROL

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Soil treatment with termiticide.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include the EPA-Registered Label.

B. Product certificates.

C. Soil Treatment Application Report: Include the following:

1. Date and time of application.

2. Moisture content of soil before application.

3. Brand name and manufacturer of termiticide.

4. Quantity of undiluted termiticide used.

5. Dilutions, methods, volumes, and rates of application used.

6. Areas of application.

7. Water source for application.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located.

B. Regulatory Requirements: Formulate and apply termiticides according to the EPA-Registered Label.

1.4 BUILD AMERICA, BUY AMERICA ACT (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

1. Warranty Period: **Five years** from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 SOIL TREATMENT

A. Use an emulsible concentrate insecticide for dilution with water, specially formulated to prevent infestation by termites. Fuel oil will not be permitted as a diluent. Chemicals used must be acceptable to the Division of Forest Insect Research, Forest Service, U.S.D.A., or proprietary products registered with the Pesticide Regulation Section, Plant Pest Control Branch, Agricultural Research Service, U.S.D.A. under the Federal Insecticide and Rodenticide Act, for use as a termite toxicant for which prolonged effectiveness may be anticipated. In addition, the toxicant shall be EPA registered and suitable for use under the conditions indicated.

B. Toxicant Chemical: Water based emulsion, uniform composition, **synthetic dye** to permit visual identification of treated soil.

PART 3 – EXECUTION

3.1 PREPARATION

A. General: Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.

B. Soil Treatment Preparation: Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.

3.2 APPLYING SOIL TREATMENT

A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.

1. Slabs-on-Grade / mud slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.

2. Foundations and footings: Adjacent soil including soil along the entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating the slab, and around interior column footers, piers,; also along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.

B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

D. Post warning signs in areas of application.

E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION

SECTION 32 31 19 - ORNAMENTAL STEEL GATE SYSTEM

PART 1 – GENERAL

1.1 WORK INCLUDED

A. The contractor shall provide all labor, materials and appurtenances necessary for installation of the industrial ornamental steel gate system defined herein at the mechanical equipment yard complete with hasps, locking devices.

1.2 RELATED WORK

A. Division 3 Section “Cast-in-Place Concrete

B. Division 4 Section “Masonry”.

1.3 QUALITY ASSURANCE

A. The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

1.4 REFERENCES

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

1.5 SUBMITTAL

A. The manufacturer's submittal package shall be provided prior to installation.

1. Include elevations of all gate components, material lists, connection details, etc.

1.6 PRODUCT HANDLING AND STORAGE

A. Upon receipt at the job site, all materials shall be checked to ensure that no damages occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism and theft.

1.7 BUILD AMERICA, BUY AMERICA (BABA)

A. This Project is subject to the Build America, Buy America Act (BABA), 41 U.S.C. §§ 8301–8305.

B. Domestic Manufacturing Requirements:

1. Iron and steel: All manufacturing processes, from melting through coating, shall occur in the United States.

2. Manufactured products: All manufactured products permanently incorporated into the project must be manufactured in the United States.

3. Construction materials: All manufacturing processes for construction materials shall occur in the United States.

C. Compliance Documentation:

1. Provide manufacturer's certification of domestic origin for all products.

2. Provide BABA compliance documentation with each product submittal. Refer to Section 01 33 00 Submittals.

3. Failure to provide BABA documentation will be grounds for rejection.

D. Waivers: **Waivers will not be considered.**

1.8 PRODUCT WARRANTY

A. All structural fence components (i.e. rails, pickets, and posts) shall be warranted within specified limitations, by the manufacturer for a period of 10 years from date of original purchase. Warranty shall cover any defects in material finish, including cracking, peeling, chipping, blistering or corroding.

B. Reimbursement for labor necessary to restore or replace components that have been found to be defective under the terms of manufactures warranty shall be guaranteed for five (5) years from date of original purchase.

PART 2 - MATERIALS

2.1 MANUFACTURER

A. The fence system shall conform to Ameristar Aegis II, 3-Rail style manufactured by Ameristar Fence Products, Inc. in Tulsa, Oklahoma.

B. Or equal meeting the specified requirements, subject to post-award substitution procedures in accordance with Section 01 25 00. Substitutions during bidding are not permitted

2.2 MATERIAL

A. Steel material for fence framework (i.e. tubular pickets, rails and posts), shall be galvanized prior to forming in accordance with the requirements of ASTM A653/A653M, with minimum yield strength of 45,000 psi (310 MPa). The steel shall be hot-dip galvanized to meet the requirements of ASTM A653/A653M with a minimum zinc coating weight of 0.90 oz/ft^2 (276 g/m^2), Coating Designation G-90.

B. Material for pickets shall be 1" square x 14 Ga. tubing. The cross-sectional shape of the rails shall conform to the manufacturer's ForeRunner™ double wall design with outside cross-section dimensions of 1.75" square and a minimum thickness of 14 Ga. Picket holes in the ForeRunner rail shall be spaced 4.715" o.c., except for Invincible style 6' long, which shall be, spaced 4.98" o.c. Picket retaining rods shall be 0.125" diameter galvanized steel. High quality PVC grommets shall be supplied to seal all picket-to-rail intersections. Fence posts and gateposts shall meet the minimum size requirements of Table 1.

2.3 FABRICATION

A. Pickets, rails and posts shall be precut to specified lengths.

B. The manufactured galvanized framework shall be subjected to the PermaCoat® thermal stratification coating process (high-temperature, in-line, multi-stage, multi-layer) including, as a minimum, a six-stage pretreatment/wash, an electrostatic spray application of an epoxy base, and a separate electrostatic spray application of a polyester finish. The base coat shall be a thermosetting epoxy powder coating (gray in color) with a minimum thickness of 2 mils (0.0508mm). The topcoat shall be a “no-mar” TGIC polyester powder coat finish with a minimum thickness of 2 mils (0.0508mm). The color shall be as approved by the Architect.

C. Swing gates shall be fabricated using 1.75” x 14ga Forerunner double channel rail, 2” sq. x 12ga. gate ends, and 1” sq. x 14ga. pickets. Gates that exceed 6’ in width will have a 1.75” sq. x 14ga. intermediate upright. All rail and upright intersections shall be joined by welding. All picket and rail intersections shall also be joined by welding. Gusset plates will be welded at each upright to rail intersection. Cable kits will be provided for additional trussing for all gates leaves over 6’.

2.4 HASPS AND LOCKING DEVICES

A. Hasps: Provide heavy-duty, shrouded hasps sized to suit gate stile and hardware. Hasps shall be fabricated from same material as gates with tamper-resistant mounting fasteners. Hasps shall be welded or through-bolted per manufacturer recommendations to prevent simple removal; exposed hinge/fastener heads shall be protected from unauthorized access.
B. Padlocks: Provide weather-resistant padlocks sized to match hasp shroud clearance and shackle dimension. Padlocks shall be one of the following:

1. Primary: Stainless steel body with stainless steel shackle, high-security, laminated or solid-body construction, minimum 8mm shackle diameter or manufacturer equivalent, closed-shackle model preferred.

2. Cylinder / Keying: Padlocks shall be factory keyed; provide keyed-alike set unless Owner requests master/keyed-differenting. Deliver two (2) keys per lock plus three (3) spare keys labeled and furnished to Owner. Provide key schedule with lock locations.

3. Security Features: Where additional cut-resistance is required, provide padlocks with hardened steel shackles and anti-saw/anti-shim features. Hasps shall be shrouded to minimize exposure to bolt cutters.

PART 3 - EXECUTION

3.1 PREPARATION

A. All new installation shall be laid out by the contractor in accordance with the construction plans.

3.2 FENCE INSTALLATION

A. Fence post shall be spaced according to Table 3, plus or minus ½". For installations that must be raked to follow sloping grades, the post spacing dimension must be measured along the grade. Fence panels shall be attached to posts with brackets supplied by the manufacturer. Posts shall be set in concrete footers having a minimum depth of 36" (Note: In some cases, local restrictions of freezing weather conditions may require a greater depth). The "Earthwork" and "Concrete" sections of this specification shall govern material requirements for the concrete footer. Posts setting by other methods such as plated posts or grouted core-drilled footers are permissible only if shown by engineering analysis to be sufficient in strength for the intended application.

3.0 GATE INSTALLATION

A. Gate posts shall be spaced according to the manufacturers' gate drawings, dependent on standard out-to-out gate leaf dimensions and gate hardware selected. Type and quantity of gate hinges shall be based on the application; weight, height, and number of gate cycles. The manufacturers' gate drawings shall identify the necessary gate hardware required for the application. Gate hardware shall be provided by the manufacture of the gate and shall be installed per manufacturer's recommendations.

3.5 CLEANING

A. The contractor shall clean the jobsite of excess materials; post-hole excavations shall be scattered uniformly away from posts.

END OF SECTION

SECTION 33 05 23.16
CASED CROSSINGS

1.0 GENERAL

1.1 DESCRIPTION

These Specifications shall govern the furnishing and installing of cased crossings as shown on the project plans and specified herein. The casing pipe and accessories shall be installed in accordance with the requirements of these specifications at the locations and depths indicated on the plans approved by the Owner and the governing regulatory agencies. The casing shall be of the class, size and dimensions shown thereon.

1.2 RELATED WORK SECTIONS

A. Section 31 23 33, Earthwork Excavation, and Backfill for Utilities
B. Section 33 11 00, Pipe Installation

1.3 MEASUREMENT AND PAYMENT

Payment for work in this section shall be included in the unit price / lump sum price as outlined in the Bid Form. Bid price shall include all cost of labor, materials and incidentals complete. Payment to the Contractor shall be based on the actual length of the installation, measured in place along the surface of the ground, complete and accepted. No payment shall be made for an abandoned bore.

1.4 QUALITY ASSURANCE

1.4.1 Cased crossings shall be performed by Contractors who are familiar with and experienced in such work.

1.4.2 The Contractor shall provide and maintain the principal equipment necessary to perform all of the work herein specified in an orderly manner. The equipment shall consist of approved units designed or selected to perform and expedite all of the work and incidental items of construction.

1.4.3 Reference Standards: Comply with the applicable provisions of ASTM A 139, Specification for Electric fusion (Arc) — Welded Steel Pipe

1.5 JOB CONDITIONS

Scheduling: The Contractor shall notify the Owner's Representative not less than three (3) business days in advance of commencing work. Contractor shall obtain all necessary permits and submit them to the Authority prior to commencing work. Contractor shall dispose of all fluids and other spoils to the requirements of the governing agencies. No drilling mud shall be left on site. Contractor shall provide and maintain sufficient dewatering systems should water be encountered.

2.0 PRODUCTS

2.1 CASING PIPE

2.1.1 General: For carrier pipes three (3) inches in nominal diameter and smaller, casing pipes may be either HDPE or steel as indicated on the plans and meeting the material specifications herein. For carrier pipes larger than three (3) inches in nominal diameter, casing shall be steel meeting the material specifications herein for open cut or jack and bored installations. For carrier pipes larger than three (3) inches in nominal diameter placed by directional bore, casing shall be HDPE meeting the material specifications herein.

2.1.2 High Density Polyethylene Casing Pipe: Casing material shall be extra high molecular weight high density polyethylene (PE 3408) per ASTM D 3350. Casing pipe shall meet the requirements of ASTM F714 and D3261. Casing internal diameter shall be adequate to allow for installation of carrier pipe, but the nominal diameter of the casing shall not be less than twice the nominal diameter of the carrier pipe. The casing pipe wall thickness shall be determined by the Engineer but shall not be less than DR17.

2.1.3 Steel Casing Pipe: Casing material shall be arc welded steel pipe, Grade B or better, meeting the requirements of ASTM A139 with a minimum yield strength of 35,000 psi. Casing internal diameter shall be adequate to allow for installation of carrier pipe, but the nominal diameter of the casing shall not be less than twice the nominal diameter of the carrier pipe. Casing pipe shall be coated with two coats of high build coal tar epoxy per AWWA C-210 for exterior applications, 10-12 dry mils per coat. Casing pipe minimum wall thickness shall be as approved by the governing agencies permitting the crossing but shall not be less than the thickness stated in the table below. Steel casing joints shall be welded by a certified welder.

Outside Diameter (inches)	Minimum Wall Thickness (inches)	
	Highways	Railroads*
16	0.250	0.281
20	0.250	0.281
24	0.375	0.313
30	0.375	0.469
36	0.375	0.469
42	0.500	0.562
48	0.500	0.625

*Meets A.R.E.A. Specifications for Pipelines for Conveying Nonflammable Substances

2.2 CASING SPACERS

Provide carrier pipe spacers according to AWWA specifications for each cased crossing. Spacer shell, risers, and fasteners shall be made of T304 stainless steel with PVC liner and ultra-high molecular weight polymer runners to protect the carrier and casing pipe during installation. Spacers shall be as manufactured by Cascade Waterworks or equal.

2.3 CASING END SEALS

Provide casing end seals made of 0.093" thick neoprene rubber. End seal shall be in a cone shape with a standard 20" length and fastened to the casing and carrier pipe with stainless steel bands.

3.0 EXECUTION

3.1 GENERAL

No work shall begin until all permits are obtained and all required bonds, cash deposit, and insurance are furnished to the governing agencies.

3.2 JACK AND BORE

Steel casings shall be installed by jack and bore and drilling a hole of a size no larger than one (1) inch in diameter around the outside circumference of the casing pipe. Boring shall be made with an auger inside the casing pipe with the cutting edges positioned just ahead of the pipe. Water-bearing sands and mucky soils shall be well-pointed prior to commencing the bore. Care shall be exercised to keep the auger properly positioned with respect to the casing pipe and maintain forward pressure on the casing to quickly run through any pockets of loose soil. Bore shall be completed with extreme care to maintain line and grade. Proposed line and grade shall be submitted to the Authority prior to construction. Excessive deviations from the proposed line and grade will not be accepted.

3.3 HORIZONTAL DIRECTIONAL DRILL

3.1.1 HDPE Casing shall be installed by means of Horizontal Directional Drill (HDD) per section 33 05 23.13.

*** END OF SECTION ***

SECTION 31 11 00
PIPE INSTALLATION

1.0 GENERAL

1.1 DESCRIPTION

1.1.1 These Specifications shall govern the installation of pipelines for the project. The pipelines shall be installed in accordance with the requirements of these specifications at the locations and depths indicated on the plans approved by the Owner and the governing regulatory agencies.

1.1.2 The Contractor shall perform the work necessary to furnish and install the piping specified herein as indicated on the plans and further specified in the respective Detail Piping Specifications.

1.2 QUALITY ASSURANCE

1.2.1 Comply with the requirements of the Mississippi State Department of Health, Division of Water Supply and Mississippi Department of Environmental Quality.

1.2.2 Reference Standards: The work, materials and related activities shall be in accordance with the latest standards of the American Water Works Association (AWWA), American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), Uni-Bell Pipe Association, Mississippi Department of Health, Mississippi Department of Environmental Quality, and any other related State or Federal standards or requirements.

1.3 RELATED WORK SPECIFIED ELSEWHERE

Section 31 23 33, Earthwork, Excavation, and Backfill for Utilities
Section 33 11 13, Water Distribution Piping
Section 33 31 13, Sanitary Sewage Piping

1.4 MEASUREMENT AND PAYMENT

Payment for pipe and fittings shall be included in the unit price / lump sum price per the specific piping specification: Section 33 11 13, Water Distribution Piping and Section 33 31 13, Sanitary Sewer Piping. Bid price shall include all cost of labor, materials and incidentals complete.

1.5 SUBMITTALS

The following shall be submitted in accordance with the General Conditions, in sufficient detail to show full compliance with the specification:

SD-01 Quality Control:

a. Certificates: Provide a manufacturer certificate of compliance that the materials supplied meet the requirements of these specifications.

2.0 PRODUCTS

2.1 MATERIALS

2.1.1 Pipe materials are specified under each applicable pipe material Specification Section.

2.1.2 Thrust Blocks: Shall be installed per details shown in the plans. Concrete for thrust blocks shall be a minimum of 3000 psi compressive strength at 28 days.

2.1.3 Pipe Marking:

2.1.3.1 Marking Tape: All pipelines shall be marked with underground warning tape which shall be placed approximately 12 to 18 inches below the finished grade of the pipe trench. Tape shall be a minimum of 3 inches wide with the message "CAUTION BURIED (TYPE) LINE BELOW", stating either WATER or SEWER for the type of pipeline. Tape color shall conform to the APWA Uniform Color Code.

2.1.3.2 Utility Marker Balls: All pressure pipelines shall include marker balls to precisely mark the location of underground utilities. Markers shall incorporate a different frequency for water and sewer facilities for identification. Markers shall be made of a watertight polyethylene shell colored blue for water and green for sewer. Active markers shall be programmable with a unique 10 digit ID and 256 bits of memory. Memory shall be capable of containing 6 lines with 8 characters on each line and a 13 character descriptive label. Markers shall be 3M Model 1400 Series or compatible with the Owner's current Utility Marking System. Markers shall be installed in accordance with the manufacturer's recommendations.

2.1.3.2.1 Passive Marker Balls shall be installed at a maximum spacing of 300 linear feet of continuous pipeline length for sections installed by means of open trench or directional drill.

2.1.3.2.2 Active Marker Balls shall be installed at all valves, fittings, beginning and ends of bored casings and creek or waterway crossings, and beginning and end of all directional drilled crossings.

2.1.3.3 Tracer Wire: 8 AWG Copper

2.1.3.4 Marker Posts: Marking posts shall be provided when pipelines continue in areas not adjacent to public roads and rights-of-way. Markers shall be three and a half (3 ½) inches in diameter by six (6) foot tall polymeric post. Marker shall note in UV and abrasive resistant solvent based ink "CAUTION (TYPE) PIPELINE" and the OWNER and OWNER's contact information.

3.0 EXECUTION

3.1 INSTALLATION

3.1.1 General: Install piping as shown, specified, and recommended by the manufacturer. Pipe and appurtenances shall be delivered, stored, and handled in accordance with the manufacturer's recommendations. Pipe, fittings and accessories that are cracked, damaged or in poor condition or with damaged linings will be rejected. Minimum cover over piping shall be three (3) feet unless otherwise noted. Earthwork required to be as specified in Section 31 23 33 of these specifications.

3.1.2 Maintain separation of sanitary piping from water mains in accordance with governing authorities. Sanitary sewer shall be laid at least 10 feet horizontally and 18" vertically from any water lines with water lines always located above sewer lines. All other scenarios shall be approved on a case-by-case basis.

3.1.3 Pipe Bedding and Backfill:

3.1.3.1 General: Comply with requirements of Section 31 23 33, Earthwork, Excavation and Backfill for Utilities.

3.1.3.2 Pipe Bedding: Installation of bedding requirements to be determined by Engineer based on soil conditions, pipe material, and depth of bury. The select bedding material shall be thoroughly compacted to a density at least equal to 95 percent of the maximum density determined by the Standard Proctor in accordance with ASTM D 698 Method C including Note 2, if applicable. In no case shall water be visible in the trench. Pipelines shall be installed in one of the following Trench Classification:

3.1.3.2.1 Class "D" Bedding: The pipe shall be bedded in compacted select bedding placed on a flat trench bottom. The select bedding shall have a minimum thickness of four inches under the barrel and extend to six inches above the pipe.

3.1.3.2.2 Class "C" Bedding: The pipe shall be bedded in compacted select bedding placed on a flat trench bottom. The granular bedding shall have a minimum thickness of four inches under the barrel and shall extend to three inches above the springline on cut depths up to 14 feet deep and shall extend to six inches above the top of pipe in cut depth greater than 14 feet.

3.1.3.2.3 Class "B" Bedding: The pipe shall be bedded in compacted select bedding placed on a flat trench bottom. The granular bedding shall have a minimum thickness of four inches under the barrel and shall extend to the spring line of the pipe.

3.1.3.2.4 Class “A: Bedding: The pipe shall be bedded in compacted select bedding placed on a flat trench bottom. The granular bedding shall have a minimum thickness of four inches under the barrel.

3.1.3.2.5 Or other installations as recommended by pipe manufacturer or designed by the Engineer may be approved by the Engineer depending on soil conditions, depth of bury, and materials.

3.1.3.3 Trench Backfill: Materials for backfilling pipe trenches shall be as specified in Section 31 23 33, Earthwork, Excavation, and Backfill for Utilities. Backfill shall be general or select backfill depending on the location of the trench. Initial backfill shall be installed by hand and compacted in accordance with these specifications and shall extend to six inches above the top of the pipe. Promptly after the pipe is laid, all trenches and excavation shall be backfilled and compacted by hand or pneumatic tamping until it covers the pipe at least one foot. This backfill shall be brought up and tamped equally and thoroughly along each side of the pipe in such a manner as to avoid displacement of or damage to the pipe.

3.1.3.4 Concrete Encasement: Comply with applicable provisions of Section 03 00 00 Concrete. Concrete Encasement shall be installed when piping is installed by means of open trench below creeks or other major drainage ways or as required by the Engineer on a case-by-case basis.

3.1.4 Laying Pipe:

3.1.4.1 Comply with manufacturer's instructions and with AWWA C600, AWWA M9, AWWA M23 and ASTM 2321 where applicable.

3.1.4.2 No pipe shall be brought into position until the preceding length has been bedded and secured in its final position. Install all pipe accurately to line and grade shown. Remove and relay pipes that are not laid correctly. Slope piping uniformly between elevations given. Place bell and spigot pipe so that bells face the direction of laying.

3.1.4.3 Ensure that water level in trench is at least six inches below bottom of pipe. Do not lay pipe in water. Maintain dry trench until jointing and backfilling are complete.

3.1.4.4 Excavate around joints in bedding and lay pipe so that only the barrel receives bearing pressure from the trench bottom.

3.1.4.5 Permissible deflections at joints shall not exceed 75 percent of the amount allowed by manufacturer.

3.1.4.6 Take every precaution to ensure that no foreign material enters the piping prior to and during installation. Interior of all pipe and fittings shall be inspected and all dirt, gravel, sand, debris or other foreign materials shall be completely removed from pipe interior before it is moved into the trench. Bell and spigot mating surfaces shall be thoroughly wire brushed and wiped clean and dry immediately before pipe is laid. Every time that pipe laying is not actively in progress the open ends of pipe shall be closed by a watertight plug.

3.1.4.7 All pipe and fittings shall be carefully examined for cracks, damage or other defects while suspended above the trench before installation. Defective materials shall be immediately removed from site.

3.1.4.8 Field cutting pipe, where required, shall be made with a machine specially designed for cutting piping. Cuts shall be carefully done, without damage to pipe or lining, so as to leave a smooth end at right angles to the axis of pipe. Cut ends shall be tapered and sharp edges filed off smooth. Flame cutting will not be allowed.

3.1.4.9 Blocking under piping shall be permitted only for special conditions. Comply with requirements of AWWA C600 where permitted.

3.1.4.10 Tracer Wire, Marking Tape and Utility Marker balls shall be installed per the manufacturer’s recommendation on all pressure mains.

3.1.4.11 Touch up protective coatings in a satisfactory manner prior to backfilling.

3.1.4.12 CONTRACTOR shall notify the Engineer in advance of any backfilling operation.

3.1.5 Jointing Pipe:

3.1.5.1 General: Clean completely all jointing surfaces and adjacent areas immediately before making joint. Lubricate and adjust gaskets and "O" rings as recommended by manufacturer. After "O"-rings are compressed and before pipe is brought fully home, each gasket shall be carefully checked for proper position around full circumference of the joint. Conform to AWWA C111 and to manufacturers' recommendations pertaining to jointing pipe.

3.1.5.2 Push-on Joints: Comply with AWWA C111 and to manufacturers' recommendations pertaining to jointing pipe.

3.1.5.3 Mechanical Joints: The plain end of pipe shall be centered and pushed into the bell and the gasket shall be firmly pressed evenly into the bell. The gland shall be slid to the bell for bolting. All bolts and nuts shall be heavily coated with an approved bituminous coating. All bolts with oiled threads shall be alternately torque tightened 180 degrees opposite to each other to seat the gasket evenly. The maximum torque shall be as follows:

Bolt Size (Inches)	Applied Torque (ft-lbs)
5/8	50
¾	80
1	90
1 ¼	110

3.1.5.4 Flanged Joints: Use hexagon head nuts and bolts on all flanged joints. Bolts shall project not more than 1/4-inch from nor fall short of the end of the nut. Use 1/8-inch rubber full-faced gaskets unless otherwise approved by AUTHORITY. Gaskets shall be suitable for service intended in accordance with manufacturers' ratings and instructions. Clean and lubricate bolt threads and gasket faces.

3.1.5.5 Butt Fusion: Follow manufacturer's instructions for fusion procedures.

3.1.6 Restraints, Supports and Thrust Blocks: All fittings shall be restrained by thrust blocks and mechanical joints. Install restrained joints as shown, specified, required, and as recommended by manufacturer. Provide concrete and steel, collars, thrust blocks and cradles as shown or otherwise approved by Engineer. Thrust blocks shall be poured against **undisturbed** earth. Concrete thrust blocks shall have tar paper between the concrete and the portion of the main being restrained. Concrete shall be kept clear of pipe and fitting joint and joint accessories. Thrust blocks and concrete anchors shall be poured in place and designed to withstand the forces imposed by the main being restrained. Concrete shall be allowed to cure in for a minimum of 24 hours before backfilling and 72 hours before pressure testing accordance with ACI requirements. Utilizing bags of quickcrete or equivalent and backfilling to allow concrete to set and cure over time shall not be permitted.

3.1.7 Transitions from One Type of Pipe to Another: Provide all necessary adapters, specials and connection pieces required when connecting different types and sizes of pipe or when connecting pipe made by different manufacturers.

3.1.8 Closures: Provide all closure pieces shown or required to complete the Work. Locate closures in straight runs of pipe.

3.1.9 Plastic Piping Supplementary Requirements: Follow manufacturer recommendations for jointing and ASTM D-2321 and D2774 for installation. Backfill with materials free of rocks or other sharp objects from an elevation a minimum of six inches from pipe top surface to surface of ground.

3.2 HORIZONTAL DIRECTIONAL DRILL

3.2.1 Contractor shall provide as-built drawing for any HDD to include vertical and horizontal location of the pipeline installed. Position of the pipe shall be documented in thirty (30) foot intervals for location on X, Y, and Z axis.

3.2.2 HDD shall be performed with a rig of sufficient capacity to perform the bore and pull back of the pipe. The pilot holes shall be drilled on the bore path with no deviations greater than 25% of the nominal pipe diameter. Reaming hole shall be a minimum of 25% greater than the outside diameter of the drilling pipe. Final installation shall provide a minimum of five (5) feet of cover and not establish new high points in the main. Contractor shall provide at a minimum of one test pit per bore to verify grade and alignment. For bores greater than 300 linear feet two test pits shall be provided and an additional pit for every additional 500 linear feet of bore length. Additional test pits will be performed should installation not be in compliance.

3.2.3 Installation shall be completed in a manner to eliminate the discharge of water, mud, fluid, and cutting to the adjacent waterways and property. Work areas at the entry and exit points shall be enclosed to contain unplanned spills and discharge.

3.3 WORK AFFECTING EXISTING PIPING

3.3.1 Location of Existing Piping: CONTRACTOR is responsible for determining exact location of existing piping to which he must make connections, or which he may disturb during earth moving operations, or which may be affected by his work in anyway.

3.3.2 Work on Existing Pipelines: Contractor shall install temporary plugs to keep all mud, dirt, water and debris from entering active pipelines. All necessary adapters, fittings, pipe, and appurtenances shall be supplied. Conform with applicable requirement of Section 01 19 00, Construction Adjacent to Jackson County Utility Authority Utility Systems. Contractor shall have written permission to work on an existing pipeline. A minimum of three (3) business days before scheduled work begins the contractor shall notify the Engineer in writing that he/she will commence work.

3.4 TESTING OF PIPING

3.4.1 General: Test all piping as specified in each pipe specification section below. Notify the Authority a minimum of three (3) business days in advance of testing. All tests shall be conducted in the presence of the Authority, unless otherwise approved in writing. Contractor shall keep written tabulated results of each test and provide all test results to the Authority for review and approval once testing is complete. Contractor shall provide all testing equipment including pumps, hoses, gauges, fittings, etc. to conduct the required tests. Pipelines which fail test shall be documented, repaired and retested.

3.4.2 Gravity Sewer Pipes:

3.4.2.1 Deflection Testing: Gravity sewer pipe will be tested for excessive deflection after installation. A “go, no-go” mandrel that is sized such that it will not pass a deflection greater than 5% shall be used. The mandrel shall be drawn through the pipe by hand from manhole to manhole. Irregularities or obstructions encountered in the line shall be noted with the station number/location and corrected by the Contractor. If a section of pipe with excessive deflection is found, the Contractor shall uncover the pipe for inspection noting the location and issues found. Damaged pipe will be replaced. If the pipe is undamaged, the Contractor may reinstall the bedding and backfill and retest the pipe. Mandrel test shall also be completed on gravity sewer pipe 1 month prior to end of warranty period.

3.4.2.2 Air Testing Procedure: Air testing shall be conducted for the completed gravity interceptor sewer after backfilling in accordance with Uni-Bell’s Uni-B 6. The line to be tested shall be tested between adjacent manholes. The line shall be sealed at both ends, with the seal at one end equipped with an orifice through which to pass air into the pipe. The air supply line shall contain an on-off gas valve and a pressure gauge having a range of 0 to 15 psi. The gauge shall have divisions of 0.10 psi and shall have an accuracy of 0.04

± psi. Pressurizing equipment should include a regulator or relief valve to avoid over pressuring and damaging the line being tested. Pressurize the pipe line being tested to a pressure of 4 psig. The line shall be permitted to stabilize between 4 psig and 3.5 psig for a period of no less than 5 minutes. After the stabilization period, the air supply valve should be closed. When the line pressure drops to 3.5 psig, commence timing with a stop watch. The stop watch shall be allowed to run until such time as the line pressure drops to 2.5 psig. The stop watch should be stopped and the measured time lapse compared with the allowable time lapse in the Table 1. If the measured time lapse is greater than that specified in the above table, the section undergoing testing shall have passed, and the test may be discontinued at that time. If the measured time lapse is less than that specified in the above table, the section undergoing testing has not passed the test and the CONTRACTOR shall be required to find the leaks, repair them and retest until the section passes. These repeated tests shall be performed at the CONTRACTOR's expense. The CONTRACTOR is advised to exercise extreme caution when conducting air tests to avoid injury or damage to personnel, equipment or installed pipe and appurtenances.

Table 1: Time in Min:Sec Required for Pressure To Drop to 2.5 PSIG
(Based on 0.003 CFM per Square Foot and 2.0 CFM)

Length of Test Section (ft)	Pipe Diameter (inches)						
	6	8	10	12	15	18	21
100	5:40	7:34	9:26	11:20	14:10	17:00	19:50
150	5:40	7:34	9:26	11:20	14:10	19:13	26:10
200	5:40	7:34	9:26	11:24	17:48	25:38	34:54
250	5:40	7:34	9:53	14:15	22:15	32:03	43:37
300	5:40	7:36	11:52	17:05	26:42	38:27	52:21
350	5:40	8:52	13:51	19:56	31:09	44:52	61:00
400	5:42	10:08	15:49	22:47	35:36	51:16	69:48
450	6:24	11:24	17:48	25:38	40:04	57:41	78:31

3.4.3 Pressure Pipe Test Procedure:

3.4.3.1 General: Backfill and compaction shall be completed except for any mechanical connections at fittings, valves, and service line connections shall be exposed to conduct the hydrostatic pressure and leakage test. Backfill and compact around all blocking before testing and as required to assure restraint by harnessed joints. Allow concrete for blocking to reach design strength before testing. Fill section to be tested slowly with water (maximum 1.0 fps) and expel all air. Install corporation cocks, if necessary, to remove all air. Test shall be in accordance with AWWA C600

3.4.3.2 Hydrostatic Pressure Test:

3.4.3.2.1 Maintain test pressure constantly for a four-hour period and accurately measure the amount of water which must be added to maintain the test pressure. Test pressure shall be no less than 1.50 times the normal operating pressure (minimum - 150 psi) of the system. Pressure shall not exceed the design pressure for the pipe and the system appurtenances. Test pressures required are at the lowest elevation of the pipeline section being tested unless otherwise specified. Test pressure shall not vary more than +/- 5 psi from the pressure required for the duration of the test. If at any point the test pressure varies by more than +/- psi the test is considered to be failed.

3.4.3.2.2 Hydrostatic pressure test shall be conducted on sections of line in no more than 1500 linear foot sections, unless approved by the Authority in writing for transmission mains.

3.4.3.2.3 No visible leakage shall be accepted.

3.5 CLEANING

3.5.1 All piping shall be thoroughly cleaned and flushed prior to testing. Pipes shall be flushed with clean potable water at a minimum velocity of two (2) feet per second unless otherwise stated. The Contractor shall be careful as not cause erosion or damage to the pipeline or adjacent property while flushing. Piping 24 inches diameter and larger shall be inspected from inside and all debris, dirt and foreign matter removed.

3.6 DISINFECTION OF POTABLE WATER LINES

3.6.1 Disinfect all water mains and water services. Flush piping prior to disinfection with water at a minimum velocity of 2-1/2 feet per second. Conform to procedures described in AWWA C651. Water for flushing, testing and chlorination shall be furnished and paid for by the CONTRACTOR. Chlorine will be supplied by CONTRACTOR.

3.6.2 Bacteriologic tests will be sampled by the certified water system operator for the system or a certified testing laboratory and shall be analyzed by the Mississippi Department of Health or at a laboratory approved by the Mississippi Department of Health.

3.6.3 Chlorine concentration in the water entering the piping shall be between 50 and 100 parts per million, such that a minimum residual concentration of 25 mg/l will be left after a 24-hour retention period. The operation shall be repeated as necessary to provide complete disinfection. Complete disinfection shall be defined as less than one coliform bacteria per 100 ml for samples taken on two consecutive days.

3.6.4 Water being collected for testing shall not have a chlorine residual higher than normally maintained in the water system. No chlorine shall be present which is a result of line disinfection.

*** END OF SECTION ***

SECTION 33 11 13
WATER DISTRIBUTION PIPE

1.0 GENERAL

1.1 DESCRIPTION

These Specifications shall govern the furnishing and installing of water mains and fittings for the project. The pipe and accessories shall be installed in accordance with the requirements of these specifications at the locations and depths indicated on the plans approved by the Owner and the governing regulatory agencies. The pipe and accessories shall be of the classes, sizes, and dimensions shown thereon.

1.2 QUALITY ASSURANCE

1.2.1 Source Quality Control: Obtain pipe and fittings from no more than one manufacturer.

1.2.2 Reference Standards: The work, materials and related activities shall be in accordance with the latest standards of the American Water Works Association (AWWA), American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), Uni-Bell Pipe Association, Mississippi Department of Health, Mississippi Department of Environmental Quality, and any other related State or Federal standards or requirements.

1.3 RELATED WORK SPECIFIED ELSEWHERE

Section 31 23 33 – Earthwork, Excavation, and Backfill for Utilities
Section 33 11 00 – Pipe Installation

1.4 MEASUREMENT AND PAYMENT

Payment for work in this section shall be included in the unit price / lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials and incidentals complete.

1.5 SUBMITTALS

The following shall be submitted in accordance with the General Conditions, in sufficient detail to show full compliance with the specification:

SD-01 Quality Control:
a. Certificates: Provide a manufacturer certificate of compliance that the materials supplied meet the requirements of these specifications.

2.0 MATERIALS

2.1 GENERAL

Markings: Pipe shall be marked at a maximum of 5 ft. intervals and shall include nominal size, schedule, SDR designation, or pressure class, AWWA designation, National Sanitation Foundation (where applicable), material cell classification (where applicable), and Manufacturer's name and code. All pipe shall be blue to denote for use as potable water. Ductile iron pipe and fittings shall have blue polyethylene encasement.

2.2 BURIED DISTRIBUTION MAINS

2.2.1 General: Pipe shall be either PVC or Ductile Iron meeting the specifications below. Fittings shall be ductile iron. Pipes shall be considered a Main if the nominal diameter is four (4) inches or larger. Pipes larger than twelve (12) inches in nominal diameter shall be considered transmission infrastructure and be Ductile Iron, unless shown on the plans otherwise or approved by the Engineer.

2.2.2 Ductile Iron Pipe: Pipe shall be non-flanged centrifugally cast in metal or sand lined molds manufactured in accordance with the latest edition of ANSI A21.51 (AWWA C151). Pipe shall have a minimum pressure rating of 350 psi in accordance with ANSI A21.50 (AWWA C150). Joints shall be mechanical or push-on type in accordance with ANSI A21.11 (AWWA C111). Pipe shall be coated with a factory applied bituminous coating approximately one (1) mil thick and lined with a cement-mortar lining in accordance with ANSI A21.4 (AWWA C104). Pipe shall be wrapped in a polyethylene encasement in accordance with ANSI A21.5 (AWWA C105) and installed in accordance with DIPRA Method A. Polyethylene encasement shall have a minimum thickness of 8 mils. Where joint restraints are necessary they shall be a boltless type locking gasket meeting the requirements of ANSI A21.11 (AWWA C111). Joint lubricant shall be as recommended by the pipe manufacturer. Ductile iron pipe shall be as manufactured by American Cast Iron Pipe Company or U.S. Pipe.

2.2.3 Ductile Iron Fittings: Fittings shall conform to the latest edition of ANSI A21.10 (AWWA C110) or ANSI A21.53 (AWWA C153) for compact fittings. Fittings shall have a minimum pressure rating of 350 psi in accordance with ANSI A21.50 (AWWA C150). All joints for fittings, valves, and specials shall be mechanical type in accordance with ANSI A21.11 (AWWA C111). Mechanical joints shall have plain rubber gaskets with stainless steel bolts and nuts (threads shall be coated to resist galling). Fittings shall be coated with a factory applied bituminous coating approximately one (1) mil thick and lined with a cement-mortar lining in accordance with ANSI A21.4 (AWWA C104). All fittings shall be wrapped in a polyethylene encasement in accordance with ANSI A21.5 (AWWA C105). Polyethylene encasement shall have a minimum thickness of 8 mils. **No "special" fitting will be allowed without written approval.** Ductile iron fittings shall be as manufactured by American Cast Iron Pipe Company or U.S. Pipe.

2.2.4 Polyvinyl Chloride (PVC) Pipe: PVC pipe shall conform to AWWA C900 or C905 depending on size. Pipe shall be pressure rated 235 psi (DR18) for sizes four (4) inches through twelve (12) inches and pressure rated 235 psi (DR 18) for sizes fourteen (14) inches and larger. Pipe shall be made of type 1, grade 1 class 12454-B material in accordance with ASTM D 1784. Pipe outside diameter shall conform to the outside diameter dimensions of ductile iron pipe to facilitate use of Ductile Iron Fittings, cast iron valves and specials. Joints shall be integral bell and spigot type with elastomeric flexible seals in accordance with ASTM F-477. Joint lubricant shall be as recommended by the pipe manufacturer. Fittings shall be ductile iron as specified in Section 2.02 C with joint restraint gland. Joint restraint shall meet the requirements of UNI-Bell 13 and comply with ASTM F1674-96. Where bell restraints are necessary they shall incorporate a split ring behind the bell and a serrated ring on the spigot to grip the pipe with sufficient number of bolts and to provide a minimum working pressure rating equivalent to the pipe.

2.2.5 High Density Polyethylene (HDPE) Pipe: HDPE pipe shall only be used for directional drill applications or where otherwise shown on the plans or approved by the Engineer. Pipe material shall be a high density PE 3608 or 3408 cell classification 345464C per ASTM D3350 and conform to AWWA C906. Outside diameter of the pipe shall be controlled by ductile iron pipe size (DIPS). The pressure rating for the pipe shall be calculated by a licensed engineer in the State of Mississippi based on boring conditions but in no case shall it be less than 160 psi (DR11). The nominal size of the pipe selected shall not restrict the capacity of the main thus increasing the nominal pipe size for HDPE sections may be required. Sections of pipe shall be joined into continuous lengths on the job site above ground by heat fusion method in accordance with manufacturer's recommendations. Fused joint strength shall at a minimum equal the tensile strength of the pipe. Connection of HDPE pipe section to either PVC or DI shall be made with a Mechanical Joint Adapter designed for such connection of dissimilar pipe materials.

2.3 EXPOSED DISTRIBUTION MAIN

Exposed water mains shall be Ductile Iron Pipe and Fittings. Exposed mains shall meet the requirements of section 2.02 B and C except where modified herein. Pipe and fitting joints shall be flanged in accordance with ANSI A21.15 (AWWA C115) and include 1/8 inch thick red rubber full faced gaskets. Bolts and nuts shall be type 304, stainless steel (threads shall be coated to resist galling). Pipe and fittings shall be coated with 2 coat of epoxy primer for 1.5-2.5 dry mils per coat, 1 coat of intermediate coating, high build epoxy, for 3.0-4.0 dry mils, and 2 coats of finish coating, aliphatic acrylic polyurethane, for 2.0-3.0 dry mils per coat. Ductile iron fittings shall be as manufactured by American Cast Iron Pipe Company or U.S. Pipe.

2.4 WATER SERVICE PIPE

Pipes smaller than a nominal diameter of four (4) inches shall be considered a service. Pipe material shall be high density PE 3608/3408 cell classification 345464C per ASTM D3035. Pipe shall be conforming to AWWA C901. Pipe shall be pressure rated 200 psi (SDR9). For pipe sizes ¾" through 2" outside diameter shall be controlled by copper tubing size (CTS) and 3" pipe outside diameter shall be controlled by iron pipe size (IPS). Pipe shall conform to ASTM D2737 or D3035 as applicable depending on size. Pipe shall conform to NSF Standard 14/61.

3.0 EXECUTION

Comply with Section 31 11 00, Pipe Installation.

*** END OF SECTION ***

SECTION 33 12 16
WATER VALVES AND APPURTENANCES

1.0 GENERAL

1.1 DESCRIPTION

These Specifications shall govern the furnishing and installing of water valves and appurtenances for the project. The valves and appurtenances shall be installed in accordance with the requirements of these specifications at the locations and depth indicated on the plans approved by this Owner and the governing regulatory agencies. The valves and appurtenances shall be of the classes, sizes, and dimensions shown thereon.

1.2 QUALITY ASSURANCE

1.2.1 Source Quality Control: Obtain valves and fittings from no more than one manufacturer.

1.2.2 Reference Standards: The work, materials and related activities shall be in accordance with the latest standards of the American Water Works Association (AWWA), American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), Uni-Bell Pipe Association, Mississippi Department of Health, Mississippi Department of Environmental Quality, and any other related State or Federal standards or requirements.

1.3 RELATED WORK SPECIFIED ELSEWHERE

Section 31 23 33 - Earthwork, Excavation, and Backfill for Utilities
Section 31 11 00 – Pipe Installation
Section 33 11 13 - Water Distribution Pipe

1.4 MEASUREMENT AND PAYMENT

Payment for work in this section shall be included in the unit price / lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials and incidentals complete.

1.5 SUBMITTALS

The following shall be submitted in accordance with the General Conditions, in sufficient detail to show full compliance with the specification:

SD-01 Quality Control:
a. Certificates: Provide a manufacturer certificate of compliance that the materials supplied meet the requirements of these specifications.

2.0 MATERIALS

2.1 MATERIALS

2.1.1 General: All valves and appurtenances shall have manufacturer's name and working pressure cast in raised letters on valve body. All exposed valves shall be flanged with ends conforming to ANSI B16.1 Class 125. 1. All bolts, nuts, and studs on or required to connect buried or submerged valves shall be stainless steel. Bolts and nuts shall have hexagon heads and nuts. Gasket material and installation shall conform to manufacturer's recommendations.

2.1.2 Water Service:

2.1.2.1 General: All brass components, except Service Saddles, in contact with potable water must be made from either CDA/UNS Brass Alloys C89520 or C89833 with a maximum lead content of 0.25% by weight.

2.1.2.2 Service Saddle: Shall be Brass saddle per ASTM B62 and ASTM B584 in accordance with AWWA C800. Saddle shall have double 18-8 type 304 stainless steel straps or band and EPDM rubber gasket per ASTM D2000 as manufactured by Ford Meter Box Company, Inc. Style 202BS, Mueller BR2S (brass) or equal. Saddle shall have female threaded connection AWWA (CC).

2.1.2.3 Corporation Stop: Corp Stop shall be a ball type valve and comply with AWWA C800 and be made of No-Lead Red Brass. The end connections shall be male tapered AWWA (CC) thread by pack joint with stainless steel insert for connection to water service pipe per Specification 0200. Corporation stop shall be manufactured by Ford Meter Box Company, Inc. Style FB1000 series, Mueller 300 series, or equal.

2.1.2.4 Curb Stop: Curb stop shall be a straight ball meter valve and comply with AWWA C800 and be made of No-Lead Red Brass. Tee head shall be capable of rotating a full 360 degrees. The operating nut shall be lockable. The end connections shall be pack joint for connection to water service pipe per Section 0200 and meter swivel nut. For services with meters larger than one (1) inch the curb stop shall have pack joint or FIP by meter flange. Curb stop shall be manufactured by Ford Meter Box Company, Inc., model Ball Meter Valve, Mueller, model 300 series ball meter valve or equal.

2.1.2.5 Meters: Meters shall be Neptune T-10 with R900i transmitter for residential service. Meters shall include No-Lead Brass straight style dual check backflow prevention device with meter swivel nut for one (1") inch and smaller or flanged for two (2") inch and larger by FIP threaded end connections manufactured by Mueller, Model H-14242 or equal. Check valve shall not require the meter to be removed for service. A MIP meter flange shall be used to for connection of larger meters to backflow prevention device. All meters will be supplied by the Authority when applicable fees are paid and documents are submitted and approved.

2.1.2.6 Pressure Reducing Valve: When necessary due to water system pressures exceeding 80 psi a PRV may be required at individual service lines. Valve shall be a bronze body with integral stainless steel strainer. Valves shall reduce pressure to a maximum of 60 psi at the outlet. Valve shall have FIP threaded end connections with a threaded stainless steel nipple for connection to meter check valve. Valves shall be manufactured by Watts, Model N55B or equal. Verify pressure with the Authority before installing Pressure Reducing Valves.

2.1.2.7 Nipples: Shall be schedule 40, No-Lead Brass and rated for 150 psi working pressure.

2.1.2.8 Coupling: Shall be No-Lead Brass and used for connecting valves to water service pipe with MIP by pack joint end connections. Shall include a stainless steel insert for HDPE pipe connections. Couplings shall be manufactured by Ford Meter Box Company, Inc., Mueller, or equal.

2.1.2.9 Meter Box:

2.1.2.9.1 General: Traffic Rated Box shall be used if meter is installed within paved area or in any area where there is a potential for a traffic loading. This includes sidewalks, driveways, parking lots, etc. All meter boxes shall be sized large enough to allow for maintenance and removal of the equipment inside the box. This includes meter valves, meters, check valves, pressure reducing valves, couplings, etc. If located in pavement the box shall be large enough to allow the removal of the meter equipment and appurtenances without disturbing the paved area.

2.1.2.9.2 Non-Traffic Rated: Shall be NDS D1200 for automatic meter reading or approved equivalent. Box and cover must be polypropylene material with a minimum body and cover thickness of 0.25". Meter box shall be capable of housing curb stop, straight style dual check valve, water meter and pressure reducing valve (where required). Cover shall have cast iron flip lid.

2.1.2.9.3 Traffic Rated: Shall be fiberglass box rated for vehicular traffic loadings and sized to fit the meter, curb stop, check valve and pressure reducing valve (where required). Cover shall be polymer concrete with cast iron flip lid for viewing the meter. Box and cover shall be Quazite, CDR, Pentek, or equal.

2.1.2.9.4 Standard Size:13" width x 19" length x 12" height (minimum dimensions)

2.1.2.9.5 Jumbo Size: 17" width x 30" length x 12" height (minimum dimensions)

2.1.3 Backflow Prevention Device:

2.1.3.1 General: Devices shall be installed where a possible health hazard exists as indicated on the project plans. Possible health hazards include cross connections with another water source or locations where hazardous hydraulic connection may exist (pressure drops below minimum requirements of the MS Department of Health). Valve shall be bronze body with minimum rating of 175 psi working pressure. The size of the valve shall be as shown on the project plans. Device shall be located downstream of the meter in an above ground removable, insulated enclosure. Classification of hazard level shall be determined based on Mississippi State Department of Health, Division of Water Supply, "Cross Connection Control Program Reference Manual."

2.1.3.2 Low Hazard Connection: Device shall be a double check valve assembly meeting the requirements of AWWA C510 and all applicable ASSE Standards. Devices shall be Watts Series 719 or 709 depending on the size or equal.

2.1.3.3 High Hazard Connection: Device shall be a reduce pressure principle assembly meeting the requirements of AWWA C511 and all applicable ASSE Standards. Devices shall be Watts Series 909 or equal.

2.1.4 Fire Hydrants: Hydrants shall conform to AWWA C502. Main valve shall be 5 ¼ inches with compression type closing utilizing water pressure for positive sealing. Valve shall open left (counterclockwise). Hydrant shall have two 2 1/2 inches hose connections and one 4 ½ inches hose connection including matching chained caps for each opening. Threads shall be National Standard unless otherwise specified by the Local Fire Department. The inlet connection shall be buried with a minimum of four (4) feet cover. The hydrant shall be operated with a 1 ½ inch (point to flat) pentagon operating nut. Hydrant shall include a ground line breakable component that will shear off upon impact at the ground line without damage to the barrel and a stainless steel safety stem coupling that will separate upon impact. Hydrant shall have two drain valves and at least two drain openings. Hydrant Nozzle shall be placed 18 inches from the ground line complying with NFPA Handbook. Hydrant spacing shall not exceed 500 ft. spacing without approval from the Engineer. Hydrants shall be painted in accordance with manufacturer's recommendations to the color determined by the local fire agency. Hydrants shall be Mueller Super Centurion 250 (A-423) or approved equal.

2.1.5 Gate Valve: Valves shall be resilient seat, non-rising stem type with cast iron body and bonnet complying with AWWA C509. Valves shall turn left (counterclockwise) to open and the valve body shall indicate the direction of operation. All buried valves shall include a 4 ½ inch diameter three-piece adjustable cast iron valve box with stem extensions (as required), operating nuts, and heavy duty cast iron covers. Additional extensions may be required to the valve box as necessary to reach finished grade. Use of pipe material to extend box shall not be permitted. Exposed valves shall have flanged ends conforming to ANSI B16.1, Class 125 and buried valves shall have mechanical joints per ANSI A21.11 (AWWA C111). Valves shall be located on all sides of any tee or cross connection and at a maximum spacing of 1000 linear feet for continuous runs of water main. Valves shall be M&H Style 4067 or approved equal

2.1.6 Joint Restraints: Restraint shall be a mechanical restraint for connecting pipe to mechanical joint fittings. Restraint shall be made of ductile iron per ASTM A536 with type 304 stainless steel nuts and bolts and EPDM or Buna-N gaskets. Restraints shall be made with twist off nuts to insure proper actuating of the restraint to the type of pipe for which it is being used (i.e. ductile iron, PVC or HDPE). Restraints shall be manufactured by EBBA Iron, model Megalug, Mueller, model Aquagrip, or equal.

2.1.7 Repair Coupling:

2.1.7.1 Pipes 10” and Larger (transmission mains): Coupling shall be a mechanical joint repair coupling (restrained) for connecting two straight sections of water mains. Sleeve shall be fusion bonded epoxy coated carbon steel per ASTM A283 or ductile iron with 18-8 type 304 stainless steel bolts and nuts. Glands/followers shall be coated ductile iron. Gaskets shall be SBR per AWWA C111. Coupling shall be rated for a minimum 150 psi working pressure. Coupling shall be EBBA 3800, Smith-Blair 470, or equal.

2.1.7.2 Pipes 4” thru 8” (distribution mains): Coupling shall be as required for transmission mains. Except when axial restraint is not deemed necessary then coupling may be Hymax 2000, Ford Coupling, Smith-Blair 411, or equal.

2.1.7.3 Pipes 3” and smaller (service lines): Coupling shall be made of brass with pack joint by pack joint for end connections for CTS HDPE water service pipe. Each coupling shall be provided with two stainless steel inserts. Couplings shall be Ford Pack Joint Coupling, Mueller, or equal.

2.1.8 Bell Joint Leak Clamp may be used when a joint is leaking but there is no axial restraint necessary to keep the bell and spigot from separating. Clamp rings (bell and spigot ends) shall be split ring type for installation on existing pipe and made of ductile iron per ASTM 536 with a fusion bonded epoxy coating. Gaskets shall be a “kee-lok” type for installation on existing water main and made of Buna-N NSF61 approved. All nuts and bolts shall be stainless steel. Clamp shall be Smith-Blair model 274 or equal.

2.1.9 Repair Clamp: Clamp shall be a full circle repair clamp. Band, bolts, nuts, and lugs shall be 304 Stainless Steel. Clamp gasket shall be virgin SBR or Buna-N for water service and be provide full 360 degree pipe coverage for the entire length of the clamp. Clamp shall be rated for 150 psi working pressure Clamp shall be Ford FS series or equal for water mains and Smith and Blair 247 Redi-Clamp, Mueller 230 Mini-Band, or equal for water service pipe.

2.1.10 Tapping Sleeve: Band, lugs, flange, and bolts and nuts shall be 304 Stainless Steel with flanged joint outlet for connection of a tapping valve. Nuts shall be coated to prevent galling. Sleeve shall have three quarter (3/4) inch test plug to ensure proper sealing before tapping of main. Sleeve gasket shall be virgin SBR or Buna-N for water service and provide full 360 degree pipe coverage for the full length of the sleeve. Tapping valve shall have flanged and mechanical joint connections. Sleeve shall be rated for 150 psi working pressure. Sleeve shall be Mueller H-304, Ford FTSS, or equal. Taps shall only be made with coordination and approval of the Owner.

2.1.11 Butterfly Valves: Valves shall be constructed of high strength cast iron bodies, with high strength cast iron discs with stainless steel edges and 304 stainless steel shafts meeting AWWA C504 designed for a minimum operating pressure of 150 psi. Seats shall be natural or synthetic rubber and with full resistant seats retained in the body or on the disc edge in accordance with AWWA C504. Fasteners shall be type 316 stainless steel with a one piece stainless steel retaining ring. End connections shall be flanged. Valves shall be designed for bi-directional flow. Valves 30-inch and larger shall have a flow through type vane. Replacement of seals, for all butterfly valves, shall not require removal of the valve from the line. Replacement of seals on valves 30 inches or larger shall not require disturbing any part of the valve or operator assembly, except any packing follower glad. Valves shall be manufactured by Henry Pratt Company, DeZurik, or equal.

2.1.12 Check Valves: Check valves shall be counterweighted swing type having cast iron body, cover, disc, and levers meeting AWWA C508. Counterweight arm shall be constructed of cast iron. Shaft shall be 18-8 stainless steel. Body seat shall be bronze. Seat ring shall be rubber. Shaft packing gland shall be compression type. Check valves shall be manufactured by Clow, Model F-5382, American Flow Control, Model 50SC, or equal.

2.1.13 Ball Valves: Valves shall be no-lead brass having a circular port ball. Both body and ball shall be no-lead brass and the seat, stem seal, and body seal shall be TFE. End connections shall be threaded. Valves shall be manufactured by Ford Meter Company, Model FB-1000, Mueller, Model 300 Series or approved equal.

2.1.14 Pressure Gauge: Pressure gauges shall be silicone oil liquid filled with a Bourdon tube pressure element. Accuracy shall be ±0.5 percent of span (ANSI B40.1 Grade 2A). Range shall be 0-200 psi unless shown elsewhere on the plans. Case shall be solid front design constructed of glass filled polyester with 304 stainless steel stem mounting, ¼" male NPT bottom connection. Ring shall be threaded, glass filled polyester. Window shall be glass covering a white dial with block lettering. Bourdon tube and socket shall be 316 SS, heliarc welded. Movement shall be cam and roller movement, 300 series stainless steel. Face size shall be 4 ½". Pointer adjustment shall be externally accessible with built in overload and underload movement stopes. Pressure snubber shall be sintered stainless steel threaded into gauge socket or in external stainless steel housing with ¼ NPT male and female connections. Guage cock shall be ¼ NPT 316 stainless steel for pressure gauges not assembled with diaphragm seals, unless otherwise indicated.

3.0 EXECUTION

3.1 INSTALLATION

3.1.1 Install all valves and appurtenances in accordance with manufacturer's instructions.

3.1.2 Install suitable corporation stops at all points shown and required where air binding of pipe lines might occur.

3.1.3 Install all valves so that operating wrenches may be conveniently turned from ground level but without interfering with access. Install extensions on operators that are more than 24" below ground.

3.1.4 Unless otherwise approved, install all valves plumb and level. Valves shall be installed free from distortion and strain caused by misaligned piping, equipment or other causes.

3.1.5 Valve boxes shall be set plumb and centered with the bodies directly over the valves. Earth fill shall be carefully tamped around each valve box to a distance of 4 feet on all sides of the box, or to the undisturbed trench face, if less than 4 feet.

3.1.6 Hydrants and connecting pipe shall have at least the same depth of cover as the distributing pipe. The hydrants shall be set upon a slab of concrete not less than 4 inches thick and 15 inches square. Where restrained hydrants are not used the side of hydrant opposite the pipe connections shall be firmly blocked against the vertical face of the trench with a concrete thrust block. Not less than 2 cubic yard of washed gravel shall be placed around the base of the hydrant at the location of the drain holes.

3.2 FIELD TEST AND ADJUSTMENTS

3.2.1 Adjust all parts and components as required correct operation.

3.2.2 Conduct functional field test of each valve in presence of the Engineer to demonstrate that each part and all components together function correctly. All testing equipment required shall be provided.

* * END OF SECTION * *

SECTION 33 16 13.14
HYDROPNEUMATIC TANK

1.0 GENERAL

1.1 The Work in this Section shall include furnishing all materials, equipment, and labor necessary for connecting a hydropneumatic tank and all appurtenant work. The Contractor shall furnish and install on concrete piers or steel saddles on concrete footings a hydropneumatic tank sized as indicated on the project plans.

1.2 RELATED SECTIONS

Section 00 72 00	General Conditions
Section 09 91 00	Painting

1.3 MEASUREMENT AND PAYMENT

Payment for Work in this Section shall be included in the unit price/lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials, and incidentals complete.

1.4 REFERENCES

The publications listed below form part of this specification. Each publication shall be the latest revision and addendum in effect on the date this specification is issued for construction unless noted otherwise. Except as modified by the requirements specified herein or the details of the Drawings, Work included in this specification shall conform to the applicable provisions of these specifications.

ASME Code for Unified Pressure Vessels

1.5 SUBMITTALS

The following shall be submitted in accordance with the General Conditions, in sufficient detail to show full compliance with the specification:

SD-01 Product Data: Submit shop drawings and plans of proposed construction for tank supports.

SD-02 Quality Control: Testing: Submit bacteriological test results.

2.0 PRODUCTS

2.1 MATERIALS

2.1.1 Hydropneumatic tank of the capacity shown on the plans constructed for 125 psi service and 175 psi burst pressure. The design and construction shall conform to ASME Code for unified pressure vessels. The tank shall have tappings for connection of piping and accessories as indicated on the drawings and in conformance with Mississippi Department of Health guidelines. Submit shop drawings in triplicate for review prior to manufacture.

3.0 EXECUTION

3.1 PREPARATION

3.1.1 For metal surface preparation and painting requirements for the tank, see Section 09 91 00 of these specifications.

3.2 INSTALLATION

3.2.1 The tank shall be mounted on reinforced concrete piers or steel saddles on concrete footings of sufficient height to raise the tank at least 24" above the ground. Piers or saddles shall be supported on foundations sized and reinforced to support tank and water with a minimum bearing area of one square foot for each 100 gallons capacity. Supports shall be subject to approval by the Engineer. Submit plans of proposed construction for review prior to construction.

3.3 FIELD QUALITY CONTROL

3.3.1 Tests

3.3.1.1 After flushing the system, the system shall be sealed off tight and filled with water to the highest point, venting off all air as system is filled. After the system is filled, all openings shall be closed and the pressure in the tank raised to 125 psi. The system shall stand thus filled and under pressure for a period of two hours without showing any loss of pressure.

3.4 CLEANING

3.4.1 After all appurtenances have been connected to the tank, the system shall be sterilized in the same manner specified for sterilization of the distribution system. State Board of Health approval will be required.

3.4.2 Upon completion of all tests the tank site shall be cleaned up, leveled and graded to drain.

*** END OF SECTION ***

SECTION 33 21 13

PUBLIC WATER SUPPLY WELL

1.0 GENERAL

1.1 The Work in this Section shall include furnishing all materials, equipment, and labor necessary for drilling and installing a water supply production well as shown on the drawings and as described in these specifications. The Contractor shall be responsible for making necessary field decisions to install a well to produce the required well capacity as shown on the project plans.

1.1.1 Furnish labor, materials, services, equipment, and other necessary items required for performing all operations in connection with the installation of electrical equipment and controls to operate the water supply well.

1.1.2 Furnish and place all labor, materials, tools and equipment required for installation of the pump foundation and seal (see contract drawings for details). The pump head shall be connected to the outer casing by a watertight seal.

1.1.3 Furnish and install an approved permanent deep well vertical turbine pump.

1.2 RELATED SECTIONS

Section 00 72 00 General Conditions
Section 33 11 13 Water Distribution Pipe

1.3 MEASUREMENT AND PAYMENT

Payment for Work in this section shall be included in the unit price / lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials, and incidentals complete.

1.4 REFERENCES

The publications listed below form part of this specification. Each publication shall be the latest revision and addendum in effect on the date this specification is issued for construction unless noted otherwise. Except as modified by the requirements specified herein or the details of the drawings, Work included in this specification shall conform to the applicable provisions of these publications.

ANSI/ASME B16.18	Cast Copper Alloy Solder Joint Pressure Fittings
ANSI/ASME B16.22	Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
ASTM A-120/ASTM A-53/API 5L	Steel Pipe Specifications
ANSI/AWS A5.8	Brazing Filler Metal
ANSI/AWWA C105	Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids
ASTM A48	Gray Iron Castings
NEMA MG1	Electric Motor Specifications
ANSI B58.1/AWWA E101	Standard for Vertical Turbine Pumps - Line Shaft and Submersible Types
ASTM B88	Seamless Copper Water Tube
ASTM A296/ANSI 304	Stainless Steel Specifications
AWWA A100 – 66-AWWA	Standard for Deep Wells
AWWA C200 – 80-AWWA	Standard for Steel Water Pipe

1.5 SUBMITTALS

The following shall be submitted in accordance with the General Conditions, in sufficient detail to show full compliance with the specification:

SD-01 Shop Drawings:

a. Submit for approval detailed drawings, data and descriptive literature for each pump motor, motor starter, control equipment, and all other equipment prior to ordering pumping equipment.
b. Calculations, from static water level, of drawdown, column friction losses and above ground discharge pressure shall be made to ensure proper design performance. The pump shall operate at a speed not to exceed 1,800 RPM.
c. The Contractor shall submit to the Engineer one copies of the pump curve, installation plan and bill of materials of the proposed pumping equipment.

SD-02 Quality Control

a. Design Data
b. Test Reports:
The pump bowl assembly shall be factory tested in accordance with ASA B58.1 and six certified copies of the following non-witnessed test results shall be furnished for the pump.
1. Bowl standard performance test;
2. Hydrostatic test of bowl assembly; and
3. Hydrostatic test of discharge head.

At the Owner's option, the above specified factory test shall be "WITNESSED". The Owner shall pay the expenses of his representative to witness the tests. All other expenses or costs shall be paid by the Contractor.

c. Certificates:
1. Submit manufacturer's certificates of compliance with ANSI, AWWA and other Standards listed herein.
2. Prior to installation of casing, the Contractor shall supply mill certificates on the pipe with heat numbers the same as found on the pipe.
d. Manufacturer’s Instructions
e. Manufacturer’s Field Reports:
1. Certify that valves are properly installed except as noted.
2. Recommend corrective action for any deficiencies noted.

SD-03 Contract Close-out

a. Project Record Documents:
1. Accurately record actual locations of piping, connections, well depth, and pipe invert elevations.
b. Final Report:
1. The Contractor shall provide a Final Report on the supply well. The final report shall contain all reports, logs, data analysis, shop drawings, manufacturer's warranties and other information pertinent to this well project.
2. Copies of the report, bound and labeled, shall be submitted to the Engineer for review.
3. Approval of the final report by the Engineer is required before final payment can be made.
c. Operation and Maintenance Manuals:
1. Submit a detailed operation and maintenance manual for valves and appurtenances provided under this Section including the following information:
a. Product name and number.
b. Name, address and telephone number of manufacturer and local distributor.
c. Instruction bulletins for operation, maintenance and recalibration.
d. Complete parts and recommended spare parts lists.

SD-04 Data Warranty.

1.8 WARRANTY

1.8.1 Well Efficiency Guarantee

1.8.1.1 From the final 24-hour aquifer test of the well, the Contractor shall determine, by standard methods as normally used by groundwater hydrologists, the specific capacity of the well in gallons per minute per foot of drawdown

and the coefficient of transmissivity of the waterbearing formation being drawn on by the well in gallons per day per foot.

1.8.1.2 The Contractor shall determine the well efficiency using recognized methods. If the well is less than 75 percent efficient at the specified test pumping rate at the end of the 24-hour test, the Contractor shall continue development operations at his own expense to improve the well's efficiency until it equals or exceeds 75 percent. If the Contractor is unable to increase the well to at least 75 percent efficiency, the Owner may not accept the well or may reduce the payment to the Contractor by two percent for each one percent below 75 percent efficiency. If the Contractor does not develop a minimum of 50 percent well efficiency, no payment shall be due the Contractor for the well (proposal item for water supply well).

1.8.2 Mechanical Warranty

1.8.2.1 The Contractor shall warrant all components of the well to be free from defects in both materials and workmanship for a period of one year after acceptance by the Owner, except that any warranties by the manufacturer of materials longer than one year shall be transferred to the Owner.

1.8.3 Operational and Yield Guarantee

1.8.3.1 The Contractor shall guarantee that the well will produce the specified capacity for one year from date of final acceptance unless additional wells are later installed with a radius of influence overlapping this well.

1.8.3.2 The Contractor shall further guarantee that the well will function properly as specified, at a minimum of seventy-five percent well efficiency at the design rate.

1.8.3.3 It is desired by the Owner that the water produced by the well water supply unit(s) covered by these specifications be of the best quality available at the site furnished to the Contractor. However, it is distinctly understood by all concerned that while the Contractor must exercise due diligence in an effort to obtain a satisfactory water quality, no guarantee is expressed or implied on the part of the Contractor regarding the chemical quality of the water.

1.8.3.4 The Contractor shall guarantee the water to be free of the coliform group of bacteria. The water shall be free of foreign mud, sand or silt. The maximum permissible turbidity as reflected by the analysis of final water samples shall be five N.T.U. and settleable solids shall not exceed 10 parts per million after pumping four hours.

1.8.3.5 In addition to other guarantees called for in these specifications, the Contractor shall guarantee the satisfactory operation of all apparatus and machinery and shall guarantee the equipment against defects in workmanship, material and installation for one year after the installation is accepted in writing by the Owner.

2.0 PRODUCTS

2.1 PIPE

2.1.1 Refer to Section 33 11 13, Water Distribution Pipe, for piping materials and installation requirements.

2.1.2 If required, pipe sizes 3” and smaller that are installed below grade and outside building shall comply with the following:

2.1.2.1 Polyvinyl Chloride (PVC) Water Pipe: Pipe shall meet the requirements of AWWA C-900 and comply with ASTM D 2241, rated DR 18 (Class 150). Pipe shall be continually marked with manufacturer’s name, pipe size, cell classification, SDR rating, ASTM classification, National Sanitation Foundation Seal (Potable Water Only). Pipe joints shall be integrally molded bell ends in accordance with ASTM D 3034, Table 2, with factory supplied elastomeric gaskets and lubricant.

2.2 OUTER CASING

2.2.1 All casing installed shall be new pipe with plain ends and machine beveled for welding or threaded for coupling, conforming to ASTM A120 or prime API 5L Grade B. The outer casings shall be a minimum weight

as indicated on the plans. The outer casing shall be equipped with centralizers with the first one located four feet above the bottom of the casing and then one approximately every one-hundred feet above that to the surface to hold the casing in the center of the hole.

2.2.2 Drift Indicator for Alignment Survey

2.2.2.1 SINCO Inclinometer or equal.

2.2.3 Casing Coating

2.2.3.1 All coatings coming into contact with potable water must be NSF approved.

2.2.3.2 The inside wall of the casing and both walls of the discharge column, lap pipe and pump tail pipe shall be coated with three coats of Tnemec Series 20-1255 or approved equal, to a total dry film thickness of 15 mils (5 mils each coat).

2.2.3.3 The surface to be coated shall be prepared to SSPC-SP8, Commercial Blast, or SSPC-SP8, acid cleaning, and as recommended by the coating manufacturer.

2.3 CASINGS AND SCREEN

2.3.1 Material Settings: The lengths of the several components of the outer casing, screen and lap pipe (if applicable) and the positions at which the several components may be set in the well have been estimated as shown by the base lengths given in the contract drawings. The exact material settings will be approved by the Engineer based on test hole log data and existing well information.

2.3.2 Lap Pipe: The lap pipe shall be attached to the top of the screen. The lap pipe shall consist of a minimum of 60 feet of steel pipe of the same diameter as the screen. The pipe material shall be equal to that specified for the outer casing.

2.3.3 Screen: Type 304, 188 stainless steel continuous slot, welded screen

2.3.3.1 U.O.P. Johnson Company, Houston Well Screen Company or approved equal.

2.4 OIL LUBRICATED PUMPS

2.4.1 A suitable pump head of high grade cast iron ASTM A48, Class 30, shall be provided for mounting the motor and supporting the pump column, bowls and suction pipe. The above ground outlet shall be flanged, provided with a circular groove interfaced for square packing and drilled to match ANSI Class 125 cast iron or 150 steel flange connections. The discharge nozzle shall be constructed with a vertical vane for reduction of turbulence. Also, the discharge flange shall have a 1/4-inch NPT connection for a pressure gauge. The design shall permit the drive shaft to be coupled above the stuffing box to facilitate easy removal and replacement of the driver. A cast iron tension box designed to maintain proper tension in the shaft tubing at all times when locked into position with hex head cap screws shall be provided with a grooved bronze tension bearing. The pump head shall be equipped with separate cast iron base plate. The discharge head shall be equipped with a properly sized screened air vent in order to vent the well casing. The air vent assembly shall turn back towards the ground.

2.4.2 The discharge column to be furnished under these specifications shall be steel ASTM A53, Grade A, electric weld prime line pipe. The discharge column shall be furnished in interchangeable sections 10 or 20 feet in length (with exception of the top and bottom sections) and shall be furnished with screwed couplings.

Each spider shall be faced parallel to permit the ends to butt against the machined faces on the column pipe. The pipe shall have the ends machined eight threads per inch with a 1/8-inch taper and faced parallel to permit the ends to butt against the machined surfaces on the alignment spiders.

Pump settings in excess of 200 linear feet must be furnished with an adjustable top column flange to compensate for the elongation of the column pipe. For deep (500 feet+) setting pumps, the Engineer shall be furnished with six certified copies of factory calculations on column stretch and shaft stretch for all possible pump operating conditions from closed valve to open discharge at the pump head.

2.4.3 The line shaft bearings which serve as couplings for the shaft tubing shall be spaced at each tubing length to maintain alignment of pump shafting and to prevent excessive vibration. They shall be cast of continuous cast bronze alloy, equivalent to ASTM B505 alloy 836, machined, threaded and grooved for proper lubrication.

2.4.4 The line shaft shall be of ASTM A108, Grade 1045, steel ground and polished with a surface finish not to exceed RMS 40. It shall be of ample size to operate the pump without distortion or vibration and shall be capable of carrying the maximum horsepower that may be generated by the motor. The butting ends shall be machined, faced and recessed square to the axis of the shaft. To insure accurate alignment, the shaft shall be straight within 0.007 inches total indicator reading. The ends of the shaft shall be accurately machine threaded for connection. Shaft couplings shall be bored and threaded from solid ASTM A108, Grade B1112, or 12L14 steel bars designed with a safety factor of 11/2 times that of the shaft. The threads shall be lefthand to tighten during pump operation. The couplings shall be without vent holes. The length of the shaft shall be such as to match properly the length of the discharge column.

2.5 PUMP ACCESSORIES

2.5.1 Pump bowls, suction and discharge cases shall be of close grained cast iron equivalent to ASTM A48, Class 30, without imperfections. For pump sizes 8-inch through 15-inch, the bowl water passages shall be porcelain enamel coated to provide optimum performance and consistency of output. For pumps 8-inch and larger, the suction case and intermediate bowls shall be fitted with replaceable wear rings of bronze, ASTM B505, Alloy 836. Wear rings shall have the minimum practical clearance to the mating cylindrical surface of the impeller to provide adequate sealing independent of vertical positioning of the impellers. Bowls and cases shall have bronze sleeve type bushings to support and guide the shaft. Bushing material shall be bronze, ASTM B505, Alloy 836. The suction case bearing shall be grease packed with provision for grease circulation from a reservoir in the suction case hub. A sand collar of rubber or bronze, ASTM B505, Alloy 836, shall be provided to protect the suction case bearing from abrasives in the liquid pumped. The discharge case shall have vanes to deliver the flow of water with minimum turbulence. The intermediate stages shall be selected to provide the maximum efficiency with least number of stages. Impeller shall be of the enclosed type only, cast of bronze, ASTM B584, Alloy 836, accurately cast, machined, balanced and filed for optimum performance and minimum vibration. The design shall be non-overloading for the capacity of the motor selected. The impeller shall be securely fastened to the bowl shaft with taper collets of ASTM A582, Grade 416, stainless steel. Bowl shaft shall be of sufficient diameter to transmit the pump horsepower with a liberal safety factor and rigidly support the impellers between the bowl or case bearings. The bowl shaft material shall be high chrome stainless steel of ASTM A276, Grade 410.

The pump bowl shall have a minimum operating efficiency of 80 percent for the design condition as specified on the Project plans. The pump bowl shall be set a minimum of the NPSHR below the deepest projected pumping level.

2.5.2 The Contractor shall furnish, with the pumping unit, a minimum of a 10-foot section of blank steel, ASTM A53, Grade B, suction pipe threaded for attaching to the pump. The minimum size diameter of the suction pipe shall be as specified on the project plans. A corrosion resistant cone type strainer designed for use with vertical turbine pumps shall be provided.

2.5.3 Air-Vent Valve: Air-vent valve with the necessary pipe connections shall be provided to permit the automatic escape of air from the discharge column when the pump is started. Size of the air-vent valve and piping shall suit the actual requirements of the individual installation and the recommendations of the pump manufacturer.

2.5.4 A heavy duty automatic solenoid operated lubricating device complete with piping isolating valves and timer shall be installed at the pump head or motor frame. A system which does not pre-lubricate the oil lubricated shaft bearings shall not be acceptable. The system shall be suitably sized for the necessary pump column size and anticipated water level. Piping shall be insulated with Thermozip Series 375, 1-inch thick, and tapped into the discharge pipe in accordance with the pump manufacturer's recommended pump installation instructions. Food grade oil shall be used for lubrication.

2.5.5 Stainless steel coated tubing (1/4-inch I.D. minimum) of sufficient thickness with the necessary connections, air valve and airline gauge (calibrated in feet) and hand air pump shall be furnished for determining static and pumping water levels. The tubing shall extend to the top of the pump bowl and shall be strapped to the column pipe with stainless steel bands and buckles spaced at ten foot intervals. Plastic tubing will not be permitted.

2.5.6 The Contractor shall furnish and install a 4-1/2 inch, minimum, pressure gauge on the pump discharge flange. This gauge shall be of ample size to cover the operating pressure of the pump including shut off head. Pressure unit shall be displayed in PSI.

2.5.7 The pump discharge piping shall include the following items as shown on the plan:

1. One deep well type air release and vacuum valve, vertically mounted, of the size specified on the project plans with throttling device complete with seamless copper tubing air discharge piping to discharge in a downward direction. End of discharge piping shall be fitted with a stainless steel or bronze strainer.
2. One Style 38 or 138 Dresser or Smith-Blair coupling with stainless steel all thread rod restraints as shown on the contract drawings.
3. One flanged by plain end spool piece.
4. Four tie bolts (via flange brackets).
5. One cast iron test tee complete with blind flange, tapped with air release vacuum valve assembly.
6. One flanged, adjustable lever and weight, resilient disk ring check valve, Mueller A2602601 or approved equal.
7. One N.R.S. gate valve with hand wheel, Mueller A23806 or approved equal.
8. Two flanged by flanged spool pieces.
9. One master flow meter, Water Specialties, or equal with 4-20 mA output.
10. One three-quarter inch smooth-mouth brass sampling cock.
11. One ductile iron flanged 45 degree bend.
12. One ductile iron mechanical joint 45 degree bend.
13. One discharge pressure gauge and one drawdown gauge.
14. One three-quarter inch smooth-mouth brass sampling cock.
15. Paint all above-ground pipe work with two coats of Tnemec Series 20-1255 Pota-Pox or approved equal.
16. Yard piping and tie in as shown on the contract drawings.

2.6 ELECTRIC MOTOR

2.6.1 The well pump shall be furnished complete with an electric motor installed under this contract. The motor shall conform to National Electrical Manufacturer's Association (NEMA) Standard MG1. Motor specifications shall be as follows unless otherwise indicated on the Project plans (WDS):

1. Motor Type: Three-phase squirrel cage induction motor, NEMA B.
2. Horsepower: As determined in the field from pump drawdown and discharge pressure requirements or as indicated on the project plans.
3. Synchronous Speed: 1,800 RPM.
4. Voltage: 480V
5. Frequency: 60 Hz.
6. Enclosure: Weather protected Type 1, suitable for outdoor service.
7. Service Factor: 1.15 minimum.
8. Special Electrical Features:
   a. Solid state “soft-start” devices required for all motors.
   b. Premium efficiency, low power factor design.
9. Special Mechanical Features:
   a. Bearings and cooling designed for long life and continuous duty.
   b. Equipped with ratchet to prevent back spin of motor on shutdown.

2.7 TURBINE PUMP FOR WELL

2.7.1 Pump and motor selection shall be such that the wire-to-water efficiency is equal to the best generally available in this type of application.

3.0 EXECUTION

3.1 WELL CONSTRUCTION

3.1.1 Should drilling mud be necessary, a commercial bentonite-type shall be used during the drilling operations. The viscosity of the mud shall be sufficient to carry the heaviest drilled material to the surface. Organic-type drilling mud shall not be allowed. Contractor shall provide water for drilling.

3.1.2 The Contractor shall employ only competent workmen for this contract and all applicable work shall be performed by or under the supervision of an experienced well driller.

3.1.3 If the well hole was drilled appreciably deeper than the total depth selected for the permanent well, the Contractor shall plug the well hole, immediately below the bottom of the waterbearing formation selected, with concrete by the standard Haliburton cementing method. The Contractor shall satisfactorily assure the Engineer that the well hole has been plugged in accordance with the Mississippi State Department of Health regulations.

3.1.4 Outer Casing

3.1.4.1 The bore hole shall be reamed to a minimum diameter of five inches larger than the outside diameter of the outer casing.

3.1.4.2 At no point shall the casing be out of alignment more than one degree per 500 linear feet. Three depths (upper, middle and lower) shall be checked with a drift indicator.

3.1.4.3 The operation and use of the drift indicator shall be in strict accordance with the manufacturer's instructions. Should the alignment not be within the prescribed limits, the Contractor shall, at his own expense, correct the alignment within the available limits of the bore hole or abandon and plug the hole and drill another hole at this site.

3.1.4.4 The inside wall of the casing and both walls of the discharge column, lap pipe and pump tail pipe shall be coated with three coats of Tnemec Series 20-1255, or equal, to a total dry film thickness of 15 mils (5 mils each coat). The surface to be coated shall be prepared to SSPC-SP8, Commercial Blast, or SSPCSP8, acid cleaning, and as recommended by the coating manufacturer.

3.1.4.5 The top of the casing shall extend at least two feet above final ground surface or as shown on the contract drawings.

3.1.4.6 The Contractor may elect to use steel surface casing. However, no payment will be made by the Owner. It will not be required to leave the surface casing in place, but the Contractor may do so at his discretion.

3.1.5 Welding shall be done in accordance with the American Welding Society Specifications and the American Petroleum Institute Specifications. All welding shall be done by a qualified welder, using adequate equipment, rods compatible with the casing materials, with full penetration, avoidance of slag inclusion and complete filling of the well space with weld metal. The casing shall be spaced and aligned before the first bead is made. A minimum of four aligning straps, a minimum of four feet in length shall be used to align the casing or the Contractor may use aligning clamps. A minimum of two pass weld shall be run around the complete circumference of the casing at each weld joint. Proof of the welder's qualifications may be requested by the Engineer prior to any welding.

3.1.6 The outer casing shall be cemented in place with a minimum of a two and one-half inches cement grout around the outside of the casing from bottom to top. The cement shall be placed by a standard Haliburton cementing method, involving pumping from the bottom of the casing up the outside of the casing to the ground surface.

The hole and casing shall be circulated prior to beginning any cementing operations. The viscosity of the drilling mud shall be reduced to a minimum viscosity prior to circulation.

The cement used shall be Portland Class A with a maximum of eight percent gel additive. The cement shall be mixed with 7.8 gallons of water per sack of cement and shall have a minimum slurry weight of 14 pounds per gallon. The volume of the slurry shall be 1.92 cubic feet per sack of cement. The slurry shall be weighed with a standard mud balance and the slurry weight shall be maintained as specified during the cementing operation.

A reserve of at least 20 percent over the calculated volume of cement required for the cementing shall be stocked on location for washout. The cement after placement shall be allowed to set for a period of not less than 24 hours, after which the plug at the bottom of the casing may be drilled. The drilling fluid shall be treated in a manner approved by the Engineer to eliminate cement contamination prior to beginning any other drilling operations.

3.1.7 Under-Reamed Hole Below the Casing

3.1.7.1 The hole below the outer casing shall be reamed or under-reamed to a minimum diameter of six inches larger and a maximum diameter of 16 inches larger than the outside diameter of the screen. The under-reaming shall be done with a hydraulic under-reamer, or approved equal.

3.1.7.2 The diameter of the under-reamed hole shall be sufficient to allow pumping the design yield rate at no greater than five times the natural flow limit (Laminar Flow) of the formation.

3.1.8 Casings and Screens

3.1.8.1 The screen shall be plain end, beveled for welding, or threaded for coupling. The size of the screen openings to be used on the screen shall be as selected by the Contractor and approved by the Engineer, based on mechanical analysis of the formation samples and the type and grading of gravel selected as a result of test hole information. The screen shall not be less than the nominal pipe-size diameter and estimated length shown on the Project plans unless approved by the Engineer.

3.1.8.2 Two groups of three centering guides shall be placed on the outside of the lap pipe in the annular space between the lap pipe and the outer casing. The first group of centering guides shall be five feet above the bottom of the outer casing and the second group shall be five feet below the top of the lap pipe. Centering guides shall also be used on the screen with at least one set at the top and bottom of the screen in the under-reamed hole and one set in the center of the screen with total spacing not to exceed 50'. The guides to be used shall be steel and their positions shall be approved by the Engineer.

3.1.9 Gravel Wall

3.1.9.1 The type and size of gravel to be used shall be determined and selected by the Contractor from the character and mechanical analysis of the waterbearing formation as provided by the test hole data information. The gravel selected shall be washed, screened and without sharp edges. The gravel shall be free of dirt, trash, clay or other foreign substances. Crushed gravel shall not be used. Not more than five percent of the gravel shall be soluble in hydrochloric acid. A sample of the gravel and the mechanical analysis of the gravel shall be submitted to the Engineer for approval at the time the Contractor submits his evaluation of the test hole information.

NOTES:

a. 50 percent grain size of gravel pack should not exceed five and one-half times that of the 50 percent grain size of the formation material;
b. Uniformity should be less than 1.75; and
c. Percent of formation material retained shall not be less than 90 percent.

The selected slot size of the screen shall retain at least 90 percent of the gravel pack material. At the same time, the entrance velocity through the screen at the design yield shall not exceed 0.1 feet per second.

3.1.9.2 The annular space between the screen and the face of the under-reamed hole and between the inner casing and the outer casing shall be filled with select gravel to within five feet of the top of the inner casing. The gravel shall be placed in the well through a gravel line or tremie pipe which shall be set up as near to the top of the screen as possible and withdrawn as the gravel rises. The gravel shall be tremied with water from the surface through this line. The volume of gravel placed in the well shall not be less than the calculated volume of the annular space between the under-reamed face of the well and the outside of the screen plus the annular space between the inner and the outer casings. A quantity of gravel amounting to at least 20 percent more than this computed annular space shall be stocked on location before the graveling operations commence. After development, testing and completion of the well, the gravel level shall be checked and returned to within five feet below the top of the inner casing. Any other methods proposed for placement of the gravel pack must be approved by the Engineer prior to construction.

3.1.9.3 The Contractor shall notify the Engineer at least 24 hours prior to the start of placing the gravel pack so that the Engineer may be present to witness this operation.

3.1.9.4 The gravel shall be sterilized to a residual of 50 parts per million free chlorine solution as it is placed in the well.

3.1.9.5 The gravel shall be protected in an appropriate manner to prevent contamination when stockpiled on the job site. At no time shall the gravel material be placed in direct contact with the soil.

3.1.10 Well Development

3.1.10.1 The well shall be developed by mechanical methods consisting of agitation and washing with a tandem agitator under pressure with backwashing and pumping with air to remove the mud cake from the face of the waterbearing formation and any mud material that has penetrated the waterbearing formation and to orient and stabilize the waterbearing materials and gravel pack. During development, the Contractor shall provide means for pumping at a rate that will carry all sand passing through the screen to the surface.

3.1.10.2 All water used in the drilling and construction process shall be obtained from sources of proven satisfactory quality and shall meet the primary standards of the Safe Drinking Water Act Regulations.

3.1.10.3 Upon completion of the well and prior to acceptance, the Contractor shall disinfect and re-disinfect the well as is necessary until two consecutive samples of chlorine-free water from the well are found to be free of Coliform bacteria. Samples of water shall be submitted to the Department of Health in accordance with their requirements for submitting water samples for bacteriological examination. Prior to collecting the initial sample, the well shall be pumped for a sufficient time to eliminate any chlorine used for disinfection and any water around the screen which may have been influenced by reaction with chlorine. The second sample shall be collected following at least two hours of continuous pumping after the first sample. The well shall not be re-disinfected prior to collecting the second sample.

3.1.10.4 Before the final pumping tests are made, the well shall be sounded and if any material is found inside the well above the bottom of the lowest screen, it shall be removed before the well is tested. At this time, the back pressure valve shall be filled with cement grout to a depth of one foot above the connection between the back pressure valve and the screen.

3.2 INSTALLATION OF PUMP FOUNDATION

3.2.1 The Contractor shall furnish and place all labor, materials, tools and equipment required for installation of the pump foundation and seal (see contract drawings for details). The pump head shall be connected to the outer casing by a watertight seal. A minimum 2" diameter pipe with ¾" tubing shall be installed for the use of an electric water level measuring device to be lowered between the well casing and the pump column. The tubing shall extend to the top of the pump bowl and shall be strapped to the pump column with stainless steel bands.

3.3 CLOSED-CIRCUIT TELEVISION INSPECTION AND PROCEDURE

3.3.1 A closed circuit television inspection of the well is required. Television equipment shall consist of a self contained camera and a monitoring unit connected by a coaxial cable. Camera shall be small enough to ensure passage through the screen, shall be waterproof and shall have a self-continuous, clear picture showing the entire inside periphery of the constructed well. The closed circuit television inspection shall be made in the presence of the Engineer.

3.3.1.1 The television equipment shall be capable of "writing" on the monitor screen and permanent media to indicate the depth of materials.

3.3.1.2 The television inspection shall be performed on the entire depth of the well. The inspection shall be performed by lowering the television camera down the well along the axis of the outer casing and secondly on the axis of the screen and lap pipe. A continuous record of the inspection shall be recorded on a DVD in a readable format with standard viewing software, such as Windows Media Player, and furnished to the Owner. The video record shall display the depth of the camera from the top of the outer casing. The measurement reading shall be made at ground level by means of a meter device. Marking on a cable shall not be allowed.

3.3.1.3 The television inspection shall include a recorded survey of three welded joints via a 90 degree rotational light head. The three joints to be inspected shall be determined by the Engineer. Should the workmanship of any of the welded joints be questionable, the Engineer reserves the right to have additional joints inspected.

3.3.1.4 A television work report, in log form, shall be maintained during the television inspection. This log shall show the exact location of each section of screen or lap pipe. The reference location shall include the distance from the top of the casing. It shall also contain notations as to any irregularities that might be discovered. Copies of such records shall be furnished along with the descriptive literature submittals to be compiled at the conclusion of the project.

3.4 CAPPING

3.4.1 After development, the well shall be capped by welding on a 1/4-inch steel plate or in a manner approved by the Engineer. Before capping, the well and adjacent aquifer must be disinfected using a 50 mg/L free chlorine solution for a contact time of 24 hours.

3.5 WELL CLEANING

3.5.1 After testing of the well is completed and the test pump is removed, the well shall be sounded and if there is any sand or other material inside the well above the bottom of the lowest screen, this material shall be removed prior to installation of the permanent pump.

3.6 PUMP INSTALLATION

3.6.1 Sufficient column assembly shall be furnished and installed to submerge the top of the pump bowl a minimum of 30 feet below the pumping level in the well at the end of 24 hours pumping at open discharge

3.6.2 Installation and assembly of the pumping equipment into the well shall be supervised by experienced and qualified personnel of the pump supplier. A qualified person shall make all adjustments to the pumping equipment and supervise startup of the pump.

3.6.3 A copper air line, with a direct reading gauge, will be installed with the pump column.

3.7 FIELD QUALITY CONTROL

3.7.1 Tests

3.7.1.1 When the well is completed and thoroughly developed, the Contractor shall furnish, install and operate a test pump complete with prime mover, water-level measuring device and pipe orifices for accurately measuring the pumping rate. A 24-hour aquifer test with continuous pumping shall be conducted at a constant rate of pumping at the specified well design capacity. Measurements during the test will be made at the designated time intervals or as directed by the Engineer and the results recorded. After the pumping portion of the test has been completed, measurements of the recovery of the water level shall be made at the designated time intervals for a twenty-four hour period or until the water recovers to the original static water level, whichever occurs first. The pump shall not be removed during this recovery period.

1. The Contractor shall record the water level readings taken during the pumping and recovery periods in an acceptable form and deliver at least two copies of the field test report to the Engineer. Air line shall be used to measure water levels.
2. Two 1-gallon water samples shall be collected in the 24th hour of pumping. The Contractor shall have a standard chemical analysis made of one sample of the water by an independent certified laboratory acceptable to the Engineer. The analysis shall be for the elements listed below. The other sample shall be delivered to the Engineer.

*$pHCO_{2FC}$	Chloride	Odor	Color
Alkalinity as $CaCO_3$ (T & P)	*H_2S (presence)	Total Dissolved Residue	Turbidity, SiO_2
Total hardness	Nitrate	Sulfate	Sodium
*Iron	Calcium	Fluoride	$CaCO_3$
Manganese	Magnesium	Potassium	*Temperature

*To be analyzed in the field immediately upon collection of the sample.
Results shall be submitted to the Engineer.

3. The Contractor shall analyze the 24-hour aquifer test data by normally recognized methods showing semi-log plots of drawdown and recovery and, as a minimum, report the following:
   a. The degree of development of the production well;
   b. The well specific capacity;
   c. The well efficiency of the production well;
   d. Recommended capacity for the permanent pumping equipment for the production well;
   e. Recommended pump bowl setting depth;
   f. Recommended horsepower of the permanent pumping equipment for the production well based on pump bowl depth, static head on system, and friction head on system; and
   g. Review feasibility of proposed well spacing and capacities (if applicable).

3.7.1.2 Acceptance Tests

3.7.1.2.1 When the Contractor has completed the installation of the permanent pumping equipment and has operated the same ready for the acceptance test, the installation shall be tested in the presence of the Engineer.

1. Pump Performance Tests:
   a. When the well has been completed and the permanent pump and motor installed, the pump shall be operated for a period of eight hours during which time the pump flow shall be shown to meet or exceed the specifications in the project plans as measured at the discharge flange and at a discharge pressure as specified on the project plans. Reasonable stops, not to exceed a total of one hour, shall be allowed during this period for the adjustment of the equipment and measuring devices. When the eight hour test is complete, the Contractor shall then conduct a three hour step-test at six different flow rates of 30 minutes each and shut off head at the pump.
   b. A circular orifice weir or other accurate flow measuring device shall be furnished by the Contractor with a valve and pressure gauge for verifying the required performance of the complete installation. Operation of any remote well operation control shall also be satisfactorily demonstrated.
2. Motor Performance Tests: Motor current and temperature shall be shown to be within design and nameplate specifications. These tests may be performed concurrent with the pump performance tests specified above.
   a. Motor no load current and voltage for each phase with the unclutched motor.
   b. Motor full load current and voltage for each phase with the coupled pump and motor while pumping at specified flow rate against specified discharge pressure.
3. Vibration Tests
   a. The vibration of the pump and motor installation shall be measured as described herein, using an IRD Model 345 vibration analyzer or equivalent equipment. Background vibration shall first be determined with all equipment at rest. Next, unclutched motor vibration shall be determined. The coupled pump and motor vibration shall then be measured. Measurements shall be made at the top of the motor in the vertical plane and both horizontal planes, parallel and perpendicular to the discharge pipe line.
   b. Vibration at the design point on the pump curve at design speed shall not exceed those specified by the Hydraulic Institute Standards, Twelfth Edition.
4. Bacteriological Tests:
   Upon completion of the well and prior to acceptance, the Contractor shall disinfect and re-disinfect the well as is necessary until two consecutive samples of chlorine-free water from the well are found to be free of Coliform bacteria. Samples of water shall be collected in the presence of the Engineer and submitted to the State Department of Health in accordance with their requirements for submitting water

samples for bacteriological examination. Prior to collecting the initial sample, the well shall be pumped for a sufficient time to eliminate any chlorine used for disinfection and any water around the screen which may have been influenced by reaction with chlorine. The second sample shall be collected following at least two hours of continuous pumping after the first sample. The well shall not be re-disinfected prior to collecting the second sample.

3.7.1.3 Testing Completion

3.7.1.3.1 Prior to acceptance of completed testing for the well, contractor shall flush all foreign materials and place 50 mg/l of free available chlorine for a contact time of 24 hours in adjacent storage structures if not in current operation to ensure proper disinfection prior to utilization. Samples of water shall be collected in the presence of the Engineer and submitted to the State Department of Health in accordance with their requirements for submitting water samples for bacteriological examination.

*** END OF SECTION ***

SECTION 33 31 13
SANITARY SEWER PIPE

1.0 GENERAL

1.1 DESCRIPTION

These Specifications shall govern the furnishing and installing of sanitary sewer mains and fittings as shown on the project plans and specified herein. The pipe and accessories shall be installed in accordance with the requirements of these specifications at the locations and depths indicated on the plans approved by this Owner and the governing regulatory agencies. The pipe and accessories shall be of the classes, sizes, and dimensions shown thereon.

1.2 QUALITY ASSURANCE

1.2.1 Source Quality Control: Obtain pipe and fittings from no more than one manufacturer.

1.2.2 Reference Standards: The work, materials and related activities shall be in accordance with the latest standards of the American Water Works Association (AWWA), American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), Uni-Bell Pipe Association, Mississippi Department of Health, Mississippi Department of Environmental Quality, and any other related State or Federal standards or requirements.

1.3 RELATED WORK SPECIFIED ELSEWHERE

Section 31 23 33, Earthwork, Excavation, and Backfill for Utilities
Section 33 11 00 – Pipe Installation

1.4 MEASUREMENT AND PAYMENT

Payment for work in this section shall be included in the unit price / lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials and incidentals complete.

1.5 SUBMITTALS

The following shall be submitted in accordance with the General Conditions, in sufficient detail to show full compliance with the specification:

SD-01 Quality Control:
a. Certificates: Provide a manufacturer certificate of compliance that the materials supplied meet the requirements of these specifications.

2.0 MATERIALS

2.1 GENERAL

Markings: Pipe shall be marked at a maximum of 5 ft. intervals and shall include nominal size, schedule, SDR designation, or pressure class, AWWA designation, National Sanitation Foundation (where applicable), material cell classification (where applicable), and Manufacturer's name and code. All pipe shall be green to denote for use as sanitary sewer. Ductile iron pipe and fittings shall have green polyethylene encasement.

2.2 GRAVITY SANITARY SEWER MAINS

2.2.1 General: Pipe shall be either PVC or Ductile Iron meeting the specifications below. Pipes shall be considered a Main if the nominal diameter is eight (8) inches or larger. Sanitary sewer service connections shall connect to the main with a "wye" or "tee" fitting and be installed during the installation of the main. Installation of flexible tap saddles shall not be permitted unless approved in writing by the Engineer.

2.2.2 Ductile Iron Pipe: Pipe shall be non-flanged centrifugally cast in metal or sand lined molds manufactured in accordance with the latest edition of ANSI A21.51 (AWWA C151). Pipe shall have a minimum pressure rating of 350 psi for 12" and smaller diameters and 250 psi for 14" and larger diameters in accordance with ANSI A21.50 (AWWA C150). Joints shall be push-on type in accordance with ANSI A21.11 (AWWA C111). Pipe shall be coated with a factory applied bituminous coating approximately one (1) mil thick and lined with a forty (40) mil ceramic epoxy liner as manufactured by Induron, Protecto 401 or equal. Pipe shall be wrapped in a polyethylene encasement in accordance with ANSI A21.5 (AWWA C105) and installed in accordance with DIPRA Method A. Polyethylene encasement shall have a minimum thickness of 8 mils. Joint lubricant shall be as recommended by the pipe manufacturer.

2.2.3 Polyvinyl Chloride (PVC) Pipe: PVC pipe shall conform to ASTM D1784, ASTM D3034 and ASTM F679 for all dimensional, chemical, and physical requirements. Pipe shall be made of type 1, grade 1 class 12454-B material in accordance with ASTM D 1784. Pipe shall be SDR 26 and not exceed the bury depths as recommended by the manufacturer. Joints shall be integral bell and spigot type with elastomeric flexible seals in accordance with ASTM F-477. Joint lubricant shall be as recommended by the pipe manufacturer.

2.3 BURIED PRESSURE SANITARY SEWER MAINS

2.3.1 Ductile Iron Pipe: Pipe shall be non-flanged centrifugally cast in metal or sand lined molds manufactured in accordance with the latest edition of ANSI A21.51 (AWWA C151). Pipe shall have a minimum pressure rating of 350 psi for 12" and smaller diameters and 250 psi for 14" and larger diameters in accordance with ANSI A21.50 (AWWA C150). Joints shall be mechanical or push-on type in accordance with ANSI A21.11 (AWWA C111). Pipe shall be coated with a factory applied bituminous coating approximately one (1) mil thick and lined with a forty (40) mil ceramic epoxy liner as manufactured by Induron, Protecto 401 or equal. Pipe shall be wrapped in a polyethylene encasement in accordance with ANSI A21.5 (AWWA C105) and installed in accordance with DIPRA Method A. Polyethylene encasement shall have a minimum thickness of 8 mils. Where joint restraints are necessary they shall be a boltless type locking gasket meeting the requirements of ANSI A21.11 (AWWA C111). Joint lubricant shall be as recommended by the pipe manufacturer.

2.3.2 Ductile Iron Fittings: Fittings shall conform to the latest edition of ANSI A21.10 (AWWA C110) or ANSI A21.53 (AWWA C153) for compact fittings. Fittings shall have a minimum pressure rating of 350 psi for 12" and smaller diameters and 250 psi for 14" and larger diameters in accordance with ANSI A21.50 (AWWA C150). All joints for fittings, valves, and specials shall be mechanical type in accordance with ANSI A21.11 (AWWA C111). Mechanical joints shall have plain rubber gaskets with stainless steel bolts and nuts. Fittings shall be coated with a factory applied bituminous coating approximately one (1) mil thick and lined with a forty (40) mil ceramic epoxy liner as manufactured by Induron, Protecto 401 or equal. All fittings shall be wrapped in a polyethylene encasement in accordance with ANSI A21.5 (AWWA C105). Polyethylene encasement shall have a minimum thickness of 8 mils. No "special" fitting will be allowed without written approval.

2.3.3 Polyvinyl Chloride (PVC) Pipe

2.3.3.1 (Sizes 4" and larger): PVC pipe and fittings shall comply with the requirements for PVC Water Distribution Pipe. Pipe shall have a minimum pressure rating of 235 psi (DR 18) for pipe complying with AWWA C900 and 235 psi (DR 18) for pipe complying with AWWA C905.

2.3.3.2 (Sizes 3" and smaller): PVC pipe and fittings shall be pressure rated polyvinyl chloride in accordance with ASTM D2241 and ASTM D1784. Pipe shall be manufactured with an integral bell to utilize gaskets for sealing and conforming too ASTM F477. Pipe shall be a minimum of DR21 rated for 200 psi in pressure sewer applications. Pipe shall have outside diameter dimension of IPS (Iron Pipe Size).

2.3.4 High Density Polyethylene (HDPE) Pipe: HDPE pipe and fittings shall comply with the requirements for HDPE Water Distribution Pipe.

2.3.4.1 (Sizes 4" and larger): Pipe material shall be a high density PE 3608/3408 cell classification 345464C per ASTM D3035. Pipe shall conform to AWWA C901. Pipe shall be pressure rated 160 psi (SDR11). For pipes 4" and larger, outside diameter shall be controlled by ductile iron pipe size (DIPS). Pipe shall conform to ASTM D2737 or D3035 as applicable depending on size. Pipe shall conform to NSF Standard 14/61.

2.3.4.2 (Sizes 3" and smaller): Pipe material shall be high density PE 3608/3408 cell classification 345464C per ASTM D3035. Pipe shall conform to AWWA C901. Pipe shall be pressure rated 160 psi (SDR11). For pipe sizes ¾" through 3" pipe outside diameter shall be controlled by iron pipe size (IPS). Pipe shall conform to ASTM D2737 or D3035 as applicable depending on size. Pipe shall conform to NSF Standard 14/61.

2.4 EXPOSED PRESSURE SANITARY SEWER MAINS

2.4.1 Exposed pressure sanitary sewer mains shall be either Ductile Iron Pipe and Fittings or 316 SS Pipe and Fittings as called for on the project plans and specified herein.

2.4.2 Exposed ductile iron pipe and fittings shall meet the requirements of section 2.03 A and B except where modified herein. Pipe and fitting joints shall be flanged in accordance with ANSI A21.15 (AWWA C115) and include 1/8 inch thick red rubber full faced gaskets. Bolts and nuts shall be type 304, stainless steel. Pipe and fittings shall be coated with 2 coat of epoxy primer for 2.0-4.0 dry mils per coat, 1 coat of intermediate coating, high build epoxy, for 3.0-4.0 dry mils, and 2 coats of finish coating, aliphatic acrylic polyurethane, for 2.0-3.0 dry mils per coat.

2.4.3 Exposed stainless steel pipe and fittings shall be 316 grade, austenitic stainless steel, schedule 20, seamless for sizes up to 16 inches and welded for sizes above 16" per ASTM A312. Pipe and fittings shall be flanged per ASTM A182.

2.5 SANITARY SERVICE PIPE

2.5.1 Gravity Sewer Service Pipe: Shall comply with the requirements of section 2.02 C. Only one structure shall be connected to each gravity sewer service. Gravity sewer services shall be capped watertight three (3) feet below ground and marked with a 4" square wood post painted green. Post shall extend a minimum of two (2) feet above ground. Capped service shall have metal cap for detection with metal detector and survey coordinates shall be listed on record documents.

2.5.2 Pressure Sewer Service Pipe (sizes 2" and smaller):

2.5.2.1 PVC: Pipe material shall be Sch. 40. Fitting shall be brass when threaded.

2.5.2.2 HDPE: Pipe material shall comply with Section 2.03 D.2. Fittings shall be brass.

3.0 EXECUTION

Comply with Section 33 11 00, Piping General.

*** END OF SECTION ***

SECTION 33 31 14
SEWER VALVES AND APPURTENANCES

1.0 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

Section 31 23 33, Earthwork, Excavation and Backfill for Utilities
Section 33 12 16, Water Valves and Appurtenances
Section 33 31 13, Sanitary Sewage Pipe

1.2 QUALITY ASSURANCE

1.2.1 Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

AWWA C500, Gate Valves 3 Inch Through 48 Inch For Water and Other Liquids.
AWWA C508, Swing Check Valves for Ordinary Waterworks Service.
AWWA C507, Plug Valves
AWWA C512, Air Release, Air/Vacuum and Combination Air Valves for Water and Wastewater Service
ANSI B16.1, Cast-Iron Pipe Flanges and Flanged Fittings.
ANSI B16.4, Cast-Iron Screwed Fittings.
ASTM A 307, Carbon Steel Externally and Internally Threaded Standard Fasteners.
ASTM A 354, Quenched and Tempered Alloy Steel Bolts, Studs and Other Externally Threaded Fasteners.
ASTM D 1784, Rigid Polyvinyl Chloride Compounds and Chlorinated Polyvinyl Chloride Compounds.
ASTM D 2464, Threaded-Type Schedule 80 PVC Pressure Fittings.
ASTM D 2467, Socket-Type Schedule 80 PVC Pressure Fittings.
Standards of National Electrical Manufacturer's Association.

1.2.2 Operation and Maintenance Data: Submit a detailed operation and maintenance manual for all valves and appurtenances provided under this Section including the following information:

a. Product name and number.
b. Name, address and telephone number of manufacturer and local distributor.
c. Instruction bulletins for operation, maintenance and recalibration.
d. Complete parts and recommended spare parts lists.

1.3 MEASUREMENT AND PAYMENT

Payment for work in this section shall be included in the unit price / lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials and incidentals complete.

1.4 SUBMITTALS

The following shall be submitted in accordance with the General Conditions, in sufficient detail to show full compliance with the specification:

SD-01 Quality Control:

a. Certificates: Provide a manufacturer certificate of compliance that the materials supplied meet the requirements of these specifications.

SD-02 Contract Closeout:

a. Operation and Maintenance Data: Submit a detailed operation and maintenance manual for all valves and appurtenances provided under this Section including the following information:
   e. Product name and number.
   f. Name, address and telephone number of manufacturer and local distributor.

g. Instruction bulletins for operation, maintenance and recalibration.
h. Complete parts and recommended spare parts lists.

2.0 PRODUCTS

2.1 MATERIALS

2.1.1 General:

2.1.1.1 All valves shall have manufacturer's name and working pressure cast in raised letters on valve body.

2.1.1.2 All manual valve operators shall turn right to close unless otherwise specified. Valves shall indicate the direction of operation.

2.1.1.3 Unless otherwise specified all flanged valves shall have ends conforming to ANSI B16.1, Class 125.

2.1.1.4 All buried valves shall be provided with adjustable three-piece valve boxes and Provided with extension stems, operating nuts and covers unless otherwise shown or specified. All bolts, nuts and studs on or required to connect buried or submerged valves shall be stainless steel.

2.1.1.5 All bolts and studs embedded in concrete required to connect wall pipes to valves and appurtenances specified herein shall be stainless steel.

2.1.1.6 All other bolts, nuts and studs shall, unless otherwise approved, conform to ASTM A 307, Grade B cadmium plated, hot dipped galvanized or stainless steel.

2.1.1.7 Bolts and nuts shall have hexagon heads and nuts.

2.1.1.8 Gasket material and installation shall conform to manufacturer's recommendations.

2.1.2 Service Connection to Pressure Sewer Main:

2.1.2.1 Connection Materials

2.1.2.1.1 Service Saddle:
a. Required for connection to PVC and HDPE sewer force mains.
b. Straps: double stainless steel straps
c. Saddle: stainless steel
d. Manufacturer and Model
1. Ford Meter Box Company, Inc. Style 202BS
2. Or approved equal.

2.1.2.1.2 Tapping Tee:
a. Electrofusion Type
b. Manufacturer: Frialen DAA High Pressure Tapping Tee or approved equal.

2.1.2.2 Service Connection Box:

2.1.2.2.1 Location: within 5’ of connection of pressure sewer service line and main pressure sewer transmission mains. Required for all grinder pump and STEP tank effluent pump connections to force mains.

2.1.2.2.2 Service Connections shall incorporate an assembly consisting of a check valve, threaded PVC nipple, and shutoff ball valve.
a. Shutoff ball valve shall be PVC type 1, ASTM D 1784 with EPDM O-rings. Valve shall have “T” type stem with polypropylene handle and be pressure rated for 150 psi minimum (schedule 80). Valve shall be manufactured by Spears, Utility Ball Valves or approved equivalent. End connections shall be threaded.
b. Check valve shall be ball type. Material shall be PVC type 1, ASTM D 1784 with Nitrile

Rubber check ball and seal at the clean-out port. Valve shall be marked with external flow direction arrow and note “this side up” for correct installation and incorporate a clean-out port as not to require the valve body to be removed to service the valve. Valves shall be pressure rated to 100 psi. Valves shall be manufactured by Flomatic, Series 208 or approved equivalent. End Connections shall be threaded.

c. Service Connection shall have PVC or HDPE adapter on each end. Adapter shall incorporate compression connection (pack joint) and male IP threaded connection to allow valves to be removed from box for replacement or maintenance. All couplings shall be brass.

2.1.2.2.3 Sewer Service Connection Box shall be sized to provide access to couplings, adapters, shutoff valve and check valve. Box shall be NDS type 1200 meter box meeting the requirements of Section 33 12 16, Paragraph 2.02.C, with GREEN colored cover.

2.1.3 Combination Sewage Air Valve:

2.1.3.1 Type: Single Body, Automatic Float Operated Valve. Designed to release accumulated air from pipeline (force main) during system operation and designed to allow large quantities of air to exhaust the pipeline during filling and admit air during draining. Valve must be designed for use with wastewater applications.

2.1.3.2 Working Pressure: capable of working at a pressure range of 3 to 250 psi and pressure tested to 350 psi.

2.1.3.3 Construction:

2.1.3.3.1 Body and Cover shall be Cast Iron Class B with epoxy coating

2.1.3.3.2 Float and all internal parts shall be stainless steel.

2.1.3.4 Location: At high points along pressure sewer main, or any location where air may become trapped during operation. Valve shall be installed in a vault meeting the requirements of precast manhole sections and be traffic rated.

2.1.3.5 Manufacturer shall be ARI D-020, D-025 or D-023, size shall be as required for air release and intake.

2.1.3.6 Required Accessories:

2.1.3.6.1 Backflushing Attachments for flushing as recommended by manufacturer with valves at connection points.

2.1.3.6.2 Isolation valve and tapping saddle for connection to pressure sewer main. Tapping saddle shall be stainless steel band with stainless steel saddle and buna-n rubber gasket by Ford Meter Box or equal. Isolation valve shall be 2-piece stainless steel full port ball valve with stainless steel ball and stainless steel stem. Manual lever operator shall be stainless steel. All nipples shall be stainless steel.

2.1.4 Gate Valve:

2.1.4.1 Standard: AWWA C509.

2.1.4.2 Type: Non-Rising Stem. Capable of passing a 3” Solid, unless otherwise approved for grinder sewer pump applications by the Authority.

2.1.4.3 Construction:

2.1.4.3.1 Body and Bonnet: Cast iron.

2.1.4.3.2 Wedges and Trim: Resilient Seat.

2.1.4.3.3 Packing: O-ring.

2.1.4.4 End Connections:

2.1.4.4.1 Exposed Valves: Flanged, conforming to ANSI B16.1, Class 125, unless otherwise shown.

2.1.4.4.2 Buried Valves: Mechanical joint, conforming to ANSI B21.11.

2.1.4.5 Operation: Handwheel for exposed valves in vault and 2” operating nut for buried valves.

2.1.4.6 Manufacturer:

2.1.4.6.1 M&H Style 4067.

2.1.4.6.2 Or equal.

2.1.5 Swing Check Valve:

2.1.5.1 Type: Counter-weighted swing check. Capable of passing a 3” solid.

2.1.5.2 Construction:

2.1.5.2.1 Body, Cover, Disk and Levers: Cast Iron

2.1.5.2.2 Counterweight Arm: Cast iron

2.1.5.2.3 Shaft: 18-8 Stainless Steel

2.1.5.2.4 Body Seat: Bronze

2.1.5.2.5 Seat Ring: Rubber

2.1.5.2.6 Shaft Gland Packing: Compression Type

2.1.5.3 Location: As indicated on the project plans.

2.1.5.4 Coating: Valve shall be epoxy coated.

2.1.5.5 Manufacturer: Clow F-5382, American Flow Control 50SC or equal.

2.1.6 Tapping Sleeve

2.1.6.1 To be used on all hot-tap line connections.

2.1.6.2 Construction

2.1.6.2.1 Cast Iron

2.1.6.2.2 Split end gaskets

2.1.6.3 End Connection: Mechanical Joint

2.1.6.4 Manufacturer and Model:

2.1.6.4.1 M & H Styles 1174 & 1274

2.1.6.4.2 Or equal.

2.1.7 Plug Valves:
2.1.7.1 Standard: AWWA 507

2.1.7.2 Type: Non-lubricated eccentric plug with resilient plug faces

2.1.7.3 Construction:

2.1.7.3.1 Body and Plug Material: Cast Iron, ASTM A126, Class B

2.1.7.3.2 Bearings: Permanently lubricated, stainless steel

2.1.7.3.3 Plug Facing: Neoprene bonded to plug

2.1.7.3.4 Seat: Nickel

2.1.7.3.5 Packing: Buna (VEE)

2.1.7.4 Required Features:

2.1.7.4.1 Valve rated for drip tight shutoff at 150 psi differential pressure

2.1.7.4.2 Valve packing adjustable and replaceable without disassembly of valve

2.1.7.4.3 For valves 8″ and smaller — lever actuator; valves larger than 8″— geared actuator

2.1.7.5 Manufacturer:

2.1.7.5.1 CLOW

2.1.7.5.2 M.H.

2.1.7.5.3 Or equal

2.1.8 Yard Hydrant:

2.1.8.1 Type: Compression, non-freezing.

2.1.8.2 Connection:

2.1.8.2.1 2 inch IPS inlet thread, universal type.

2.1.8.2.2 1-1/2" outlet thread nozzle with quick connect 1-1/2" adaptor with female NPT as specified in this section.

2.1.8.3 Materials:

2.1.8.3.1 Head: Bronze.

2.1.8.3.2 Casing: Steel.

2.1.8.3.3 Supply Pipe: Galvanized steel.

2.1.8.4 Field serviceable without digging up hydrant.

2.1.8.5 Manufacturer:

2.1.8.5.1 Merrill

2.1.8.5.2 Murdock, Inc.

2.1.8.5.3 Or equal.

2.1.9 Sluice Valve:

2.1.9.1 Standard: AWWA C501

2.1.9.2 Construction:

2.1.9.2.1 Frame: Fabricated stainless steel

2.1.9.2.2 Gate: Fabricated stainless steel

2.1.9.2.3 Guides: Non-metallic UV resistant polyethylene.

2.1.9.2.4 Seal: Resilient lip seal

2.1.9.3 Manufacturer:

2.1.9.3.1 Wey or approved equal.

2.1.10 Knife Gate Valve:

2.1.10.1 Standard: AWWA C520

2.1.10.2 Construction:

2.1.10.2.1 Body: Stainless steel

2.1.10.2.2 Gate: Stainless steel

2.1.10.2.3 Seat: Buna N

2.1.10.2.4 Bolts, Gland, Stem, Yoke: Stainless steel

2.1.10.2.5 Stem nut: Bronze

2.1.10.2.6 Handwheel: D.I.

2.1.10.2.7 Packing: TFE lubricated synthetic

2.1.10.3 Manufacturer:

2.1.10.3.1 Townley

2.1.10.3.2 DeZurik

2.1.10.3.3 Henry Pratt

2.1.10.3.4 Or Equal

2.2 APPURTENANCES

2.2.1 Extension Stems, Stem Guides, Wrenches and Keys:

2.2.1.1 Extension stem shall be at least as large as the stem of the valve it operates.

2.2.1.2 Extensions shall be placed on any operator that is more than 24” below ground. Intermediate stem guide shall be installed for extensions more than 10 feet long.

2.2.1.3 Stem brackets and guides shall be made of cast iron and have fully adjustable bronzed bushed guide block.

Fasten brackets to walls with approved expansion bolts.

2.2.1.4 Operating nuts about 2 inches square shall be included with extension stem.

2.2.1.5 Provide operating key or wrench of suitable length and size for each valve that is not readily accessible to direct operation.

2.2.2 Extension Bonnets: Shall be provided for all of the filter's isolation valves, filter-to-waste valves, and air scour valves. Extension shall be of adequate length to place top of bonnet as shown on the drawings.

2.2.3 Valve Boxes:

2.2.3.1 Location: Provide for all buried valves.

2.2.3.2 Construction:

2.2.3.2.1 Heavy pattern cast iron box.

2.2.3.2.2 Type: Three-piece adjustable, telescoping.

2.2.3.2.3 Inside Diameter: 4-1/2 inches minimum.

2.2.3.2.4 Cover: Heavy-duty cast iron marked “JCUA SEWER”

2.2.3.2.5 Direction to Open Arrow: Cast in cover.

2.2.3.3 Provide extension stem and operating nut.

2.2.3.4 Operating nut and stuffing box enclosed by lower section which rests on bonnet.

2.2.4 Manual Operators:

2.2.4.1 Type: Handwheel, lever, chainwheel, chainlever or operating nut.

2.2.4.2 Location:

2.2.4.2.1 Handwheel or Lever: Comply with schedule 15100.

2.2.4.2.2 Chainwheel or Chainlever: Provide on all valves more than 6 feet 6 inches above the operating floor level or as otherwise specified in Schedule 15100.

2.2.4.2.3 Operating Nut: Provide on all buried valves.

2.2.4.3 General:

2.2.4.3.1 Conform to the requirements of AWWA C504.

2.2.4.3.2 Maintain valve position in any intermediate position without creep or flutter.

2.2.4.3.3 Designed to prevent over travel of valve at either full open or closed position.

2.2.4.3.4 Designed to produce required torque at a maximum input pull of 80 pounds.

2.2.4.4 Gearing:

2.2.4.4.1 Provide worm gear operators for all handwheel and chainwheel operated butterfly valves.

2.2.4.4.2 Design: Totally enclosed.

2.2.4.5 Chainwheel Operator Details:

2.2.4.5.1 Chainwheel: Manufacturer's standard design or sprocket wheel bolted directly to valve handwheel.

2.2.4.5.2 Chain:
(1) Material: Zinc-coated steel.
(2) Length and Size: As reviewed by the ENGINEER.

2.2.4.5.3 Chain Hold Device: Equip each operator with 1/2-inch hook bolt located to keep chain out of walking area.

2.2.4.6 Additional Butterfly Valve Operator Details:

2.2.4.6.1 Stop-limiting Devices: Provide for open and closed positions.

2.2.4.6.2 Design: Adequate to avoid damage to all components from 200 lb pull on handwheel or chainwheel operators or 300 ft-lb input torque from operating nuts.

2.2.5 Motor Operators:

2.2.5.1 Electric Open/Closed Valve Actuators:

2.2.5.1.1 General:
(1) Self-contained unit with drive motor and controls, reduction gearing, limit and torque switching gearing, declutching device and auxiliary handwheel;
(2) Torque Rating: 1.5 times maximum required torque;
(3) Gearing capable of opening or closing valve from one extreme to the other in not less than 30 seconds nor more than 60 seconds;
(4) Mechanical Stops: Internal limit stops to prevent overtravel;
(5) Rotation: 90 degrees reversible;
(6) Limit switches for valve open/closed control;
(7) Auxiliary Limit Switches for Remote Position Indication: 4 SPDT required -- 2 for open and 2 for closed indication;
(8) Adjustable torque switches to protect motor in the event of excessive torque developed during travel in either direction;
(9) Handwheel:
(a) Provide integral declutching mechanisms to disengage motor and motor gearing mechanically;
(b) Design so handwheel does not rotate during motor operation;
(c) Design to produce required torque at maximum input pull of 80 pounds.
(10) Enclosure: NEMA 4.

2.2.5.1.2 Electrical Features:
(1) Characteristics:
(a) Power Supply: 480-volt, 3-phase, 60 Hz;
(b) Control Power: 120 volt, single phase, 60 Hz;
(2) Motor duty rating sufficient for one complete open-close-open or reverse cycle without exceeding motor temperature rating;
(3) Integral reversing magnetic starter;
(4) Circuit breaker disconnect with external operating handle;
(5) 120 volt, single phase space heater;
(6) Local Controls:
(a) Remote/local switch;
(b) Open and closed position indicating lights;
(c) Reversible, intermittent contact open-stop-closed switch;
(d) Mount controls on the cover of the unit.

2.2.5.1.3 Manufacturer:
(1) Limitorque;
(2) AUMA;
(3) Or equal.

2.2.6 Modulating Valve Actuators:

2.2.6.1 General Requirements:

2.2.6.1.1 Comply with all of the specifications for electric open/close valve actuators and as listed below:
(1) Equip actuator with integral electronics for accepting a proportional 4-20 mA dc control signal and to position the valve proportional to the control signal;
(2) Electronics Power Source Requirements: Internally derived and regulated as required if other than 120 VAC unregulated is required;
(3) Equip actuator with zero and span adjustments;
(4) Provide actuator with a field set choice of valve positions on loss of signal;
(5) Provide position indicator for each actuator;
(6) Equip Actuator with integral electronics for output of a 4-20 mA DC position feedback signal for remote indication;

2.2.6.1.2 Electrical Features:
(1) Characteristics:
(a) Power Supply: 480V 3 Phase 60 Hz;
(b) Control power: 120V Single Phase 60 Hz;
(c) Control power transformer;

2.2.6.1.3 Manufacturer:
(1) Limitorque
(2) EIM
(3) Or equal

3.0 EXECUTION

3.1 INSTALLATION

3.1.1 Install all valves and appurtenances in accordance with manufacturer's instructions.

3.1.2 Install suitable corporation stops at all points shown and required where air binding of pipe lines might occur.

3.1.3 Install all valves so that operating handwheels or wrenches may be conveniently turned from operating floor but without interfering with access.

3.1.4 Unless otherwise approved install all valves plumb and level. Valves shall be installed free from distortion and strain caused by misaligned piping, equipment or other causes.

3.1.5 Valve boxes shall be set plumb, and centered with the bodies directly over the valves. Earth fill shall be carefully tamped around each valve box to a distance of 4 feet on all sides of the box, or to the undisturbed trench face, if less than 4 feet.

3.2 FIELD TEST AND ADJUSTMENTS

3.2.1 Adjust all parts and components as required correct operation.

3.2.2 Conduct functional field test of each valve in the presence of the Engineer to demonstrate that each part and all components together function correctly. All testing equipment required shall be provided.

*** END OF SECTION ***

SECTION 33 32 16.13

PACKAGED SEWAGE GRINDER PUMPING STATIONS

1.0 GENERAL

1.1 These Specifications shall govern the furnishing and installation of grinder pump stations. The stations shall be installed in accordance with the requirements of these specifications, at the locations and depths indicated on the plans. The stations shall be of the class, size, and dimension shown thereon.

1.2 GENERAL

1.2.1 All systems for each project shall be by a single source so as to ensure compatibility of controls and ensure system responsibility.

1.2.2 Units shall contain grinder pump(s), discharge piping, controls, and all other necessary parts and equipment required to provide an operating simplex grinder pump station, and shall include the equipment being installed a fiberglass reinforced, corrosion resistant polyester tanks for outside installations. All equipment shall be factory installed, except for externally mounted control panel, gravity sewer inlet hubs and pump assembly, which are to be installed in the field.

1.2.3 Simplex units shall be installed in single family residential applications and include a single pump and controls necessary for operation of a single pump, unless a duplex station is required by the project. Duplex units shall be installed in multi-family residential, commercial, and light industrial applications.. Duplex units shall include two pumps and controls necessary for operation of a duplex pump station.

1.2.4 All equipment and materials provided for this project shall be warranted against defects in materials and workmanship for a period of five (5) years from the date the system is tested and accepted. The manufacturer will provide and install new parts free of charge for the duration of the warranty; remanufactured parts will not be accepted.

1.2.5 Grinder Pump Manufacturer shall be required to maintain an authorized warranty and repair service center within a fifty (50) mile radius of the project site.

1.2.6 Provide electrical power to units as required to meet the testing requirements specified within these specifications. If power is not readily available it will be the responsibility of the person(s) installing the equipment to provide power by whatever means necessary (i.e. generator) to power the equipment for testing.

1.2.7 Related Work Sections:

Section 03 30 00	Cast-in-Place Concrete
Section 31 23 33	Earthwork, Excavation and Backfill for Utilities

1.3 MEASUREMENT AND PAYMENT

Payment for Work in this section shall be included in the unit price / lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials, and incidentals complete.

1.4 SUBMITTALS

The following shall be submitted in accordance with the General Conditions, in sufficient detail to show full compliance with the specification:

SD-01 Quality Control:

a. Design Data
b. Test Reports

c. Manufacturer's Instructions
d. Manufacturer's Field Reports

SD-02 Contract Close-out:
a. Project Record Documents
b. Operation and Maintenance Manuals

SD-07 Data Warranty.

2.0 PRODUCTS

2.1 DESCRIPTION

2.1.1 System shall consist of sewage grinder pump(s), level control switches, discharge piping, and stainless steel lifting chain, for each pump, to be installed in factory built basin. A NEMA 4X fiberglass weatherproof control box shall be supplied for mounting at the sump site or remote from the basin as required.

2.2 OPERATING CONDITIONS

2.2.1 Simplex Stations:

2.2.1.1 Operating Conditions:
a. Standard System: Pump shall be capable of producing a minimum flow of ten (10) gallons per minute at a total head (static and dynamic) of 90 feet and be capable of pumping at a total head as low as 20 feet at a maximum flow of fifty (50) gallons per minute. Shutoff head shall be 100 feet minimum.
b. High Head System: Pump shall be capable of producing a minimum flow of ten (10) gallons per minute at a total head (static and dynamic) of 110 feet and be capable of pumping at a total head as low as 20 feet at a maximum flow of fifty (50) gallons per minute. Shutoff head shall be 125 feet minimum.

2.2.1.2 Motor Rating: 2 HP, 230 volts, single phase, 60 Hz, 3450 RPM. The full load current shall not exceed 13 amps.

2.2.1.3 Pump shall be a submersible centrifugal grinder pump, positive deplacement pumps shall not be considered, manufactured by Myers, model WGL20 Series or approved equivalent.

2.2.2 Duplex Stations: Operating conditions will vary depending on application. Motor rating will vary depending on application, rating shall be recommended for certain application and operating conditions by manufacturer. Pumps shall be manufactured be Myers, model WGL20 Series or approved equivalent.

2.3 DESIGN

2.3.1 The pump volute, motor and seal housing shall be cast iron, ASTM A-48, Class 30, and integrally built. Pump shall be designed for pumping normal domestic and commercial sewage including a reasonable amount of foreign objects such as small wood, sticks, plastic, thin rubber, sanitary napkins, disposable diapers, and the like to a fine slurry that will freely pass through the pump and the 1¼" discharge piping. All external mating parts shall be sealed with Buna-N rubber O- Rings on rabbet joints. Gaskets shall not be acceptable. All fasteners exposed to the pumped liquids shall be 300 series stainless steel.

2.4 ELECTRICAL POWER CORD

2.4.1 Electrical power cord shall be water resistant, UL and/or CSA-approved and size according to amp draw for the application, minimum of 14 gauge, 5 lead SOOW. Single cord shall incorporate the power and seal sensor leads. Cords shall be furnished by manufacturer and shall be a minimum of 30 feet in length.

2.4.2 The power cable entry into the pump/motor unit of the system shall be designed to prevent water contamination to gain entry even in the event of wicking or capillary attraction. Seal shall be a compression fitting with Buna-N sealing ring in the gland.

2.5 MOTORS

2.5.1 Each pump shall be driven by a Submersible Electric Motor. The motor shall be oil filled. Motor shall be NEC Code D for continuous duty, capable of sustaining 10 starts per hour. The pump and motor shall be produced by one manufacturer and shall be of submersible design.

2.5.2 The stator, rotor and bearings shall be mounted in a sealed submersible frame. The stator winding shall be of the open type with Class F insulation, (155° C or 311° F), NEMA L design (single phase) or NEMA B design (three phase). Single phase motors shall be capacitor start, capacitor run type for high start torque.

2.5.3 Pump shall be equipped with thermal sensors imbedded in phase of the winding to protect the motor from overheating. Switch(s) shall open at a temperature recommended by the manufacturer and turn the pump off and automatically reset when it cools to a temperature recommended by the manufacturer.

2.5.4 No special tools shall be required for pump and motor disassembly. The stator must be capable of being repaired or rewound by a local motor service center. Pump must be capable of being serviced in the field.

2.5.5 The pump and motor shall be specifically designed so that they may be operated partially or completely submerged in the liquid being pumped without compromise. The pump shall not require cooling water jackets.

2.6 BEARINGS AND SHAFT

2.6.1 Motor shall have an upper single row ball radial bearing and a lower single row ball thrust bearing. Ball bearings shall be designed for 50,000 hours B-10 life.

2.6.2 The common motor pump and grinder shaft shall be machined from solid 400 series stainless steel and be designed for minimum shaft overhang.

2.6.3 The shaft shall be threaded to mount the pump impeller and grinder impeller.

2.7 SEALS

2.7.1 Motor shall be protected by two seal. Seal face shall be carbon, when rotating, or ceramic, when stationary. All hardware is to be 300 series stainless steel and sealing elastomers are to be Buna- N Rubber. Sealed housings shall contain moisture sensing probes that shall activate a warning light in the control panel if moisture enters the sealed area.

2.8 IMPELLER

2.8.1 Shall be bronze or cast iron construction and non-overloading. Impeller shall be multi-vane, centrifugal type, semi-open design. Impeller shall be hydraulically and statically balanced.

2.9 GRINDER CUTTERS

2.9.1 Grinder cutters shall be in combination with the pump impeller and attached to the common motor and pump shaft. Grinder shall consist of a grinder impeller and shredding ring. The grinder cutters shall be on the suction side of the pump impeller and discharge directly into the impeller inlet. Grinder cutters shall be capable of grinding all materials found in domestic, including plastic, rubber, sanitary napkins, disposable diapers and wooden articles into a slurry of fine ground particles with dimensions no greater than ¼ inch in any direction. Grinder cutters and shredding shall be hardened 400 series stainless steel with a minimum hardness of 55 Rockwell C.

2.10 PAINTING/COATING

2.10.1 The pump shall have a High Build Epoxy protective coating on all outside surfaces.

2.11 TESTING

2.11.1 Commercial testing at the factory shall be required and include the following:

2.11.1.1 The pump shall be visually inspected to confirm that it is built in accordance with the specification as to HP, voltage, phase, and hertz.

2.11.1.2 The stator motor leads shall be tested for integrity using a megohmeter at the highest setting.

2.11.1.3 Pump shall be allowed to run dry to check for proper rotation.

2.11.1.4 Discharge piping shall be attached; the pump submerged in water and amp readings shall be taken in each leg to check for an imbalanced stator winding. If there is a significant difference in readings, the stator windings shall be checked with a bridge to determine if an unbalanced resistance exists. If so, the stator will be replaced.

2.12 BASIN

2.12.1 Basin – The diameter shall be a minimum 24 inch and depth shall be a minimum 5 foot deep for simplex units. Depth may increase depending on location of basin and gravity inlet pipe. Duplex units shall be sized depending on the application and shall meet the manufacturer's recommendations.

2.12.2 Basin Materials – Molded Fiberglass Reinforced Polyester Resin: System shall be suitable for atmospheres containing hydrogen sulfide and dilute sulfuric acid as well as other gases associated with wastewater collection systems. Basins shall have a minimum thickness of ¼", or as required to meet the requirements below for depth required for project. Reinforcing materials shall be commercial grade "E" mat, continuous roving, chopped roving, roving fabric, or a combination.

2.12.3 Inner and Outer Surfaces – All surfaces shall be smooth and resin rich, free of cracks and porosity, with uniform molded in color and thickness. Air bubbles will not be acceptable. Fiber-reinforced polyester basin shall not have any blisters larger than ½ inch in diameter. Surface pits shall be less than ¾ inch in diameter and 1/16 inch in depth Wrinkles on interior surfaces shall be less than 1/8 inch in depth. Both exterior and interior surfaces shall be smooth with no sharp projections or exposed fibers.

2.12.4 Tank Wall – Wall thickness shall provide the aggregate strength necessary to meet the tensile and flexural physical properties requirements. The basin wall must be designed to withstand wall collapse or buckling based on:

2.12.4.1 Minimum dynamic-load rating 16,000 ft-lbs. Rating shall be established by basin not leaking, cracking or suffering any other damage when load tested at 40,000 ft-lbs and shall not deflect vertically downward more than ¼ inch at the point of load application when loaded to 24,000 lbs.

2.12.4.2 Conditions: Hydrostatic Pressure of 62.4 lbs/sf, Saturated Soil Weight 120 lbs/cf, and Soil Modulus of 700 lbs/sf.

2.12.4.3 Test shall be as specified in ASTM D3753, latest edition, Section 6.

2.12.4.4 Tank wall must be constructed to withstand or exceed (2) two times the actual imposed loading on any depth of basin.

2.12.5 Tank Bottom – The basin bottom shall be of sufficient thickness to withstand applicable hydrostatic uplift pressure. In saturated conditions, the center deflection of the empty basin bottom shall be less than 3/8" (elastic deflection) and shall not interfere with bottom pump mounting requirements. Any mounting studs, plates, cap screws into tank bottom should be stainless steel and resin covered except for threads. Any inserts should be stainless steel or brass and resin covered except for threads.

2.12.6 Tank Collar (Anti-Flotation) – A means to counteract buoyancy forces shall be provided on the tank bottom in the form of a ring, and shall extend a minimum of 2" beyond the O.D. of the basin wall. Wall and collar should be blended with a radius not to exceed 1 ½" beyond wall O.D.

2.12.7 Venting – Tank shall be vented to the atmosphere via non-degradable integrated venting screen at the ground level with at least 10 square inches of perforated surface area.

2.12.8 Capacity – Tanks with a nominal outer diameter of 24" shall be capable of holding at least 45 gallons of water in the bottom 16" (antifloat region), and a minimum of 28 gallons of water per vertical foot above the antifloat region.

2.13 BASIN COVER

2.13.1 A one piece, solid polypropylene, fiber-reinforced polyester, or aluminum (24" or 30" dia. basins) cover or aluminum (36" and larger dia. Basins) cover shall be provided for each installation. The cover shall be constructed for a 250 PSF load. Hatch shall be attached to the basin.

2.13.2 The cover shall be grass green in color if polypropylene or fiber-reinforced polyester. The cover surface shall have a non-skid design, and shall be water-tight. Cover shall be bolted to the basin with stainless steel cap screws for "light duty" loading. Design of cover shall allow for basin to be mounted flush with ground.

2.13.3 Aluminum covers shall include a single leaf hatch of minimum size to access all valves and remove the pump(s) from the basin without having to remove the cover. Hatch shall be equipped with stainless steel hinges and automatic hold open arms and a padlock hasps.

2.13.4 Provide a 2" mushroom vent for cover. Note: If inlet pipe is connected to vent stack in house, vent on basin cover is not required.

2.14 PIPING AND APPURTENANCES

2.14.1 Pump Discharge:

2.14.1.1 Simplex units shall consist of a stainless steel or schedule 80 PVC discharge piping which is connected to a check valve, shutoff valve, and hydraulic cast iron seal flange or stainless steel quick disconnect that connects the discharge piping to the force main via a flex hose. Gate valve shall remain attached to force main when pump, check valve, and discharge piping are removed from the basin for maintenance.

2.14.1.2 Duplex units shall consist of stainless steel or schedule 80 PVC discharge piping, shutoff valves, check valves, discharge elbow, and stainless steel guide rail(s).

2.14.2 Check valve shall be sch. 80 pvc, coated cast iron, stainless steel, or brass construction and of either swing or ball type design to provide unobstructed flow through the valve body when the pump is pumping flow and close when the pump shuts off preventing flow from entering the basin from the system. The ball type valves shall incorporate a clean- out port that does not require the body of the valve to be removed. Check valve shall be rated for 150 psi pressure minimum.

2.14.3 Ball type shutoff valve: Handle shall be near the top of basin, within reach for service personnel. Shutoff valve shall be rated for 150 psi pressure minimum. Valve shall be sch. 80 PVC, coated cast iron, stainless steel, or brass.

2.14.4 Seal flange or quick disconnect shall be capable of being disconnected without entrance into the basin by personnel. Seal flange shall automatically seal pump if a discharge elbow is provided or be an integral part of the discharge piping or check valve allowing access from the top of the basin by maintenance personnel. Quick disconnect shall be located as to allow access from the top of the basin by maintenance personnel.

2.14.5 An adequate length stainless steel chain or nylon rope shall be supplied for removing the pump. The chain/rope shall be of sufficient length and strength for easy removal. It shall not be required to lift on the discharge piping to remove the pump.

2.14.6 Inlet Flange: One-piece, flexible basin inlet fitting for 4" SCH 40 plastic pipe for residential or 6" SCH 40 plastic pipe for commercial shall be shipped loose for field installation.

2.14.7 No male threaded PVC fittings shall be allowed. Couplings to convert from PVC piping to threaded connections shall be brass.

2.15 JUNCTION BOX

2.15.1 A U.L. listed, NEMA Type 6 submersible rated junction box shall be provided. Junction box shall be formed from corrosion resistant, flame retardant thermoplastic. The enclosure shall be of adequate thickness and properly reinforced to provide good mechanical strength. The junction box shall have a fully gasketed, hinged cover that is held in place by stainless steel screws.

2.15.2 An adequate number of sealing-type cord grips shall be supplied for incoming pump and level control cords. The cord grips shall be made of non-corrosive material such as PVC or nylon, and shall make an effective seal around the wire jacket.

2.15.3 The junction box shall have a PVC solvent weld socket with an integral 1½" NPT pipe for attaching basin conduit hub. The hub shall be made of a corrosion resistant material and shall be of adequate size to accommodate the number of wires required for pump and level control operation.

2.15.4 The incoming wires shall be sealed by external means so that condensation from the conduit or groundwater will not enter the enclosure. The interior of the enclosure shall be of adequate size to accommodate the wires and connections for pump and level control operation.

2.15.5 The wires running between the control panel and the junction box shall be color-coded and fastened to the pump and level controls by means of adequately sized and insulated twist lock or crimp connectors.

2.16 ELECTRICAL CONTROL PANEL AND APPURTENANCES

2.16.1 Control Panel Model / General Construction

2.16.1.1 Control Panel – shall be supplied by pump manufacturer with Float Switch Operation. Panel shall include a Hand-Off-Automatic switch for each pump.

2.16.1.2 Simplex or Duplex – Weather Proof Controller with Alarm meeting U.L. Standard 508.

2.16.2 General Operation / Construction

2.16.2.1 A complete wiring diagram and installation instructions shall be provided. The control panel assembly shall be completely factory tested and shall be "UL" 508A listed and labeled. Enclosure shall have nameplate with model number, voltage, phase, hertz, ampere rating and horsepower rating.

2.16.2.2 Run lights, failure lights, test/silence push button and hand on-off-automatic switch shall be provided. The test/silence button shall output alarm for a test and silence the alarm when alarm is already activated for a failure or other situation. Switch and lights shall be properly labeled as to the function of each. Duplex pumps shall also provide switch to manually run one or both pumps independently of the other.

2.16.2.3 Motor Contactors. The motor contactor shall be a heavy duty definite purpose rated contactor sized to meet NEC requirements. It shall provide the electrical start / stop control for each pump along with an integral overload protection and have 120 volt operating coil. Contactors shall be Culter Hammer or approved equal.

2.16.2.4 The features shall be integrated on a single control board with scope for future expansion. The compactness of the control board shall eliminate the need for several discrete components resulting in ease of serviceability, reduction in probability of failure and lower heat generation. The plug-ins feature of the control board shall enhance ease of serviceability by eliminating the need for all manual wiring. The control board shall operate on a low voltage DC.

2.17 CONTROL PANEL/TESTING

2.17.1 Factory Tests – Each control panel shall receive a factory test to ensure proper operation prior to shipment. Factory Tests shall include at a minimum:

a. All control logic functions, including: turn on, turn off, alarms,etc.
b. All fuses and circuit breakers
c. All indicator lights and switches
d. Audible and visual alarm indicators (when provided).
e. Power transfer circuit to pump motor
f. Float switch input circuits (for float operated models)
g. Pressure level operation (for pressure transducer operated models)
h. The panel shall be connected to a representative test pump. The panel shall be tested for proper motor starting and running operation

2.17.2 Enclosure

2.17.2.1 Durable NEMA 4X Enclosure, made from a poly carbonate material and intended for indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, and hose directed water; undamaged by the formation of ice on the enclosure. The resin system also shall include a flame retardant to obtain a flammability rating which meets U.L. 94V-O. Heat distortion temperature shall be 350 degrees Fahrenheit. The resin system shall be resistant to ultraviolet light.

2.17.2.2 Removable non-metallic hinged door with standard lockable stainless steel latches, for safe operation indoor and outdoor.

2.17.2.3 Non-Conductive Standard Molded Sub-Door (Dead Front). The sub-door will isolate the user from energized components and line voltage.

2.17.2.4 Non-Conductive Injected Molding Back Panel The back panel shall have a raised platform for mounting circuit breakers, a heavy-duty parallel ground lug, housing for motor contractors and elevated terminal strip.

2.17.2.5 Inside Sub-Door Quick disconnect circuit board for easy replacement and troubleshooting. Spare fuses for Alarm and Control fuse replacement. The inner door shall include a screwdriver for ease of field service.

2.17.3 Alarms / Indicators

2.17.3.1 Visual Alarm Circuitry– A top mounted high intensity flashing red light with various flashing modes depending on alarm condition. The panel will have an individual alarm circuit fuse.

2.17.3.2 Audible Alarm Cicuitry – Audible piezo alarm, +/- 95 dB within 2 feet, with a side mounted touch to silence pad and circuitry feature.

2.17.3.3 Individual Control and Alarm Fuses with fail indicator lights. Each fuse shall have an individual fuse “blown” indicator light for simple troubleshooting.

2.17.3.4 Control, Alarm, Pump Run and Float Indicator lights. Pump Run lights shall be provided for each motor and mounted on the sub door, along with a separate control circuit power light and alarm circuit power light. The float operated panels shall have float status indicator lights for both the simplex and duplex models.

2.17.4 Circuit Breakers

2.17.4.1 Control Circuit Breakers. The 120 Volt common control circuit shall be protected by an auxiliary single (1) pole circuit breaker. Breaker shall be rated 10,000 Amps interrupt current (10KAIC). The circuit breakers shall be accessible through the sub door.

2.17.4.2 Motor Circuit Breakers. The pump breakers shall be thermal magnetic trip devices and provide for individual motor disconnect and overload / short circuit protection as required by the NEC rating for motor branch circuit protection. Breaker shall be rated 10,000 Amps interrupt current (10KAIC). The voltage rating shall match that of the panel incoming service. All circuit breakers shall be accessible through the sub door.

2.17.5 Level Controls

2.17.5.1 Float Switch Control Operation

2.17.5.1.1 The control panel shall provide terminal strip inputs for: Simplex: pump off, pump on, and alarm float controls; Duplex: lead pump on, lag pump on, pumps off, and alarm float controls.

2.17.5.1.2 The controller shall provide float switch status indicator lights. The indicator LED's shall activate to indicate the closure of each of the float switches. The indicator LED's shall also flash to indicate float switch failure. The out of sequence or float failure indicators shall remain activated until the next pump down sequence after the fault has been corrected. A chirping audible alarm shall also be activated when a float switch failure or out of sequence operation is detected.

2.17.5.2 Float Controls

2.17.5.2.1 Simplex control panel operation shall be automatically controlled by 3 (simplex) or 4 (duplex) mercury level controls. Float switches shall control off, on and alarm functions.

2.17.5.2.2 Float switch shall be capable of operating at temperatures between 32 and 170° F. Float switches shall activate and deactivate between 5 degrees above horizontal and 5 degrees below horizontal. Float switch shall be constructed with a polypropylene outer shell for durability and resistance to wastewater environment. Outer shell shall be filled with polyurethane foamed interior to provide best buoyancy, water tight integrity and protect the mercury switch.

2.17.5.2.3 Float switches shall be of normally open type.

2.17.5.2.4 Float switch cables shall be made of chlorinated polyethylene, type SJOOW, 18 AWG, 2-wire type. Float switch contacts and shall be capable of handling 10 amps at 115 VAC or 3 amps at 240 VAC.

2.17.5.2.5 Float switch shall be third party safety listed by UL, US and shall be capable of operating intrinsic safe relays.

2.17.5.2.6 Float switches shall have an external zinc plated cast iron weight. Weight shall be of the split design and shall be easily adjustable for tether length. Float switch weights made of heavy metals which may contaminate the waste flow stream shall not be acceptable.

2.18 SPARE PARTS

2.18.1 The following spare pumping equipment items shall be provided at the rate of one (1) for every twenty (20) simplex or duplex units installed in a project, a minimum of one of each of the items shall be provided for all projects where five (5) or more units is installed:

a. Grinder pumps
b. Liquid level controls
c. Control panels
d. Check valves
e. Shut-off valves

3.0 EXECUTION

3.1 INSTALLATION

3.1.1 Install pumps and accessories in accordance with the manufacturer's recommendations.

3.1.2 Align, adjust, and lubricate in accordance with the manufacturer's instructions and leave in proper working condition.

3.1.3 Perform any required touch-up painting in accordance with recommendations of paint system or coating manufacturer.

3.2 FIELD QUALITY CONTROL

3.1.4 General: Retain a qualified representative of the manufacturer to perform the following services if multiple pumping units are installed or use a manufacturer approved contractor for installation and testing.

3.1.5 Required Manufacturer Services:

3.1.5.1 Equipment Installation:
a. Oversee installation of the equipment and accessories specified herein.
b. Inspect the completed installation and note deficiencies.
c. Be present and assist CONTRACTOR during the start-up, adjusting, and field testing of completed installation.

3.1.5.2 Furnish test forms and procedures for field testing.

3.1.5.3 The manufacturer's representative shall revisit the job site as often as necessary until all trouble is corrected and the installation is entirely satisfactory to the Engineer.

3.1.5.4 Manufacturer's Installation Report:
a. Prepare manufacturer's installation reports and submit them within 30 days after completion of field testing and operation instruction.
b. Include the following information:
   1. Field testing reports.
   2. Description of installation deficiencies not resolved to the Engineer's satisfaction.
   3. Description of problems or potential problems.

3.1.6 Field Testing:

3.1.6.1 Field test and calibrate equipment to demonstrate that all equipment will satisfactorily perform the functions and criteria specified in Part 2.

3.1.6.2 Provide all test apparatus required at no cost. Testing shall include providing calibrated/certified instruments to verify results.

3.1.6.3 Follow testing procedures recommended by the manufacturer.

3.1.6.4 Motor Field Tests:
a. Assembly details, motor-rating, and electrical connections, etc., shall be checked for compliance with design.
b. A motor and cable insulation test for moisture content or insulation defects shall be made.
c. Prior to submergence, the unit shall be run dry to establish correct rotation and mechanical integrity.
d. The pump shall be run for 10 minutes submerged.
e. After operational test (subparagraph d), stop motor and leave the motor submerged for 30 minutes. Then, run the insulation test (subparagraph b) again with the motor still submerged.

3.1.6.5 Seal the pump cable end with a high quality protective covering to make it impervious to moisture or water seepage prior to electrical installation.

3.1.6.6 Start up and testing of grinder pump shall be completed before warranty period begins. Water for testing can be either potable water paid for by contractor or sewage if permitted by the Engineer.

*** END OF SECTION ***

SECTION 33 39 13
PRECAST CONCRETE MANHOLES AND WETWELLS

1.0 GENERAL

1.1 DESCRIPTION

1.1.1 These Specifications shall govern the furnishing and installing of precast concrete sections as SHOWN on the plans and specified herein. The precast manholes and wetwells shall be of the shapes, sizes, and dimensions shown on the plans and shall be installed in accordance with the requirements of these specifications at the locations and depths indicated on the plans approved by the Owner and the governing regulatory agencies.

1.1.2 Contractor shall furnish all materials, equipment, and labor necessary for the installation of the precast manholes and wetwells in accordance with the plans and these specifications.

1.2 GENERAL

1.2.1 Inverts shall conform accurately to the size and elevation of the adjoining pipes. Side inverts shall be curved and main inverts, where direction changes, shall be laid out in smooth curves of the longest possible radius which is tangent to the centerlines of adjoining pipelines.

1.2.2 Related Work Specified Elsewhere:
1. Section 03 30 00, Cast-in-Place Concrete
2. Section 31 23 33, Earthwork, Excavation, and Backfill for Utilities.
3. Section 33 11 00, Pipe Installation
4. Section 33 19 14, Castings for Precast Concrete Manholes and Wetwells.

1.3 MEASUREMENT AND PAYMENT

Payment for Work in this section shall be included in the unit price / lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials, and incidentals complete.

1.4 SUBMITTALS

The following shall be submitted in accordance with the General Conditions, in sufficient detail to show full compliance with the specification:

SD-01 Product Data.

SD-02 Quality Control:
a. Test Reports: Submit a written tabulated report of each test and submit with the record documents.

1.5 QUALITY ASSURANCE

1.5.1 Source Quality Control: Obtain precast concrete sections from no more than one manufacturer.

1.5.2 Reference Standards: The work, materials and related activities shall be in accordance with the latest standards of the American Water Works Association (AWWA), American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), Uni-Bell Pipe Association, Mississippi Department of Health, Mississippi Department of Environmental Quality, and any other related State or Federal standards or requirements.

2.0 PRODUCTS

2.1 PRECAST CONCRETE SECTIONS

2.1.1 Precast sections shall conform to the standard details attached herein. Base sections may be precast unless cast-in-place is required and approved by the Engineer.

2.1.2 Except where otherwise specified, sections shall conform to ASTM C 478.

2.1.3 Precast sections shall be of approved design and of sufficient strength to withstand the loads to be imposed upon them. All sections shall be capable of withstanding a minimum of HS-20 traffic load after installation. An approved joint shall be provided to receive the sections forming the barrel.

2.1.4 Mark date of manufacture and name or trademark of manufacturer on inside of barrel.

2.1.5 Unless a larger size is recommended by the manufacturer based on pipe sizes or required by the Engineer, the barrel of precast manholes shall be constructed of 48-inch diameter standard reinforced concrete manhole sections. The barrel shall be constructed of various lengths of pipe in combination to provide the correct height with the fewest joints. No section shall be longer than four (4) feet unless approved by the Engineer. Wall sections shall not be less than five inches thick. Precast wetwell sections shall be constructed of the diameter recommended by the pump manufacturer to house the number of pumps being installed.

2.1.6 All joints shall be tongue and groove with preformed mastic joint compound or rubber and concrete using O-ring gaskets conforming with ASTM C-443. For rubber ring joints, the base of the bell shall be buttered with cement mortar to provide a uniform bearing for the spigot of the entering pipe.

2.1.7 A precast or cast-in-place slab or precast eccentric cone, as shown or approved, shall be provided at the top of the manhole barrel to receive the cast iron frame and cover. The slab or cone shall be of acceptable design and of sufficient strength to safely support an H-20 loading. Concrete slabs shall be not less than 8 inches thick. A concrete slab shall be provided at the top of the wetwell barrel. Top slab shall receive an aluminum hatch with stainless steel hardware and hinges sized large enough to remove pumps via rail system.

2.1.8 Sections shall contain manhole steps, uniformly spaced, 12 inches minimum, 16 inches maximum on centers, accurately positioned and embedded in the concrete. Steps are specified under Section 33 19 14, Castings for Precast Concrete Manholes and Wetwells.

2.2 COATINGS, LINING, AND ADMIXTURES:

2.2.1 Precast Sections - Admixture: All precast sections shall contain a cementitous crystalline type admixture that chemically controls and permanently fixes a non-soluble crystalline structure throughout the capillary voids of the concrete. Admixture shall be Xypex Admix C-100-T, containing red dye to ensure detection, or equal. The admixture dosage shall be 3.5% by weight of cement or as recommended by the manufacturer. Concrete shall be cured in accordance with ACI 308. After the sections are installed all grouted surfaces shall be properly prepared for application of two (2) coats of Xypex Concentrate, or equal, at a rate of 1.5 lbs. per square yard of surface area.

2.2.2 Manhole Sections - Linings: All manhole sections shall be lined with an approved coal tar epoxy coating. Lining shall be applied in a total of three (3) coats, a primer coat and two (2) coats of surface for a minimum dry thickness of 24 mils. Epoxy coating shall be applied in strict accordance with manufacturer’s requirements. Epoxy coating shall be applied at the concrete casting facilities. All concrete surfaces receiving an epoxy coating shall contain no greater than 10 percent moisture as determined by measurement with a suitable moisture meter. No manhole sections shall be shipped until coating is approved by the Engineer. Field touch-up and repair shall be performed in strict accordance with manufacturer’s requirements.

2.2.3 Wetwell Sections - Linings: Shall receive a monolithic interior surfacing system. Epoxy coating shall be installed in the field once wetwell is installed to insure monolithic coating across joints and connections. System shall have a total thickness of 60 mils minimum and be installed in three applications and in conformance with manufacturer’s recommendations. When cured, the system shall form a continuous, tight-fitting, hard, impermeable surface suitable for a sanitary sewer service and be chemically resistant to any chemicals, bacteria, or vapors found in domestic sewage. System

manufacturers shall be Warren Environmental System, 100% Solids Epoxy, Tnemec Series 436 Perma Shield FR, Polyspec, or equivalent.

2.3 MISCELLANEOUS METALS

2.3.1 Metal frames, covers, steps, toe pockets and similar required items shall be provided as shown and in accordance with Section 33 39 14, Castings for Precast Concrete Manholes and Wetwells.

2.3.2 Wetwell hatch shall be lockable aluminum hatch and frame with 316 stainless steel hardware. Hatch shall incorporate a hold arm with release handle and recessed lifting handle. Hatch shall be rated for 300 lbs per square foot loading. Hatch shall be manufactured by Halliday Products or equal.

2.4 MORTAR

Portland Cement Mortar shall consist of one (1) part Portland Cement, complying with ASTM C150, type 1, and three (3) parts mortar sand. Mix with sufficient water to mix mortar to proper consistency.

2.5 DROP INLET CONNECTIONS

Drop inlet connections for manholes shall conform to the design and details shown. Pipe and fittings shall be cast or ductile iron, or reinforced concrete as shown or otherwise approved for drop connections outside of the manhole. For internal drop connections (8" and smaller pipes only) the connection shall be strapped to the manhole wall using 11 gauge stainless steel (304) brackets and 18-8 bolts, nuts and anchors by RELINER or equal. A minimum of two (2) brackets are required for all connections. The top and bottom brackets shall be no more than two (2) ft from the top and bottom. Additional brackets shall be installed so that no spacing is more than six (6) ft between brackets. The connection shall be topped with an inside drop bowl by RELINER or equal.

2.6 FLEXIBLE CONNECTORS

2.6.1 Gravity Sewer Connections to Precast Concrete Structures: Flexible connections complying with ASTM C923 shall be employed in the connection of each sewer pipe with outside diameter less than 59 inches to precast section. Connector will consist of rubber EPDM and elastomers designed to resist ozone, acids, alkalis, oils and petroleum products. Banding mechanism shall be totally non-magnetic, 304 stainless steel and torqued for 60-70 inch/lbs. Connectors shall be as manufactured by Kor-N-Seal or equal.

2.6.2 Pressure Sewer and Discharge Pipe Connections to Precast Concrete Structures: Connection shall be flexible. Connection shall mechanical seal by Link-Seal or equal.

3.0 EXECUTION

3.1 PLASTERING

The outside of grading rings shall be neatly plastered with 2 inches of cement mortar as the work progresses.

3.2 BASE SECTIONS

Precast bases shall be set on a concrete foundation or compacted granular material as shown. Precast bases shall be set at the proper grade and carefully leveled and aligned.

3.3 PRECAST SECTIONS

Set sections vertical with steps and sections in true alignment. Install sections, joints and gaskets in accordance with manufacturer's recommendations. Lifting holes shall be sealed tight with a solid rubber plug driven into hole and the remaining void filled with cement-sand mortar.

3.4 MANHOLE INVERTS

For straight through flow, inverts shall be formed of concrete and shall be given a hard trowel finish. Where side inverts and curved sections occur, the inverts within the manholes shall be formed of concrete and shall be given a hard trowel finish. Manhole inverts shall be coated with coal tar epoxy per this section.

3.5 GRADING RINGS

Grading rings shall be used for all precast manholes where required. Stacks shall be a maximum of 12 inches in height, constructed on the roof slab or cone section on which the manhole frame and cover shall be placed. The height of the stack shall be such as is necessary to bring the manhole frame to the proper grade.

3.6 GRADING AROUND STRUCTURES

All structures in unpaved areas shall be built as shown or directed to an elevation higher than the surrounding ground. The ground surface shall be graded to drain away from the manhole or wetwell. Fill shall be placed around them to the level shown on the plans, and the surface evenly graded on a 1 to 5 slope to the existing surrounding ground unless otherwise shown. The slope shall be covered with 4-inches of top soil, seeded and maintained until a satisfactory growth of grass is obtained.

3.7 COATINGS

All surfaces shall be smooth and suitable for application of coatings and linings, including benches, inverts, joints, lifting holes, and walls. All active flow shall be plugged or diverted to ensure the liquid flow is below the surface being coated. Contractor shall adhere to coating manufacturer's recommendations for surface preparation, application, and testing of final product.

3.8 WATERTIGHTNESS

3.8.1 All sections shall be free of visible leakage.

3.8.2 All manholes and wetwells shall be tested for leakage by applying a vacuum of at least 10 inches of mercury to each assembled structure. Manhole vacuum test shall be considered acceptable if the time required for a one-inch drop in mercury is greater than the times shown in the table below:

Structure Diameter	**Minimum Hold Time (sec./vert. foot)**
48"	5.0
60"	6.5
72"	8.0
84"	9.5
96"	11.0
108"	12.5

3.8.3 The test shall be conducted with the frame secured to each structure. All pipes entering the manhole shall be plugged and braced.

3.8.4 Each section shall be tested for leaks and inspected, and all leaks shall be repaired in a manner subject to Engineer's approval.

3.8.5 Structures shall be tested after coating and lining systems have been applied.

3.8.6 All pipes entering the structures shall be plugged for vacuum test.

3.8.7 Contractor shall make repairs and re-test structure if it fails the initial vacuum test. Re- testing shall occur until a satisfactory test is obtained.

3.8.8 Contractor shall notify the Authority prior to test and not conduct the test without a representative of the Authority present during the testing. Contractor shall complete a written tabulated report of each test and submit to the Authority with the record documents.

3.9 FLEXIBLE PIPE CONNECTOR AND WATERSTOP

An approved flexible connector or waterstop shall be provided between each pipe entering and exiting precast concrete sections. The joint into the section shall be completely watertight. All penetrations shall be precast at the concrete plant or core drilled.

*** END OF SECTION ***

SECTION 33 39 14

CASTINGS FOR PRECAST CONCRETE MANHOLES AND WETWELLS

1.0 GENERAL

1.1 DESCRIPTION

These Specifications shall govern the furnishing and installing of castings for the project. The casting installed on water valves and manholes shall be installed in accordance with the requirements of these specifications at the locations and elevations indicated on the plans approved by this Authority and the governing regulatory agencies.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Section 33 12 16, Water Valves and Appurtenances.
Section 33 39 13, Precast Concrete Manholes and Wetwells.
Section 33 31 14, Sewer Valves and Appurtenances.

1.3 MEASUREMENT AND PAYMENT

Payment shall be included as part of the appropriate lump sum or unit price item in the Bid. Any Work associated with this Section shall be considered incidental, unless a specific line item has been provided in the Bid Form.

1.4 SUBMITTALS

The following shall be submitted in accordance with the General Conditions, in sufficient detail to show full compliance with the specification:

SD-01 Quality Control:
a. Manufacturer's Instructions

1.3 REFERENCE STANDARDS

The work, materials and related activities shall be in accordance with the latest standards of the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), Mississippi Department of Health, Mississippi Department of Environmental Quality, and any other related State or Federal standards or requirements.

1.4 DELIVERY, STORAGE AND HANDLING

Castings which are cracked, chipped, distorted or otherwise damaged will not be acceptable.

2.0 PRODUCTS

2.1 MATERIALS

2.1.1 Manholes and below grade vaults for water air release valves shall be covered frame and cover made of ASTM A48 Class 35B gray iron or ASTM A536 Grade 65-45-12 ductile iron. Frame shall have a thirty (30) inch internal diameter with a casting diameter of thirty-two (32) inches. Frame shall have a seven (7) to nine (9) inch riser and a four (4) inch minimum flange. Casting shall be cast with "JCUA SANITARY SEWER" or "JCUA WATER" to identify manhole owner and type of service. All frames and covers shall be ASSHTO M306 requirements for H-25 traffic ratings. Fabricate castings true to pattern so that component parts fit together. Casting shall be foundry coated with coal-tar epoxy

polyamide paint. Minimum thickness shall be ten (10) mils. Prior to coating castings shall have preparation in accordance with SSPC 16. All frames and castings shall extend above the 100 year flood plain by a minimum of one (1) foot or be watertight (if approved by the Authority's Engineer). Watertight frames and covers shall be furnished with a neoprene gasket to seal the cover to the frame and a plastic manhole cover insert to prevent storm water inflow. Insert shall include a handle for removal. Frames and castings shall be manufactured by Neenah Foundry Company, Vulcan Foundry, or equal.

2.1.2 Steps: Steps shall be cast aluminum alloy meeting the requirements of the Aluminum Association (Alloy AA-514) and Federal Specification G4A.

3.0 EXECUTION

3.1 INSTALLATION

3.1.1 Follow manufacturer's printed instructions.

3.1.2 Set castings accurately to required location, alignment and elevation, plumb, level, true and free of cracks, measured from established lines and levels. Brace temporarily or anchor temporarily in formwork.

3.1.3 Castings shall be set no more than three (3) inches above finished grade when installed within road rights-of-way and flush with pavement when installed in paved areas unless approved by the governing agency and the Authority.

*** END OF SECTION ***

SECTION 44 41 13.16

PACKAGED BIOLOGICAL WASTEWATER TREATMENT PLANT

1.0 GENERAL

1.1 The Work in this Section shall include furnishing all materials, equipment, and labor necessary for the installation of one (1) prefabricated steel Wastewater Treatment System, complete and ready for operation in accordance with the plans and specifications stated herein. The complete system shall include all necessary equipment for efficient plant operation. The system shall be factory assembled, so far as possible, with all piping and controls. All surfaces shall be factory painted.

1.2 RELATED SECTIONS

Section 00 72 00 General Conditions

1.3 MEASUREMENT AND PAYMENT

Payment for Work in this section shall be included in the unit price / lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials, and incidentals complete.

1.4 REFERENCES

The publications listed below form part of this specification. Each publication shall be the latest revision and addendum in effect on the date this specification is issued for construction unless noted otherwise. Except as modified by the requirements specified herein or the details of the drawings, Work included in this specification shall conform to the applicable provisions of these publications.

ASTM A36	Standard Specification for Carbon Structural Steel
ASTM A48	Standard Specification for Gray Iron Castings
ASTM A53	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

1.5 SYSTEM REQUIREMENTS

1.5.1 Design Requirements

1.5.1.1 The wastewater treatment system shall be of the activated sludge type, specifically know as "Complete Mix/ Extended Aeration Activated Sludge ".

1.5.1.2 The system shall be designed for treating a total of 15,000 gallons per day of 300 mg/l BOD5; 300 mg/l TSS, 65 mg/l TKN domestic sewage based on composite sewage samples of the average daily flow. No substances shall be introduced in quantities, which are toxic to biological organisms.

1.5.1.3 The plant shall be designed to handle average daily flows fluctuating over the range of 35% to 100% of design flow and peak daily flow rates not to exceed 250% of design flow, with an effluent quality of < 30 mg/l-BOD5; < 30 mg/l TSS, < 2 mg/L Ammonia-N.

1.6 SUBMITTALS

The following shall be submitted in accordance with the General Conditions, in sufficient detail to show full compliance with the specification:

SD-01 Product Data.

SD-02 Shop Drawings.
SD-03 Quality Control:

a. Design Data
b. Test Reports
c. Certificates
d. Manufacturer's Instructions
e. Manufacturer's Field Reports

SD-04 Contract Close-out:
a. Project Record Documents
b. Operation and Maintenance Manuals

SD-05 Data Warranty.

1.7 WARRANTY

1.7.1 Manufacturer warrants to the original purchaser all new equipment manufactured by it to be free of defects in material and workmanship; and at the election of Manufacturer will repair or replace, f.o.b. it's factories or other locations designated and as determined by Manufacturer any part or parts returned to it, transportation/freight prepaid, which examination shall show to have failed under normal use and service by the original user within two (2) year's following initial shipment by Manufacturer. Such repair or replacement shall be free of charge except for freight and those parts such as media, chemicals, oil, grease, belts and like that are consumable under normal use.

2.0 PRODUCTS

2.1 MANUFACTURERS

2.1.1 Packaged Biological Wastewater Treatment Plant shall be manufactured by Aquapoint, LLC, New Bedford, Massachusetts or approved equal.

2.2 TANK CONSTRUCTION

2.2.1 All tank vessels shall be fabricated of one-fourth inch structural grade steel plated; ASTM A-36 ¼" minimum thickness joined by arc welding with fillets of adequate section for the joint involved. All walls shall be continuous and watertight and shall be supported by structural reinforcing members where required. Fabrication and erection shall conform to the appropriate requirements of "AISC Specification for Buildings". Connection shall conform to the requirements of the American Welding Society's Code and shall develop the full strength of the member. Aeration tank will have reinforcing members on 6'-0" maximum spacing and H-frame reinforcing will be provided on end walls and partition walls.

2.2.2 All piping shall be ASTM A-53 steel schedule 40 unless specified otherwise.

2.2.3 The systems shall be transported to the job site in one (1) section. The contractor shall be responsible for field assembly, including bolting when required.

2.3 COATING AND CORROSION CONTROL

2.3.1 All vessel surfaces to be painted shall be properly prepared in a workmanlike manner to obtain a smooth, clean and dry surface. All rust, dust, and mill scale as well as other extraneous matter shall be removed by means sandblast, interior (immersion) surfaces will receive "Near White Metal Blast": NACE 2, SSPC-SP10, or Sa 2 1/2, Is a method of preparing steel surfaces to be free of all visible oil, grease, dirt, dust, mill scale, rust and paint. Generally, evenly dispersed, very light shadows, streaks and discoloration caused by stains of rust, stains of mill scale, and stains of previously applied paint may remain on no more than 5% of the surface, All interior vessel surfaces shall be painted with two (2) coats of Tnemec series N-69 Hi-Build Epoxy, 12-16 mils total dry film thickness. All Exterior (non-immersion) vessel surfaces will receive "commercial blast" cleaning SSPC-SP6, SSPC-SP6, or Sa 2, Is a method of preparing steel surfaces to be free of all visible oil, grease, dirt, dust, mill scale, rust and paint. Generally, evenly dispersed, very light shadows, streaks and discoloration caused by stains of rust, stains of mill scale, and stains of previously applied paint may remain on no more than 33% of the surface. Slight residues of rust and paint may also be left in the craters of pits if the original surface is pitted, and will be painted with two (2) coats of Tnemec series N-69 Hi-Build Epoxy, 12-16 mils TDFT.

2.4 FOUNDATION

2.4.1 A poured concrete foundation pad shall be constructed conforming to the project specifications. The slab must be level within tolerances of 1/2" per each 10'-0" of width and within 1/4" per each 10'-0" of length. The pad may be designed as a ballast to offset buoyant forces where required. The tank may be anchored to the pad using epoxy anchors and galvanized steel turnbuckles that connect to lug locations on the bottom side wall of the tank.

2.5 INLET CONNECTION

2.5.1 The influent connection shall be one, 4 inch diameter 150# standard flange. The inlet shall be located at the inlet endwall of the system.

2.6 INLET BAR SCREEN

2.6.1 A bar screen shall be provided at the influent port, to remove any unusually large solids from the incoming raw sewage. The bar screen shall be fabricated from one-half inch diameter bars spaced one-inch apart and arranged as shown on the drawings. The bars shall be sloped to permit easy cleaning of accumulating debris. A drying deck shall be furnished for drying this debris.

2.7 FLOW EQUALIZATION CHAMBER

2.7.1 An aerated flow equalization chamber shall be supplied to work in conjunction with the secondary treatment system. The purpose of the flow equalization tank is to reduce hydraulic surges on the biological process and prevent short circuiting and biomass washout. The influent shall enter the flow equalization tank by connection of a 4 inch diameter 150# flanged pipe connection.

2.7.2 The flow equalization chamber shall be provided as an integral part of the wastewater treatment system. The capacity of this chamber shall not be less than 7,500 gallons of working volume. A duplex set of grinder pumps shall be furnished and installed in the chamber for pumping the influent to the flow control box.

2.7.3 The flow proportioning facilities shall be provided at the top inside of the flow equalization chamber at the flow equalization pump discharge to reduce the pumping rate proportional to the system design flow. The chamber shall be equipped with an adjustable flat weir so that the excess pump surges shall overflow this chamber directly to the flow equalization tank. The corrected pumping flow shall pass over the "V" notch weir into the aeration chamber.

2.7.4 A duplex set of flow equalization pumps shall be provided within the flow equalization chamber and attached by piping and valving to the flow-proportioning chamber. The pumps shall be of the submersible grinder type.

2.7.5 Each pump shall be capable of delivering the following performance points, 30 gallons per minute at 15 ft. total dynamic head, the pump motor speed shall be 3450 RPM, 2 hp, 480 Volt 3, phase, 60 Hz. The pumps shall be Barnes pump model SGVF2042L.

2.7.6 The submersible grinder pumps shall be designed to reduce all material found in normal domestic and light industrial sewage, including plastics, rubber, sanitary napkins, and disposable diapers into a finely ground slurry. The resultant slurry is then pumped through small diameter piping into a gravity interceptor or treatment facility. The temperature limitation of the liquid being pumped is 104° F continuous, 160°F intermittent and shall be capable of running dry for extended periods.

2.7.7 Pump Construction: The volute, seal plates and motor housing shall be constructed of high quality ASTM A-48 class 30 cast iron. The pump (s) shall be powder coated with an epoxy primer and polyester top coat. All exposed hardware shall be 300 series stainless steel. Discharge connection shall be a standard 1.25 inch NPT in the vertical position using a threaded bolt on discharge flange.

2.7.8 The pump impeller shall be of the recessed vortex design. Pumps with standard centrifugal semi-open impeller designs shall not be acceptable. The impeller shall be of ASTM A-48 cast iron construction. The impeller shall be capable of being trimmed to meet specific performance characteristics.

2.7.9 The pump shall be a two bearing design consisting of an upper ball bearing carrying the thrust loads, and lower ball bearing for the purpose of carrying the thrust loads and radial loads. Sleeve bearings or ball bearings will not be considered equal. Bearings shall operate in an oil bath atmosphere for superior life. Permanently lubricated bearings are not acceptable.

2.7.10 The grinder mechanism shall be specifically designed for use in a grinder pump. The mechanism shall consist of an axial cutter that is locked for rotation by a shaft key. The cutter is fixed axially by a socket head cap screw. The cutter plate is held in place by a press fit. The entire cutting mechanism shall be recessed, protecting the mechanism. All grinding mechanism components, including both the cutter plate and radial cutter shall be constructed of 440C stainless steel hardened to a minimum Rockwell C55 and shall be finish ground for a fine cutting edge. The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece, stainless steel motor shaft. The grinding assembly shall operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder shall be constructed so as to eliminate clogging and jamming under all normal operating conditions including starting. In order to demonstrate adequate flow velocity and grinding capability, the grinder pump shall be capable of passing a series of stringy type solids (diapers, rags, feminine products, etc.) through the pump without roping or winding the material in or immediately below the pump suction.

2.7.11 The motor shall meet the performance requirements of a NEMA L speed- torque curve. The motor shall be designed to be non-overloading throughout the entire pump curve. The motor shall be constructed with the open windings operating in a sealed housing, which contains clean dielectric oil for heat dissipation from the windings and for lubrication of the bearings, making it capable of operating in a totally, partially, or non-shaft shall be of 416 stainless steel.

2.7.12 The pumps shall be equipped with 30 ft. of type SOW power cord. The power cord and motor shall be connected via quick disconnect pin terminals located within the motor housing. Pin receptacles shall be crimped and molded to the power cord in a PVC plug. The plug shall be secured with a stainless steel compression plate to prevent water from entering the motor housing and to provide strain relief at the point of cord entry. A polybutylene terephthalate terminal block with brass pin inserts shall connect the power cord leads with motor leads. The ground pin shall be longer than the other pins such that the ground connection is the first connection made and the last connection broken when the plug is inserted and removed, respectively. A Buna-N O-ring shall provide isolation sealing between terminal block and the motor housing. The plug assembly shall be guaranteed by the manufacturer to meet UL approval for submersion.

2.7.13 For three phase pumps, Protection against excessive temperature shall be provided by heat sensor thermostat attached to the stator windings and connected in series with the contactor coil in the control panel.

2.7.14 The unit shall utilize a double mechanical shaft seal arrangement and shall operate in an oil atmosphere. The materials of construction shall be silicon carbide for the rotating face and silicon carbide for the stationary face, lapped and polished to a tolerance of one light band, 300 series stainless steel hardware, and all elastomer parts to be Buna-N. The seal shall be commercially available and not a proprietary design of the manufacturer.

2.8 FLOW EQUALIZATION AIR SUPPLY BLOWER MOTOR UNIT

2.8.1 For supplying the air requirement of the flow equalization chamber, one (1) blower motor unit shall be furnished and installed at the location shown on the drawings. The units shall be completely factory built and tested before shipping to the project site. The blower shall be of the tri-lobe type design complete with the accessories described below.

2.8.2 The blower unit shall be capable of delivering 30 SCFM when operating at 5 PSI. The blower shall be manufactured by Kaeser Compressors, Fredericksburg, VA. The model number of the blower shall be BB52C.

2.8.3 The motor shall be 3 HP for operation on 480 Volt, 3 Phase, 60 Cycle Service, 3,600 RPM. It shall be of the TEFC (Totally enclosed fan cooled) type.

2.8.4 The blower shall be mounted on a steel base with weatherproof enclosure. The base structure shall be adequately reinforced to support the blower and motor unit.

2.8.5 For easy adjustment of the "V" belt drive connection between the blower and motor, the motor will be furnished with an adjustable motor mounting base.

2.8.6 The blower shall be fitted with a dry type polyester filter-silencer at the air intake. Furthermore, the blower discharge shall be fitted with a check valve, pressure relief valve, pressure gauge and a flexible rubber discharge coupling.

2.8.7 To help reduce blower vibration and noise, the blower motor enclosure shall be mounted on vibration dampeners and shall incorporate a discharge silencer.

2.9 FLOW EQUALIZATION ELECTRICAL CONTROL CONSOLE

2.9.1 An electrical control panel shall be installed within a NEMA 4X fiberglass weatherproof enclosure with a locking hasp. The control console shall be provided for mounting as indicated on the plans. Any exterior mounting hardware shall be stainless steel or other corrosion resistant material.

2.9.2 The control console (CP-1) shall be completely factory assembled and tested prior to shipment. The control console shall be furnished with all necessary controls for each pump and blower motor unit and associated plant equipment.

2.9.3 Controls shall be mounted to a removable sub-panel within the enclosure and shall be wired and spaced in accordance with the latest National Electrical Code. The control console shall be supplied with a properly sized magnetic-circuit breaker to act as the main disconnects for the control console. Magnetic starters with overload protection shall be supplied for all blower motor units. An electrical alternator shall be furnished to alternate the operation of each pump. The alternator shall be provided with a manual selector switch to allow manual selection of the lead pump if desired.

2.9.4 All wiring conductors within the control console shall be U.L. type THHN, stranded #14 AWG minimum, rated at 600 volts. Control wiring shall be numbered on each end.

2.9.5 Control panel and the electrical power service shall be furnished and installed by the purchaser. Wiring and conduit between the control panel and plant equipment shall be furnished by the manufacturer of the wastewater treatment plant. The panel may be detached for shipping. The main power supply shall be 480 Volt, 3 phase, 60 Cycle, 30 Amps. The control voltage shall be 120 Volt, 1 Phase.

2.9.6 Pump and blower level controls shall be of the direct acting machanical float type for complete automatic operation as follows:

Low level Alarm float: The low level alarm float will act as a redundant pump shut off and will activate an audio/visual alarm signal when the float switch is in the extended position (open circuit).

Lead level float: In the extended position the lead float switch shall create an open circuit and prevent operation of the pumps. When the circuit is closed the float switch shall allow activation of a fully adjustable timer and the pumps shall alternate between cycles, transferring wastewater to the downstream treatment reactor(s).

Lag level float: Upon closure the lag level float switch shall activate the second pump and the two pumps shall draw down the liquid in the equalization tank until the lag level float drops out again. Upon this occurrence, a counter shall be triggered to alert the operator that a high level condition has occurred and that the timer “ON” setting may need adjusting.

High level float: The high level float switch shall activate the audio/visual alarm when the circuit is closed.

Blower timer enable float: The blower float switch shall prevent blower operation when in the extended position (open circuit). When tipped up (closed circuit) the float shall permit the blower to operate on a fully adjustable cycle timer.

2.9.7 The SJE PumpMasterPlus is a direct acting float switch, which contains a single pole mechanical switch which actuates when the float tipped up at 45 degrees and deactivates when the float is extended 45 degrees.

2.9.8 The power cord will consist of a type STO #12 conductors rated for up to 230 volts.

2.9.9 The float is a chemical resistant polypropylene casing with a firmly bonded electrical cable protruding. One end of the cable is permanently connected to the enclosed switch and the entire assembly is encapsulated to form a completely watertight and impact resistant unit.

2.9.10 Independent clamp on cable weights and a float bracket for mounting shall be provided for a complete level sensing assembly.

2.10 SLUDGE HOLDING/DIGESTER CHAMBER

2.10.1 An aerated aerobic digester chamber shall be provided as specified and shown on the plans. It shall be designed to hold a minimum of 4,000 gallons of sludge.

2.10.2 The digester chamber shall be constructed as an integral part of the wastewater treatment system and fabricated out of one-fourth inch steel plate. The chamber shall have the same protective coating as specified for the treatment plant. It shall also have the same structural requirements as the wastewater treatment plant.

2.10.3 The chamber shall be of the aerated type. Diffused air shall be supplied by the plant blower system. The diffusers shall be located parallel to and near the bottom of the tank. All piping and valves within the chamber shall be factory installed.

2.10.4 An airlift pump with vertically adjustable intake and air control valve shall be provided for the purpose of decanting supernatant from the aerobic digester. The airlift piping shall be schedule 40 painted steel piping, and neoprene bands shall isolate the piping from all steel surfaces. The pipe shall pivot on a swivel joint. The intake elevation adjustment shall allow the water level in the digester to be lowered a minimum of 48 inches.

2.10.5 An air distribution manifold shall be installed longitudinally on one side of the tank with diffuser drop assemblies connected thereto.

2.10.6 Each diffuser drop assembly shall be equipped with an air regulating and/or shutoff valve, a disconnecting union and a diffuser bar with non-clog air diffuser nozzles mounted thereon at approximately 70" centers. With this spacing, the airflow per diffuser shall range from 1 to 30 SCFM. This minimum air velocity shall be maintained to insure sufficient velocity for self-cleaning. The diffusers shall be parallel to and near the base of the vessel sidewall and at an elevation, which will provide the optimum diffusion and mixing of the vessel contents. The oxygen transfer capacity of each diffuser shall be such that an adequate supply of oxygen will be maintained in the aeration chamber to meet treatment requirements of the design sewage load.

2.10.7 The diffusers will be a Model EDI MaxAir™ as manufactured by Environmental Dynamics International, Columbia, Missouri. The diffusers will be manufactured to produce a double shear when air is released. The air is sheared as it discharges the air orifice of the air diffuser body and again as it crosses over the diaphragm baffle. The air check diaphragm located on top of the diffuser is molded directly to the diffuser body, preventing the cap from blowing off when excess CFM is delivered to the diffuser. The diffuser will be supplied with standard male pipe thread connections.

2.11 AERATION CHAMBER

2.11.1 There shall be supplied, an aeration chamber to work in conjunction with the clarifier chamber. The aeration chamber shall conform to the following specifications:

2.11.2 The aeration chamber shall be of sufficient capacity to provide a minimum of 24 hours retention of the average daily flow, and/or a minimum chamber volume of 15,000 gallons. The vessel shall be so shaped on each side to prevent sludge accumulation, to enhance rotation of the vessel contents, and to prevent scum and froth accumulation. To ensure maximum retention and eliminate short circuiting of raw sewage particles, the aeration chamber shall be constructed with air diffusers, placed longitudinally along one side of the chamber so as to, in conjunction with the flow control baffles, enhance the spiral rotation of the chamber contents. To ensure adequate circulation velocity, the proportion of the chamber width to depth, in the direction of rotation, shall not exceed 1.33 to 1. The velocity of rotation shall be sufficient to scour the bottom and prevent sludge filleting

as well as to prevent the escape to the surface of minuscule air diffusion bubbles and by so causing their entrapment to provide maximum oxygenation efficiency.

2.11.3 An air distribution manifold shall be installed longitudinally on one side of the tank with diffuser drop assemblies connected thereto.

2.11.4 Each diffuser drop assembly shall be equipped with an air regulating and/or shutoff valve, a disconnecting union and a diffuser bar with non-clog air diffuser nozzles mounted thereon at approximately 70" centers. With this spacing, the airflow per diffuser shall range from 1 to 30 SCFM. This minimum air velocity shall be maintained to insure sufficient velocity for self-cleaning. The diffusers shall be parallel to and near the base of the vessel sidewall and at an elevation, which will provide the optimum diffusion and mixing of the vessel contents. The oxygen transfer capacity of each diffuser shall be such that an adequate supply of oxygen will be maintained in the aeration chamber to meet treatment requirements of the design sewage load.

2.11.5 The diffusers will be a Model EDI MaxAir™ as manufactured by Environmental Dynamics International, Columbia, Missouri. The diffusers will be manufactured to produce a double shear when air is released. The air is sheared as it discharges the air orifice of the air diffuser body and again as it crosses over the diaphragm baffle. The air check diaphragm located on top of the diffuser is molded directly to the diffuser body, preventing the cap from blowing off when excess CFM is delivered to the diffuser. The diffuser will be supplied with standard male pipe thread connections.

2.12 CLARIFIER CHAMBER

2.12.1 There shall be furnished a clarifier chamber to work in conjunction with the aeration chamber of that system. The clarifier shall conform to the following specifications:

2.12.2 The clarifier chamber shall be of such size as to provide a minimum of four (4) hours retention, based upon the same design flow rate governing the aeration chamber, and shall have proper baffling to prevent short circuiting and to provide maximum uniform retention. The clarifier inlet shall be baffled to prevent short-circuiting and provide maximum uniform solids settling area. The bottom of the chamber shall be formed into an inverted pyramidal hopper. The flat bottom area of the hopper shall not exceed one square foot. The slope of the hopper walls shall not be less than 1.7 vertical to 1.0 horizontal. Settled sludge shall be returned from the clarifier sludge hopper to the aeration chamber by the positive sludge return system, consisting of an airlift pump. The clarifier effluent shall pass over the edge of the baffled adjustable effluent weir into the effluent trough and then out of the chamber. The weir plate will be constructed of 1/8" galvanized steel and will be gasketed with 1/4" neoprene.

2.13 SLUDGE RECIRCULATION SYSTEM

2.13.1 There shall be installed within the clarifier chamber, a positive sludge recirculation system, consisting of one (1), 3 inch diameter airlift sludge return assembly, meeting the following specifications: The airlift pump system shall have the recirculation capacity ranging from 0% to 150% of the design flow. The airline supplying air to the pump shall be equipped with a gate valve varying the capacity of the pump. The airlift pump shall be firmly supported and shall be equipped with a clean-out plug to allow for easy cleaning and maintenance.

2.14 SCUM RECIRCULATION SYSTEM

2.14.1 There shall be installed within the clarifier chamber a positive scum and skimming recirculation system consisting of one (1), 2 inch diameter airlift skimming device meeting the following specifications: The skimming device shall be of the positive airlift pump type, located in a position to skim and return floating material to the aeration chamber. The airline supplying air to the skimming device shall be equipped with a gate valve to regulate the rate of return.

2.14.2 The scum intake shall be equipped with an adjustable assembly, which will enable exact positioning of the skimmer at water level without placing a hand under the water.

2.15 MAIN AERATION AIR SUPPLY BLOWER MOTOR UNITS

2.15.1 For supplying the air requirement of the main aeration chamber, sludge holding chamber, and airlift return pumps two (2) blower motor units shall be furnished and installed at the location shown on the drawings. The units shall be completely factory built and tested before shipping to the project site. The blower shall be of the tri-lobe type design complete with the accessories described below.

2.15.2 Each unit shall be capable of delivering 105 CFM when operating at 5 PSI. The blower shall be manufactured by Kaeser Compressors, Fredericksburg, VA. The model number of the blower shall be BB52C.

2.15.3 The motor shall be 5 HP for operation on 480 Volt, 3 Phase, 60 Cycle Service, 3,600 RPM. It shall be of the TEFC (Totally enclosed fan cooled) type.

2.15.4 The blower shall be mounted on a steel base with weatherproof enclosure. The base structure shall be adequately reinforced to support the blower and motor unit.

2.15.5 For easy adjustment of the "V" belt drive connection between the blower and motor, the motor will be furnished with an adjustable motor mounting base.

2.15.6 The blower shall be fitted with a dry type polyester filter-silencer at the air intake. Furthermore, the blower discharge shall be fitted with a check valve, pressure relief valve, pressure gauge and a flexible rubber discharge coupling.

2.15.7 To help reduce blower vibration and noise, the blower motor enclosure shall be mounted on vibration dampeners and shall incorporate a discharge silencer.

2.16 MAIN PROCESS ELECTRICAL CONTROL CONSOLE

2.16.1 An electrical control panel shall be installed within a NEMA 4X fiberglass weatherproof enclosure with a locking hasp. The control console shall be provided for mounting as indicated on the plans. Any exterior mounting hardware shall be stainless steel or other corrosion resistant material.

2.16.2 The control console (CP-2) shall be completely factory assembled and tested prior to shipment. The control console shall be furnished with all necessary controls for each pump and blower motor unit and associated plant equipment.

2.16.3 Controls shall be mounted to a removable sub-panel within the enclosure and shall be wired and spaced in accordance with the latest National Electrical Code. The control console shall be supplied with a properly sized magnetic-circuit breaker to act as the main disconnects for the control console. Magnetic starters with overload protection shall be supplied for all blower motor units. An electrical alternator shall be furnished to alternate the operation of each pump. The alternator shall be provided with a manual selector switch to allow manual selection of the lead blower if desired.

2.16.4 All wiring conductors within the control console shall be U.L. type THHN, stranded #14 AWG minimum, rated at 600 volts. Control wiring shall be numbered on each end.

2.16.5 Control panel and the electrical power service shall be furnished and installed by the purchaser. Wiring and conduit between the control panel and plant equipment shall be furnished by the manufacturer of the wastewater treatment plant. The panel may be detached for shipping. The main power supply shall be 480 Volt, 3 phase, 60 Cycle, 30 Amps. The control voltage shall be 120 Volt, 1 Phase.

2.17 DISINFECTION CHAMBER

2.17.1 A baffle type disinfection chamber shall be provided, constructed as an integral part of the wastewater treatment system. The chamber shall be installed immediately following the clarifier. The chamber shall be sized for a capacity of 313 gallons. Baffles shall be provided to eliminate short-circuiting and shall be designed to keep floating material from leaving the chamber.

2.17.2 The chamber shall have the same protective coating as specified for the wastewater treatment system. The chamber shall have the same structural requirements as the wastewater treatment plant. Sufficient flow baffles will be supplied to assure proper mixing of the chlorine solution with the plant effluent.

2.17.3 A 1" NPT Chlorine injection coupling shall be provided for feeding the liquid chlorine shall be mounted at the inlet end of the disinfection chamber at the location on the drawings.

2.18 EFFLUENT FLOW MEASUREMENTS

2.18.1 For measuring the flow rate through the wastewater treatment system, a flow-measuring weir shall be supplied within the chlorination chamber. The weir shall be a 30 degree "V" notch weir located at the outlet end of the disinfection tank.

2.18.2 For measuring the flow rate, an ultrasonic flowmeter with recorder shall be installed. The unit shall record, indicate, and totalize the flow through the wastewater treatment system, the system shall be mounted within a NEMA 4X polycarbonate enclosure with a locking hasp complete with a 100 watt thermostat controlled silicone rubber insulated general purpose heater interior mounted.

2.18.3 All components shall be pre-mounted and pre-wired with a circuit protection breaker powered from the main control console. The control console shall be provided for mounting as indicated on the plans. All exterior mounting hardware shall be stainless steel or other corrosion resistant material.

2.18.4 The proposed ultra-sonic flowmeter will have a range and blanking distance to 10'-0".

2.18.5 Components shall be pre-wired and pre-tested (calibrated) at the factory prior to shipment.

2.19 SERVICE WALKWAY

2.19.1 A service walkway of FRP material shall be provided for the service area only to service the plant equipment. The design of FRP products including connections shall be in accordance with governing building codes and standards as applicable.

2.19.2 Design live loads of FRP gratings and floor panels shall not be less than 100 PSF uniformly distributed unless specifically stated otherwise in drawings and/or supplementary conditions. Grating and floor panel deflection at the center of a simple span not to exceed 0.25".

2.19.3 Structural members shall be designed to support all applied loads. Deflection in any direction shall not be more than L/180 of span for structural members. Connections shall be designed to transfer the loads.

2.19.4 The panels shall be 1-1/2 inches deep and sustain a deflection of no more than 0.25" under a uniform distributed load of 100 PSF for the span lengths shown on the plans.

2.19.5 The bearing bars shall be joined into panels by passing continuous length fiberglass pultruded cross rods through the web of each bearing bar. A continuous fiberglass pultruded bar shaped section shall be wedged between the two cross rod spacers mechanically locking the notches in the cross rod spacers to the web of the bearing bars. Continuous chemical bonding shall be achieved between the cross rod spacers and the bearing web and between the bar shaped wedge and the two cross rod spacers locking the entire panel together to give a panel that resists twist and prevents internal movement of the bearing bars.

2.19.6 The top surface of all panels shall have a non-skid grit affixed to the surface by an epoxy resin followed by a top coat of epoxy resin.

2.19.7 Panels shall be fabricated to the sizes shown on the drawings.

2.19.8 Bars that are to be exposed to UV shall be coated with polyurethane coating of a minimum thickness of 1 mil.

2.19.9 A 45 degree access stairway shall be provided leading to the walkway for the service area only to service the plant equipment. Stair treads shall be capable of withstanding a uniform load of 100 PSF or a concentrated load

of 300 lbs. on an area of 4 sq. inches located in the center of the tread, whichever produces greater stress. Hand-railing shall be affixed to the stair runners, and shall be constructed from 1-1/2" OD schedule 40 aluminum pipe

2.19.10 Handrailing system to be constructed from 1-1/2" OD schedule 40 aluminum pipe. The railing shall consist of two rails supported by posts on spans not to exceed 6'-0" O.C. the top rail shall be 42" from the walkway surface, and the middle rail to be 18" below. Construction shall be welded, with two or four-bolt stanchion connection to the tank surface at each post. Provide for water to drain from the railing system hollow sections by drilling weep holes at bottom locations or other approved methods.

2.19.11 Install railing system and related components in strict accordance with manufacturer's printed installation instructions and project shop drawings. Preassemble railing system, including posts, in easy to lift sections whenever possible. Align rails so that variations from level for horizontal members, and from parallel with rake of steps and ramps for sloping members, do not exceed 1/4 inch in 12 feet.

3.0 EXECUTION

3.1 DELIVERY INSTRUCTIONS

3.1.1 In almost every case, special lowboy trucks do shipment of your treatment system. When your plant is shipped by our truck, delivery will be made directly to the job site. The field contractor must furnish the equipment necessary to unload the plant and set it on the foundation pad.

3.1.2 When the plant arrives at the job site, the owner's contractor should have available the necessary equipment to unload and set the vessel on the foundation pad. A crane of adequate size is the easiest and fastest method. Lifting lugs are provided on the vessel to simplify handling. After setting the plant in position, a check should be made to see that it is level, and in the correct position.

3.1.3 Our package steel treatment systems shall be completely assembled units and are shipped as a unit where shipping height limitations permit this procedure. If a portion of the equipment must be removed to meet shipping height limitations, this equipment will be packaged separately at the factory for field assembly. This equipment and tankage should be field assembled and installed by the owner's contractor in the field.

3.1.4 Please refer to the pre-plant delivery instructions.

3.2 PLANT START-UP

3.2.1 At the time the wastewater treatment system is filled with water or sewage, and all power connections have been completed, and all equipment is approved for service, the contractor shall provide the services of a representative of the manufacturer who shall instruct the owner's representative in the proper operation and maintenance of the wastewater treatment system, including instructions in conducting all required operational tests. The manufacturer's representative shall furnish at this time, a service manual on the equipment installed within the wastewater treatment system.

3.3 FIELD CONTRACTOR RESPONSIBILITY

3.3.1 The field contractor shall perform and/or make the following arrangements:

3.3.2 Field unloading and setting of the wastewater treatment plant on its foundation pad, anchoring in position as defined by the contract specifications.

3.3.3 Assemble into position, at the location shown on the plans, the ancillary equipment, which has been disconnected at the factory for shipping purposes.

3.3.4 Interconnection of piping and wiring which may have been disconnected at the factory for shipping purposes.

3.3.5 Tie-in of all piping, power and wiring connections to site utilities and electrical cable entries into control panels. The power required at power block or main circuit breaker is 480 Volt, 3 Phase, 60 Hz., 30 amp service for the flow equalization chamber and 30 amp for the main aeration blower control panel

3.3.6 Furnish foundation pad to set the system on.

3.3.7 Attach system to foundation pad by anchoring including supply of anchoring method.

3.3.8 Touch-up painting of those areas damaged during installation.

3.3.9 Install shipping drain plugs and fill tankage with potable/non-potable water for readiness of start-up operations.

END OF SECTION

SECTION 44 41 13.22

NANOFILTRATION MEMBRANE WATER TREATMENT EQUIPMENT

1.0 GENERAL

1.1 The Work in this Section shall include furnishing all materials, equipment, and labor necessary for the installation of an integrated treatment system comprised of pre-treatment, membrane treatment with associated chemical feed, post-treatment and control equipment, skid mounted and all to be furnished by a single responsible equipment manufacturer. Additionally, this specification covers the supply and installation of water feed and discharge pumps along with the supply and installation of a 5,000-gallon poly discharge tank as indicated on the project plans.

It is the intent that the equipment manufacturer assumes overall system, performance and process responsibility for the membrane treatment equipment, pre-treatment equipment, post-treatment equipment, membrane chemical feed equipment and controls. Therefore the equipment manufacturer shall provide the membrane equipment described in this section of the specification with appurtenances. The Contractor will be responsible for supply and installation of the feed and discharge pumps as well as the discharge tank and shall ensure that the membrane treatment equipment controls incorporate the operation and monitoring of this equipment as well.

1.1.1 Alternates/Alternatives

1.1.1.1 Contractors wishing to pre-qualify alternate manufacturers shall submit the following information, in triplicate, to the engineer at least 14 days prior to the published bid date and time. Submission of pre-qualification materials by equipment manufacturers rather than Bidding Contractors will not be considered.

a. A list of satisfactory systems of similar type, style and size in operation for at least 1 year, using the processes and methods specified herein.
b. Detailed equipment drawings, to scale, and complete detailed information covering equipment, processes and methods specified.
c. An unpriced proposal indicating the total scope of the work being proposed and containing an itemized list of all equipment, materials and appurtenances, including structural configuration drawings and details.
d. Installation, operation and maintenance manuals from the references in paragraph (2.1) above.
e. Evidence of manufacturer's engineering staff experience necessary to complete this project. Included shall be the resume of the supervisory P.E. who will affix his stamp on the submittal drawings. Such engineer shall be a direct employee of the manufacturer.
f. Warranties and Bonds. Proof of ability to furnish warranties and bonds as described elsewhere in this specification.
g. Failure to submit the pre-qualification documents as described above shall cause rejection of the contractor's bid if such bid indicates a manufacturer other than Tonka Water.
h. Evidence of the manufacturer's ISO 9001:2015 quality system certification, including certificate. Manufacturer must submit their quality manual upon request.

1.1.1.2 Engineer Review. The above submittal information will be reviewed by the engineer. Contractors submitting requests for alternate equipment approval will be notified by contract addendum 5 days before receipt of bids. All such decisions shall be final.

1.2 RELATED SECTIONS

Section 00 72 00 General Conditions

1.3 MEASUREMENT AND PAYMENT

Payment for Work in this section shall be included in the unit price / lump sum price as outlined in the Bid. Bid price shall include all cost of labor, materials, and incidentals complete.

1.4 REFERENCES

The publications listed below form part of this specification. Each publication shall be the latest revision and addendum in effect on the date this specification is issued for construction unless noted otherwise. Except as modified by the requirements specified herein or the details of the drawings, Work included in this specification shall conform to the applicable provisions of these publications.

AWWA American Water Works Association

American National Standards Institute (ANSI)
ANSI 61 Drinking Water System Components

American Society of Mechanical Engineers (ASME(
ASME Code Section X Boiler and Pressure Vessel Code standard for Fiber-Reinforced Plastic (FRP) Pressure Vessels

U.S. Food and Drug Administration (FDA)

National Science Foundation (NSF)

1.5 SUBMITTALS

The following shall be submitted in accordance with the General Conditions, in sufficient detail to show full compliance with the specification:

SD-01 Product Data.

SD-02 Shop Drawings: Submit complete set for approval prior to fabrication.

SD-03 Quality Control:
a. Design Data.
b. Test Reports.
c. Certificates.
d. Manufacturer's Instructions.
e. Manufacturer's Field Reports.

SD-04 Contract Close-out:
a. Project Record Documents.
b. Operation and Maintenance Manuals: Provide 1 printed copy and 1 digital media copy.

SD-05 Data Warranty.

1.6 QUALITY ASSURANCE

1.6.1 Certifications

1.6.1.1 The equipment manufacturer must have a quality management system that is ISO 9001:2015 certified. Certification must remain in effect throughout the project start-up.

1.7 DELIVERY, STORAGE AND HANDLING

1.7.1 Upon delivery of the equipment to the jobsite, the contractor shall take inventory of the shipment and immediately report to the equipment manufacturer any discrepancies between the equipment manufacturers's packing lists and shipping documents.

1.7.2 The contractor shall be responsible for off-loading and protection of all equipment against damage and during on-site storage and installation. Damaged equipment and materials will be replaced by the contractor at the contractor's expense.

1.8 WARRANTY

1.8.1 Finished Water Performance Warranty

1.8.1.1 During start-up, the equipment manufacturer's representative shall perform raw water and effluent field tests to confirm performance of the equipment.

1.8.1.2 The equipment shall be warranted for a period of one year from the date of placing it on-line. The treatment water effluent during this period of time shall be as detailed in the Equipment Schedule.

1.8.1.3 All The FilmtecTM Membranes are warranted for three years from date of start-up subject to the requirements of the attached Dow FilmtecTM Membrane Warranty.

2.0 <u>PRODUCTS</u>

2.1 MANUFACTURERS

2.1.1 The membrane equipment and appurtenances described herein are based on products and services as manufactured by Tonka Water, a Kurita brand, of Minneapolis, MN or approved equal.

2.1.2 This specification has been prepared on the basis of the specific requirements for this application. These specifications require modification of manufacturer's standard equipment design. *It will be mandatory that all equipment manufacturers meet all requirements of this specification. Equipment manufacturer shall modify their standard designs and recommended operational parameters to meet all requirements of this specification.* Any claims to the contrary, whether specific or implied, indicating that the equipment may not meet the specifications, will be considered grounds for rejection of the bid.

2.2 MATERIALS

2.2.1 All components of the system herein described shall be fabricated and manufactured from new, unused materials, free from defects, of the highest quality possible.

2.2.2 The materials and equipment shall be of the configuration, quantity and design features as described on the Equipment Schedule found in this specification.

2.3 MEMBRANE EQUIPMENT

2.3.1 The membrane elements shall be supplied per the attached Equipment Schedule.

2.3.2 The membrane system shall be manufactured, tested and assembled at manufacturer's facility, and shall be available for inspection upon request.

2.3.3 The membrane system shall include the following items: pre-filtration equipment; pressure pumping equipment; membrane pressure vessels and piping; controls; instrumentation and accessories. All the above components shall be integral to and mounted onto a skid furnished, pre-wired, and fully factory assembled by the membrane equipment manufacturer. No field assembly to be required.

2.3.4 Contractor shall provide two complete sets of spare membranes.

2.4 PRE-FILTRATION EQUIPMENT

2.4.1 The pre-filtration assembly shall be stainless steel, manufactured by Filtrek, or Shelco skid mounted and shall be supplied per the attached Equipment Schedule.

2.4.2 Each filter assembly shall accept 2" diameter cartridges with length determined by the system supplier. The number of cartridges and micron rating per filter assembly shall be supplied per the attached Equipment Schedule. Two full sets of cartridges shall be provided.

2.5 SKID PUMPS AND PIPING EQUIPMENT

2.5.1 One (1) high-pressure feed pump shall be provided per skid, which shall be multi-stage centrifugal, complete with TEFC motors, 460 volt, 3 phase, 60 hertz. The RO pump shall be a C series Grundfos multi-stage centrifugal type with stainless steel housing and internals. The pump shall be capable of producing a total discharge head to satisfy the membrane pressure requirement for the 85% flow factor, considering the minimum design water temperature provided.

2.5.2 Variable frequency drives (VFDs) shall be used to soft start the RO pumps and provide pressure control for the RO membranes. The VFDs shall be internally mounted in the RO unit control panel(s).

2.5.3 High-pressure piping (>100 psig) shall be welded schedule 10 stainless steel due to its ruggedness and high safety factor. Low-pressure and permeate piping shall be solvent welded Sch. 80 PVC. All high-pressure piping shall be pressure tested to 1.3 times its design operating pressure. The bidder shall design the RO so that external piping connections are flanged and located at the top of the skid for easy field connections.

2.5.4 Valves shall be rated at or above the working pressure of the system, be of corrosion resistant materials and fitted with approved electric actuators where required.

2.6 MEMBRANE PRESSURE VESSELS

2.6.1 Membrane housings shall be supplied per the attached Equipment Schedule.

2.6.2 Membrane pressure vessels for housing the membrane elements shall be fabricated from FRP and be rated per the attached Equipment Schedule. Pressure vessels shall be designed to meet ASME Code Section X. Housing end cap connections shall be manifold style to prevent stagnant areas. The complete unit shall be pressure tested at the factory. Such testing shall be subject to inspection by the engineer if required. Units requiring field installation of elements or initial operation in lieu of shop testing shall be unacceptable.

2.7 CONTROLS

2.7.1 General. The integrated system manufacturer shall furnish an automatic control system to control the membrane equipment, as well as the pre-treatment, and post-treatment equipment specified herein.

The controls shall consist of a PLC-based control panel with OIT necessary hardware, components, timers, operator interface terminal, enclosure, relays, switches, alarms, I/O, and other items necessary for a complete operational integrated system.

The membrane control shall be essentially as described below.

2.7.2 Hardware.

2.7.2.1 PLC. The automatic control panel shall be PLC-based using Allen-Bradley Series PLC's with Allen-Bradley I/O modules and network communication hardware (as necessary). SCADA contractor will be responsible for communications hardware and driver to interface with the membrane PLC. Manufacturer to provide 10% spare I/O capacity including digital and analog I/O.

2.7.2.2 Operator interface terminal (OIT) shall be Series 1000 Panel-View color touch screen by Allen-Bradley or engineer approved equal.

The OIT shall be panel mounted and shall indicate the following, via a series of custom designed screens:

- Membrane system status (flows, pressure, conductivity, etc.)
- Alarms/alarm acknowledges
- Status of exterior signals
- Individual Membrane skid status (service, alarm, etc.)
- Other functions, indications and information as required for a complete operating system
- Chemical feed associated with the membrane system (anti-scalant, bisulfate, pH control – if necessary)

2.7.2.3 Panel shall include one 15 minute UPS (uninterruptible power supply), UL rated, and shall be furnished to automatically trickle charge. Adequately sized NiCad batteries shall be included to insure function and indication for an uninterrupted power outage of 15 minutes duration.

2.7.2.4 Enclosure. NEMA 4X rated enclosure, power supply, I/O racks, wiring terminal blocks properly labeled and numbered, circuit breakers, switches, communication modem, etc., all as required for a complete operating system. Enclosure shall be UL rated and bear the 508 UL stamp prior to shipment. Enclosure shall be stainless steel.

2.7.3 Functional Control Description

2.7.3.1 General. During automatic operation the PLC shall control the membrane functions and shall indicate and communicate membrane system status to the OIT and remote SCADA system as required.

2.7.3.2 Operational Description. The PLC will call for the Influent Permeate valve to open and after a 5 second delay both the influent pump and high-pressure feed pump will be activated. Desired permeate flow will be maintained by control of variable frequency drives on the system high pressure feed pumps.

2.7.3.3 The following alarm conditions shall be included in the membrane control panel: low inlet pressure, high permeate pressure, low concentrate flow, high permeate flow, high/low influent pH, high inlet ORP, high permeate conductivity and other alarm points that may be required with a complete system.

2.7.3.4 Power Failure. If power to the PLC is lost, the uninterruptible power supply shall engage and shall continue automatic operation of the filter control panel (all function and indication) for a minimum of 15 minutes. If after 15 minutes power has not been restored to the filter control panel, then all valves shall fail to “service”.

2.7.3.5 Shop Testing Prior to Shipment. Prior to shipment the membrane system control panel shall be fully tested with all alarms, indication and I/O fully simulated at the factory prior to shipment. All screens shall be tested along with all alarm functions and other control parameters, verified by factory certification as to inspector and date inspected. Testing shall be subject to verified witnessing by the engineer if required.

2.7.3.6 The control system shall consist of a primary control panel including OIT located on the first membrane skid. The primary control panel allows the operator to control all membrane skids at central location. The additional membrane skids shall include slave panels which transmit via Ethernet cable to the primary control panel.

2.7.3.7 Remote Access Capability. The system control panel shall contain capability for remote screen mirroring, through Ethernet, of the system control panel PLC and OIT to monitor and operate the system, using customer supplied internet access/VPN.

2.7.3.8 Supply wireless capable tablet with VNC viewer for remote access via VPN.

2.7.3.9 Remote Programming Capability. The system control panel shall contain router and VPN gateway that includes capability for remote programming, through Ethernet, of the system control panel PLC, and OIT to troubleshoot and make changes to the system, using customer supplied internet access/VPN.

2.8 INSTRUMENTATION

2.8.1 The following instrumentation devices/accessories shall be included and furnished by the membrane system supplier:

2.8.1.1 Conductivity monitors manufactured by Siemens - Monitor continuously measures inlet/permeate conductivity. The monitor includes temperature compensated cell. Indicator shall be panel mounted.

2.8.1.2 Flow meters manufactured by Siemens - flow meters shall be included for measurement of inlet flow (magnetic flowmeter), combined permeate (vortex flowmeter), and concentrate flow (magnetic flowmeter). Flows indication shall be available at the operator control panel.

2.8.1.3 Pressure gauge manufactured by Wika – The gauges should display the following pressures: Inlet, pre-filter effluent, post high pressure pump, primary, inter-stage, final, concentrate and permeate.

2.8.1.4 Pressure transmitters manufactured by Siemens - Transmits the pressure to be displayed on the HMI. The transmitters should display the following pressures: primary influent, inter-stage and final.

2.8.1.5 Pressure switch manufactured by UE, Barksdale, or similar– Transmits the pressure signal to control panel. The pressure switches will indicate: low feed and high concentrate pressure.

2.8.1.6 pH transmitter manufactured by Mettler Toledo, GF Signet, or similar – pH transmitter shall measure inlet pH. Indicator shall be panel mounted.

2.8.1.7 ORP transmitter manufactured by Mettler Toledo, GF Signet, or similar – ORP transmitter shall measure inlet ORP. Indicator shall be panel mounted.

2.9 MEMBRANE SUPPORT SKID

2.9.1 Structural frame shall be furnished for mounting of the membrane skid. Frame shall be fabricated from tubular and wide flanged sections of A36 structural steel and shall be powder coated with corrosion resistant painting system. The frame shall include grounding lugs..

2.10 CHEMICAL FEED EQUIPMENT

2.10.1 Chemical feed pumps shall be furnished as noted on the Equipment Schedule. Each feed pump shall be chemically resistant to all conditions and sized to maintain oxidant and scaling protection. Pumps to receive 4to20 signals from the membrane controller based upon membrane feed flow. Feed pump discharge pressure rating shall exceed working pressures by 25%. The chemical feed pumps shall be mounted on a corrosion resistant support frame or panel and include calibration column, strainer, check valve, backpressure valve, relief valve and pressure gauge w/guard

2.10.2 Double walled polyethylene tanks with covers shall be furnished as per the Equipment Schedule. The tanks shall include a Camlock style fill connection and level gauge.

2.11 FACTORY TESTING

2.11.1 The completed RO system shall be fully factory tested prior to shipment. The RO system test shall be included in the pricing of the equipment provided.

2.11.2 The factory test shall include testing the system piping, cartridge filter housing, RO feed pump, RO membrane housings and all instrumentation and controls. The RO system test shall include recirculating dechlorinated water through the system as well as operating the high pressure pump. The RO system testing shall utilize actual RO membranes during testing - orifice plugs, plates, etc. are not acceptable. A Factory Acceptance Testing (FAT) form shall be provided to document the results of the test.

2.11.3 The Owner and their representatives shall have the opportunity to witness the factory test. Those invited shall be made aware that testing is to occur no less than ten (10) days prior to the test date.

2.12 INFLUENT PUMPS

2.12.1 The influent feed pumps shall be vertical, multistage, centrifugal, inline type with discharge and suction flanged connections. The pump casing, stages and impellers shall be 316 stainless steel, suitable for potable water service per NSF 61/372. Elastomers shall be Viton. Pumps shall be close coupled to vertically mounted, premium efficiency electric motors with TEFC enclosures. The pumps shall be designed for continuous operation at rated flow and head without the need for external cooling. The influent feed pumps shall be rated for 35 gpm at 68 psi. Motors shall be 3 hp, 3550 rpm, 230/460 V, 3 phase, 60 HZ. Pumps shall be Model PVM(X)5-7 manufactured by Aurora Pump Company (Pentair Water) or approved equal.

2.12.2 Variable frequency drives (VFDs) shall be used to soft start the influent pumps and provide pressure control for the RO membranes feed pump. The VFDs shall be internally mounted in the RO unit control panel(s).

2.13 5,000 GALLON POLY TANK

2.13.1 Contractor shall provide a vertical, high density cross-linked polyethylene tank, having a nominal volume of 5,000 gallons meeting NSF/ANSI 61 complete and in place per the project plans.

2.13.2 Tank shall be rotationally-molded, vertical, high density cross-linked polyethylene, one-piece seamless construction, cylindrical in cross-section and vertical with flat bottom. Tank shall be adequately vented. Where indicated, tank shall be provided with ancillary mechanical fittings and accessories. Tank shall be marked to identify the manufacturer, date of manufacture and serial numbers must be permanently embossed into the tank.

2.13.3 Wall thickness shall be in accordance with the design requirements of ASTM D 1998. Tank shall be fitted with three lifting lugs designed to lift the tank when empty. The head shall be integrally molded to the cylindrical wall with a knuckle radius of 1.5 inches.

2.13.4 Tank shall have a 24" diameter manway in the top center fitted with a pressure relief device. Tank shall have a 6" minimum diameter u-vent pipe with a 24 mesh stainless steel screen.

2.13.5 Tank shall be fitted with bolted flange fittings of the size and at the locations shown on the project plans. Flanges shall use 150# ANSI bolt patterns. All fittings shall have 100% virgin PTFE Flexijoint expansion joint with a minimum of three convolutions, stainless steel limit cables and FRP composite flanges.

2.13.6 Tank shall be fitted with an ultrasonic level indicator. Level indicator shall be a Flowline ultrasonic level transmitter, level controller with one 4-20 mA continuous level input and NEMA 4X box.

2.13.7 Tank shall be manufactured by Poly Processing Co. or approved equal.

2.14 EFFLUENT PUMPS

2.14.1 The influent feed pumps shall be vertical, multistage, centrifugal, inline type with discharge and suction flanged connections. The pump casing, stages and impellers shall be 316 stainless steel, suitable for potable water service per NSF 61/372. Elastomers shall be Viton. Pumps shall be close coupled to vertically mounted, premium efficiency electric motors with TEFC enclosures. The pumps shall be designed for continuous operation at rated flow and head without the need for external cooling. The influent feed pumps shall be rated for 20 gpm at 80 psi. Motors shall be 3 hp, 3550 rpm, 230/460 V, 3 phase, 60 HZ. Pumps shall be Model PVM(X)5-7 manufactured by Aurora Pump Company (Pentair Water) or approved equal.

3.0 EXECUTION

3.1 INSTALLATION

3.1.1 Installation shall be as shown on the plans and in accordance with the manufacturer's recommendations, installation instructions and assembly drawings. Manufacturer's installation instructions and assembly drawings shall be submitted and approved by the engineer prior to shipment of equipment. Installation of the membrane system shall be in strict accordance with the details shown on the drawings and in complete conformance to manufacturer's instructions and procedures.

3.2 SYSTEM START-UP AND TRAINING

3.2.1 The contractor will verify in writing that the project is ready for manufacturer's field services. Copies of written verification shall be given to the manufacturer, engineer and owner prior to scheduling field services.

3.2.2 The contractor shall provide the services of a factory representative during start-up of the treatment equipment. The contractor shall provide the number of days on site for start-up supervision as outlined in the Equipment Schedule. At a minimum, the equipment manufacturer's technician shall perform the following start-up functions:

3.2.2.1 Inspect the final installation to assure proper installation, connection and wiring of all equipment of the manufacturer's supply.

3.2.2.2 Start-up of the equipment in the presence of the Contractor and Owner's operating personnel.

3.2.2.3 Training of Owner's operating personnel in proper operation and maintenance procedures, start-up/shutdown procedures, response to emergency conditions, and troubleshooting. The responsibility of the Contractor and the factory service representative with regard to start-up shall be fulfilled when the start-up is complete, the equipment is functioning properly, operating personnel have been trained and the equipment has been accepted by the Owner.

3.2.2.4 System monitoring for one year from the date of start-up.

END OF SECTION

EQUIPMENT SCHEDULE

Materials and Equipment

Membrane inlet flow rate (per skid):	27 gpm
Membrane permeate flow rate (per skid):	20 gpm
Recycle flow rate (per skid):	0 gpm
Blend flow rate (per skid):	0 gpm
Membrane flux rate:	14.6 gfd

Membrane Elements

Membrane type:	FilmTec NF270-4040
Membrane area (per membrane element):	82 sq. ft.
Number of membrane elements (per skid):	16 Elements
Array configuration:	3x2x1 Array

Cartridge Filters

Pre-filter housings model:	Shelco or Equal
Number of filters (per filter housing):	4
Length of filters:	20”
Micron rating:	5 Micron

High Pressure Pump

Pump model:	Grundfos CR Series
Pump Horsepower:	10

Membrane Pressure Vessel

Vessel model:	Codeline, Protec, or equal

Chemical Feed Equipment

Antiscalant Pump Size:	TBD gpd
Antiscalant Tank Size:	50 gal
Sodium Bisulfite Pump Size:	TBD gpd
Sodium Bisulfite Tank Size:	50 gal

Nozzle Sizing

Inlet:	1.5 in
Permeate:	1.5 in
Concentrate:	1 in

Factory Services & Start-Up

Equipment Installation Supervision:	1 days
Start-up & Operator Instruction:	3 days
Clean In Place Operator Instruction:	1 days
Minimum number of trips required:	3


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ARCHITECTS

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-260-1 **CODE: (SP)**

DATE: 07/10/2017

SUBJECT: Utility Work - Sewer

PROJECT: STBG-0010-01(180) / 109171301 – JACKSON COUNTY

Section 907-260, Utility Work - Sewer, is hereby added to and becomes a part of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-260 -- UTILITY WORK - SEWER

907-260.01--Description. This work also consists of furnishing labor, materials, services, equipment, and other necessary items required for accompanying the construction of the sanitary sewer systems. This shall include, but not be limited to, the following: sanitary sewer drainage piping, fittings and accessories, cleanouts, and bedding.

This work also consists of furnishing materials, equipment and tools including specially developed application equipment as required for installation and testing of the field applied monolithic manhole surfacing system. Surfacing shall be applied to precast manhole, 48-inch diameter.

This work also consists of furnishing and placing a waterproofing material on precast concrete manholes in accordance with the plans, and this special provision

This work consists of furnishing all labor, materials, equipment and incidentals necessary to provide all precast sanitary sewer manholes and pump station wetwells shown, specified and otherwise required to complete the work.

907-260.01.1--Sanitary Sewer System. This work also includes setting lines, elevations, and grades for sanitary sewer system work and control system for duration of work, including careful maintenance of benchmarks, property corners, monuments, or other reference points.

907-260.01.1.1--Related Requirements. The following are related requirement.

- Construction Plans
- Special Provision 907-260, entitled Utility Work
- Local governing authority and code requirements.
- All necessary construction permits.
- MDOT Standard Specifications for Road and Bridge Construction.

907-260.01.1.2--References. The sanitary sewer system shall be manufactured in accordance with the following Reference Standards.

- ANSI/ASTM A74, Cast Iron Soil Pipe and Fittings
- ANSI/ASTM C12, Practice for Installing Vitrified Clay Pipe Lines
- ANSI/ASTM C14, Concrete Sewer, Storm Drain, and Culvert Pipe
- ANSI/ASTM C76, Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
- ANSI/ASTM C425, Compression Joints for Vitrified Clay Pipe and Fittings
- ANSI/ASTM C443, Joints for Circular Concrete Sewer and Culvert Pipe, using Rubber Gaskets
- ANSI/ASTM D698, Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop
- ANSI/ASTM D3034, Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- ASTM C564, Rubber Gaskets for Cast Iron Soil Pipe and Fittings
- ASTM D1785, Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120
- ASTM D2922, Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- ASTM D3017, Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures

907-260.01.1.3--Submittals. The Contractor shall provide catalog materials indicating pipe, pipe accessories, and fittings.

The Manufacturer shall certify that the products meet or exceed ASTM designations.

907-260.01.1.4--Coordination. Coordination shall be performed with termination of sanitary sewer connection outside building, connection to municipal sewer utility service, and trenching.

907-260.01.2--Monolithic Manhole Surfacing System. When required, the use of specialized application equipment combined with rigorous surface preparation requirements shall be used to apply the monolithic manhole surfacing system without the use of solvents. The equipment adds high heat and pressure to the monolithic surfacing system resulting in a high build and quick set of the completed system.

Product application requirements and procedures described include surface preparation, mixing, application, material handling and storage, qualification of applicator, and application quality control.

In order to be considered as an equal a product will have the minimum characteristics as measured by the applicable ASTM standards as specified in this section.

Equal products must be approved a minimum of three weeks prior to bid date.

907-260.01.2.1--Quality Assurance. When required, the applicator shall initiate and enforce quality control procedures consistent with applicable ASTM and NACE standards together with the monolithic surfacing system manufacturer and the Engineer's recommendations.

The applicator shall use an adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts. These workmen shall be completely familiar with

the specified requirements and the methods needed for proper performance of the work of this Section.

The applicator shall use approved specialty equipment adequate in size, capacity and number sufficient to accomplish the work of this Section in a timely manner.

The product shall be manufactured at a facility that is certified as meeting ISO-9002 quality management standards.

The product shall be manufactured using the following appropriate Reference Standards.

ASTM D638	Tensile Properties of Plastics
ASTM D790	Flexural Properties of Unreinforced and Reinforced Plastics
ASTM D695	Compressive Properties of Rigid Plastics
ASTM D4541	Pull-off Strength of Coatings Using a Portable Adhesion Tester
ASTM D2584	Volatile Matter Content
ASTM D2240	Durometer Hardness, Type D
ASTM D543	Water Vapor Transmission of Organic Coating Films
ASTM D543	Resistance of Plastics to Chemical Reagents
ASTM C297	Flatwise Tensile Strength of Sandwich Constructions
ASTM	The published standards of the American Society for Testing and Materials, West Conshohocken, PA
NACE	The published standards of National Association of Corrosion Engineers (NACE International), Houston, TX

907-260.01.2.2--Submittals. When required, the Contractor shall submit data on the monolithic surfacing system and application procedures.

The applicator shall apply the system and be responsible for the complete performance of the system, including materials, application, and quality control. The applicator shall provide documentation that the applicator is an approved installer and licensed by the monolithic surfacing manufacturer and specialized equipment supplier.

907-260.01.2.3--Deliver, Storage, and Handling. When required, materials shall be kept dry, protected from weather, stored under cover and stored between 50ºF and 100ºF. Material shall not be stored near flame, heat, or strong oxidants.

Protective coating materials shall be handled according to their material safety data sheets.

907-260.01.3--Crystalline Concrete Waterproofing.

907-260.01.3.1--References. The product shall be manufactured in accordance with the following Reference Standards.

- American Society for Testing and Materials (ASTM)
- Army Corp. of Engineers (CRD)

- American Concrete Institute Reference 308

907-260.01.3.2--Storage, Delivery And Handling. The manufacturers sealed and labeled material containers shall be stored in a dry, protected environment off the ground.

907-260.01.4--Manholes. Structures shall conform in shape, size, dimensions, material, and other respects to the details shown on the Plans or as ordered by the Engineer. Metal frames, grates, covers and similar required items shall be as shown and as specified in Subsection 907-260.02. Inverts shall conform accurately to the size and elevation of the adjoining pipes. Side inverts shall be curved and main inverts, where direction changes, shall be laid out in smooth curves of the longest possible radius which is tangent to the centerlines of adjoining pipelines.

907-260.01.4.1--Quality Assurance. Quality assurance shall be in accordance with the following.

- ASTM C 139, Concrete Masonry Units for Construction of Catch Basins and Manholes.
- ASTM C 140, Sampling and Testing Concrete Masonry Units.
- ASTM C 207, Hydrated Lime for Masonry Purposes.
- ASTM C 478, Precast Reinforced Concrete Manhole Sections.

907-260.01.4.2--Submittals. If requested by the Engineer, the Contractor shall submit for approval samples of gaskets and all accessories required for the manholes.

Shop Drawings of design and construction details of all precast concrete manholes shall be submitted for approval.

If required by the Engineer, manufacturer's data on ceramic epoxy lining material, joint gasket, and flexible pipe gasket material shall be submitted.

The Contractor shall submit an affidavit from the coating supplier that each manhole sections and special has been coated in accordance with this specification.

907-260.02--Materials.

907-260.02.1--Sanitary Sewer System.

907-260.02.1.1--Sewer Pipe – General. All pipes shall be furnished by a pipe manufacturer having experience in manufacturing the specific type of pipe in the specific sizes required for use on this project.

907-260.02.1.2--Polyvinyl Chloride (PVC) Gravity Flow. Polyvinyl Chloride (PVC) gravity flow pipe shall meet the following.

A. Pipe and Fitting Material:
   1. Standard: ASTM D 1784.

2. Type: Cell Classification as specified in ASTM D 3034, ASTM F 679, or ASTM F 1803.

B. Pipe Standard:
   1. ASTM D 3034, SDR-26, sizes 4 inch through 15 inch diameter.
   2. ASTM F 679, PS-46, sizes 18 inch through 36 inch diameter.
   3. ASTM F 1803, PS-46 psi, sizes 21 inch through 54 inch diameter.

C. Joints:
   1. Standard: ASTM D 3212.
   2. Type: Integral bell and spigot.
   3. Flexible seals: Elastomeric, conforming to ASTM F-477.
   4. Lubricant: As recommended by manufacturer.
   5. Gaskets shall be factory applied.

D. Fittings:
   1. Standard: ASTM D 3034 and F 679 and F 1803.
   2. Joint Standard: ASTM D 3212.
   3. Schedule: SDR-26, sizes 4 inch through 15 inch diameter PS-46, sizes 18 inch through 36 inch.

E. Lateral Connectors:
   1. Lateral connectors can be employed in the connection of service line to sewer trunk line.
   2. Lateral connectors shall consist of a PVC hub, rubber sleeve, and stainless steel band.
   3. PVC hub shall meet ASTM D 3034 and be SDR 26 and gasket in hub shall meet ASTM F 477. Rubber sleeve shall meet ASTM C 443. Band and housing shall be Type 301 stainless steel and screw shall be Type 305 stainless steel.
   4. Model and Manufacturer:
      a. Inserta Tee by Inserta Fittings Company.
      b. Or approved equal.

907-260.02.1.3--Pipe Accessories. Pipe fittings shall be made of the same material as the pipe, molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

907-260.02.1.4--Cleanouts. Lids and frames shall be made of heavy duty cast iron construction, manufactured by Mueller with Closed Lid Design.

Shafts shall be constructed of cast iron of internal diameter as specified on plans with 2,500 psi concrete collar for cleanouts located in paved areas.

The base pad shall be cast-in-place with 2,500 psi concrete. It shall have a leveled top surface to receive cast iron shaft sections, sleeved to receive sanitary sewer pipe sections.

907-260.02.2--Monolithic Manhole Surfacing System.

907-260.02.2.1--Existing Products. When required, quick setting high strength concrete with latex or curing agent additives shall not be used unless successfully tested with the coating for compatibility or approved for use by the protective coating and concrete manufacturer. Proper surface preparation procedures shall be followed to ensure adequate bond strength to any surface to be coated. New cement or concrete shall cure at least 30 days prior to coating.

Existing coatings shall be removed or thoroughly abraded to provide an adequate surface profile for mechanical bond by the surfacing system. The applicator shall maintain strict adherence to the monolithic surfacing system manufacturer's recommendations with regard to proper surface preparation and compatibility with existing coatings.

907-260.02.2.2--Manufacturer And Equipment Supplier. When required, the manufacturer and equipment supplier shall be Warren Environmental, Inc., Raven 404, Poly Spec Corp, or an approved equal.

907-260.02.2.3--Repair Materials. When required, repair materials shall be accepted and approved by the monolithic surfacing system manufacturer for compatibility with the specified monolithic surfacing system and shall only be used as determined necessary by the Engineer and applicator.

907-260.02.2.4--Monolithic Surfacing System. When required, the Monolithic Surfacing System shall be a unique non-toxic, 100 percent solids, solventless epoxy resin laminar system applied with a patent protected process and exhibiting the following characteristics**.**

Product type	Amine cured epoxy	Test Method
Color	White	
Solids Content (vol percent)		100
Compressive Strength	12,000 psi	ASTM D695
Flatwise Tensile Strength of Sandwich Constructions	2,608 psi	ASTM C297
Tensile Strength	7,200 psi	ASTM D638
Tensile Elongation	2%	ASTM D638
Flexural Strength	13,000 psi	ASTM D790
Flexural Modulus	548,000 psi	ASTM D790
Bond Strength – Concrete	900 psi	ASTM D4541
Chemical Resistance to:		
Sulfuric Acid, 10 percent	Immersion Service	ASTM D543
Sodium Hydroxide, 20 percent	Immersion Service	ASTM D543

The monolithic surfacing system shall be applied in the field after all other work to the manhole is complete. This will insure a monolithic coating across the joints and connections.

The monolithic surfacing system shall be continuously bonded to all brick, mortar, concrete, chemical sealant, grout, pipe, and other surfaces inside the manhole and therefore shall be designed for hydrostatic loading.

The finished system shall provide a minimum total thickness of 60 mils. The cured surfacing shall be monolithic with proper sealing connections to all unsurfaced areas and shall be placed and cured in three applications in conformance with the recommendations of the monolithic surfacing system manufacturer.

When cured, the system shall form a continuous, tight-fitting, hard, impermeable surface that is suitable for sewer system service and chemically resistant to any chemicals, bacteria, or vapors normally found in domestic sewage.

The system shall effectively seal the interior surfaces of the manhole and prevent any penetration or leakage of groundwater infiltration.

The system shall be compatible with the thermal conditions of the existing sewer manhole surfaces.

907-260.02.2.5--Protective Coating Application Equipment. When required, the protective coating application equipment shall be heated, plural component equipment specially designed for use in the spray or spincast application of the specified system and shall be approved for use by the monolithic surfacing system manufacturer.

907-260.02.3--Crystalline Concrete Waterproofing. The concrete waterproofing admixture shall be of the cementitious crystalline type that chemically controls and permanently fixes a non-soluble crystalline structure throughout the capillary voids of the concrete.

The design shall include the use of the crystalline waterproofing repair materials that generate a non-soluble crystalline formation in the concrete.

907-260.02.3.1--Manufacturers. Waterproofing material shall be manufactured by Xypex Chemical Corporation, or an approved equal.

907-260.02.3.2--Admixture. Xypex Admix C-1000-T shall contain red dye to ensure detection in the concrete.

907-260.02.3.3--Mixes. The dosage rate for the Xypex Admix C-1000-T shall be 3.5 percent by weight of cement.

907-260.02.4--Manholes.

907-260.02.4.1--Precast Concrete Manholes. Precast manholes shall conform to the details shown. Manhole bases may be precast unless cast-in-place is required by the plans.

Except where otherwise specified, manhole sections shall conform to ASTM C 478.

Precast manhole bases shall be of approved design and of sufficient strength to withstand the loads to be imposed upon them. An approved joint shall be provided to receive the pipe sections forming the barrel.

The date of manufacture and name or trademark of manufacturer shall be marked on the inside of the barrel.

Unless a larger size is required by the plans, the barrel of precast manholes shall be constructed of 48-inch diameter standard reinforced concrete manhole sections. The barrel shall be constructed of various lengths of pipe in combination to provide the correct height with the fewest joints. Wall sections shall not be less than five inches thick. For 72-inch and larger manholes, a transition slab, as shown on the plans, is required for manholes greater than 12 feet deep.

Joints shall be preformed mastic joint compound or rubber and concrete using O-ring gaskets conforming to ASTM C 443. For rubber ring joints, the base of the bell shall be buttered with 1 to 2 cement mortar to provide a uniform bearing for the spigot of the entering pipe.

A precast or cast-in-place slab or precast eccentric cone, as shown or approved, shall be provided at the top of the manhole barrel to receive the cast iron frame and cover. The slab or cone shall be of acceptable design and of sufficient strength to safely support an H-20 loading. Concrete slabs shall be not less than eight inches thick.

When required, all manhole sections shall be lined with an approved epoxy coating in accordance with Special Provision 907-260, entitled Monolithic Manhole Surfacing System.

All pre-cast manholes and wet-wells shall be waterproofed in accordance with Special Provision 907-260, entitled Crystalline Concrete Waterproofing.

907-260.02.4.2--Miscellaneous Metals. Metal frames, covers, toe pockets and similar required items shall be provided as shown and in accordance with the plans.

907-260.02.4.3--Drop Inlet Connections. Drop inlet connections for manholes shall be constructed where shown and shall conform to the design and details shown. Pipe and fittings shall be ductile iron or reinforced concrete as shown or otherwise approved. Concrete shall be bonded to manhole in a manner shown or otherwise approved by Engineer.

907-260.02.4.4--Flexible Connectors. Flexible connections complying with ASTM C 923 shall be employed in the connection of each sewer pipe with outside diameter less than 59 inches to precast manholes.

Connector shall consist of rubber EPDM and elastomers designed to resist ozone, acids, alkalis, oils and petroleum products.

Banding mechanism shall be non-magnetic, 304 stainless steel, and torqued for 60-70 inch/lbs.

Connectors shall be manufactured by Kor-N-Seal, Press Seal Gasket Corporation, or an approved equal.

907-260.02.4.5--Manhole Waterstops. Elastomeric PVC manhole waterstops shall be employed in the connection of each sewer pipe with outside diameter greater than 59 inches to precast manholes. Waterstop shall consist of elastomeric PVC designed to resist ozone, acids, alkalis, oils and petroleum products.

Banding mechanism shall be totally non-magnetic stainless steel, torqued for 60 inch/lbs. and furnished with a waterstop.

Installation shall be as follows.

- Slide waterstop over clean end of entrance pipe
- Position waterstop on centerline of manhole wall
- Tighten the stainless steel band to required torque
- Use waterplug around the waterstop to close the opening in the manhole

Manhole waterstops shall be manufactured by Fernco, Inc., DFW Plastics, Inc., or an approved equal.

907-260.02.4.6--Castings. Castings and frames for manholes shall be manufactured by EJIW (Vulcan), C. L. Dews, Neenah, or an approved equal.

Castings shall be fabricated true to pattern so that component parts fit together.

All identification markings shall be subject to review by the Engineer. Markings shall include Utility Owner's Standard.

The iron shall be coated with asphaltic paint standard with the manufacturer.

907-260.03--Construction Requirements.

907-260.03.1--Sanitary Sewer System. Excavations shall be hand trimmed to required elevations. Over excavation shall be corrected with fine aggregate.

Large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction shall be removed.

907-260.03.1.1--Bedding. Pipe trenches shall be excavated in accordance with Section 203 for work of this Section. Excavation shall be hand trimmed for accurate placement of pipe to elevations indicated. Bedding material shall be placed at the bottom of the trench, leveled in continuous layer not exceeding eight inches of compacted depth, and compacted to 95 percent density. Optimum moisture content of bedding material shall be maintained to attain required compaction density.

907-260.03.1.2--Installation - Pipe. Pipe, fittings, and accessories shall be installed in accordance with ASTM C12, ASTM C14 and/or manufacturer's instructions. Seal joints watertight.

Pipe shall be laid to the slope gradients on the plans; with maximum variation from true slope of 1/8 inch in 10 feet.

Bedding shall be installed at sides and over top of pipe to minimum compacted thickness of 12 inches compacted to 95 percent density.

Trenching requirements shall meet the requirements of the MDOT Standard Specification for Road and Bridge Construction. The pipe shall not be displaced or damaged when compacting.

Installed sleeves shall be used to connect to building sanitary sewer outlet and municipal sewer system.

907-260.03.1.3--Installation – Cleanouts. The bottom of excavation shall be clean and smooth to correct elevation.

The cast-in-place concrete base pad shall be formed and placed, with provision for sanitary sewer pipe end sections.

The elevations and pipe inverts for inlets and outlets shall be established as indicated.

Lids and frames shall be mounted level in the grout, and secured to the top cone section to the elevation indicated.

907-260.03.1.4--Field Quality Control. Compaction testing will be performed in accordance with ANSI/ASTM D698, ASTM D2922 or ASTM D3017.

If tests indicate that the installation does not meet specified requirements, the installation shall be removed, replaced ,and retested at no additional cost to the State.

Deflection tests shall be performed on all flexible pipe. The test shall be conducted after the final backfill has been in place at least 30 days.

No pipe shall exceed a deflection of five percent (5%).

If the deflection test is to be run using a rigid ball or mandrel, it shall have a diameter equal to 95 percent of the inside diameter of the pipe. The test shall be performed without mechanical pulling devices.

Low Pressure Air Test (Uni-Bell's UNI-B-6). Installed gravity sewer pipe shall be air-tested prior to acceptance. Specified pressure drop of 0.5 psig shall be used to determine the required time the pipe is tested. Manholes are not required to be tested. Sections of installed pipe shall be tested from manhole to manhole.

907-260.03.2--Monolithic Manhole Surfacing System.

907-260.03.2.1--Pre-Coat Inspection. When required, all structures to be coated shall be readily accessible to the applicator.

Appropriate actions shall be taken to comply with local, state, and federal regulatory and other applicable agencies with regard to the environment, health, and safety.

All surfaces including benches, inverts, joints, lift holes and walls shall be made smooth and suitable for application of the interior surfacing system. All benches and inverts shall be in place and complete.

Active flows shall be dammed, plugged, or diverted as required to ensure that the liquid flow is maintained below the surfaces to be coated.

Installation of the protective coating shall not commence until the concrete substrate has properly cured in accordance with this Section.

907-260.03.2.2--Surface Preparation. When required, the applicator shall inspect all surfaces specified to receive the monolithic surfacing system prior to surface preparation. The applicator shall notify the Engineer of any noticeable disparity in the surfaces that may interfere with the proper preparation or application of the monolithic surfacing system.

All concrete that is not sound or has been damaged by chemical exposure shall be removed to a sound concrete surface. All contaminants including: oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants shall be removed.

Surface preparation method(s) shall be based upon the conditions of the substrate and the requirements of the monolithic surfacing system to be applied.

Surfaces to receive protective coating shall be cleaned and abraded to produce a sound concrete surface with adequate profile and porosity to provide a strong bond between the monolithic surfacing system and the substrate.

The applicator shall follow all regulations for contained space entry. The first procedure upon entering each structure will be to blast all specified surfaces by low pressure water cleaning as defined by NACE Standard 5. When all loose and/or contaminated debris has been removed, the surface shall be water blasted by the use of a held wand again. The wash water shall include a dilute solution of chlorine to diminish microbiological bacteria growth and to kill any bacteria residing on or in the surface. The surface will be tested at this point to ensure that the pH is within acceptable limits (not to exceed 8.5). These tests will be performed with litmus paper on various areas within the structure. All test results will be retained for review by the Engineer.

Surfaces that require additional cleaning or profiling will be prepared by abrasive blast to rough the surface sufficient to obtain and ensure adequate bonding of the system. A minimum surface profile of 8 to 10 mils or 10 percent of the total recommended coating system thickness must be achieved to assure proper adhesion. Detergent water cleaning and hot water blasting may be necessary to remove oils and grease from the concrete. Whichever methods are used, they shall be performed in a manner that provides a uniform, sound clean surface that is not excessively damaged.

Active water infiltration shall be stopped by using a cementitious water plug or hydroactive grout that is compatible and suitable for topcoating with the specified monolithic surfacing system.

907-260.03.2.3--Application Of Repair Materials. When required, application of repair materials shall be made by the applicator.

Repair materials shall meet the specifications of this Specification. The materials shall be trowel or spray applied utilizing proper equipment on the specified surfaces.

When using approved cementitious repair materials, such shall be troweled to provide a smooth surface with an average profile equivalent to coarse sandpaper to optimally receive the protective coating. No bugholes or honeycomb surfaces should remain after the final trowel procedure of the repair mortar.

The repair materials shall be permitted to cure according to manufacturer recommendations. Curing compounds may not be used unless approved by the monolithic surfacing system manufacturer for compatibility with the specified system.

Areas to be coated must be prepared after receiving a cementitious repair mortar and prior to application of the monolithic surfacing system.

All surfaces shall be inspected during and after preparation and prior to application of the monolithic surfacing system. Any evidence of remaining contamination or laitance shall be removed by additional water or abrasive blast, or other approved method before proceeding with the application of the monolithic surfacing system.

All surfaces shall be sufficiently smooth and even, to ensure good flow handling characteristics when complete.

907-260.03.2.4--Application Of Monolithic Surfacing System. When required, application procedures shall conform to the recommendations of the monolithic surfacing system manufacturer, including material handling, mixing, environmental controls during application, safety, and equipment.

The equipment shall be specially designated to accurately ratio and apply the specified materials and shall be regularly maintained and in proper working order.

The specified materials shall be applied by an approved installer of the monolithic surfacing system.

All specified surfaces will be lined with the monolithic surfacing system to provide a minimum total thickness of 60 mils. The cured surfacing shall be monolithic with proper sealing connections to all unsurfaced areas and shall be placed and cured in three applications in conformance with the recommendations of the monolithic surfacing system manufacturer.

Specially designed spray and/or spincast application equipment shall be used to apply each coat of the system.

907-260.03.2.5--Testing And Inspection. When required, during application, a wet film thickness gage, such as those available through Paul N. Gardner Company, Inc. meeting ASTM D4414 – Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages, shall be used to ensure a monolithic coating and uniform thickness during application.

After the system has set hard to the touch it shall be inspected by the Engineer verifying the following:

- Groundwater infiltration of the system shall be zero.
- All pipe connections shall be open and clear.
- No cracks, voids, pinholes, uncured spots, dry spots, lifts, delamination, or other type defects shall be evident in the system.

After a minimum of 24 hours following completion, the lining system shall be spark tested to assure a pinhole-free lining. Defects must be patched per the manufacturer's instructions. The test voltage shall be a minimum 6,000 volts. The holiday detector shall be a Tinker Razor Model AP/W or an approved equal. The applicator may enlist the services of an independent certified NACE inspector if desired.

A final visual inspection shall be made by the ENGINEER and applicator. Any deficiencies in the finished system shall be marked and repaired according to the procedures set forth herein by the applicator.

907-260.03.2.6--Cleaning. When required, trash and loose debris shall not be permitted to accumulate at the project site. All items shall be regularly removed and disposed of at an approved site in accordance with applicable regulatory agencies.

907-260.03.3--Crystalline Concrete Waterproofing.

907-260.03.3.1--Materials Preparation. Xypex Admix C-1000-T shall be added to the concrete at the time of batching. It is recommended that the Admix powder be added first to the rock and sand and blended thoroughly for 2 to 3 minutes before adding cement and water.

The total concrete mix shall be blended using normal practices to ensure formation of homogeneous mixture.

For precast concrete manufacturers, this usually means adding the Xypex C-1000-T into their pan type mixers.

For ready-mix batch plants, the Xypex Admix C-1000-T shall be evenly distributed on a plant conveyor belt carrying the rock and sand, or the dry powder Admix can be added to the truck first and then 30 to 50 percent of the required water for the concrete batch is dispensed along with 300 to 500 pounds of aggregate and mixed thoroughly for 2 to 3 minutes. The rest of the materials shall then be added to the truck and mixed for at least five minutes.

907-260.03.3.2--Application. Placement of concrete shall be in accordance with the Standard Specifications.

Retardation of set may occur when using Xypex Admix C-1000-T. The amount of retardation shall depend upon the concrete mix design and the dosage rate of the admixture. The manufacturer shall be consulted regarding proper dosage rate.

Concrete that contains Xypex Admix C-1000-T shall be cured as per "Standard for Curing Concrete" (ACI 308).

Normal backfilling procedures shall be used after concrete has cured for at least seven days.

After the base and joints of the precast manhole have been grouted, two coats of Xypex Concentrate shall be applied to all grouted surfaces at a rate of 1.5 lbs. per square yard to a properly prepared surface in accordance with manufacturer's written instructions.

907-260.03.4--Manholes.

907-260.03.4.1--Laying Masonry. Each grading ring shall be laid in a full bed of mortar and shall be thoroughly bonded.

907-260.03.4.2--Plastering. The outside of grading rings shall be neatly plastered with ½ of an inch of cement mortar as the work progresses.

907-260.03.4.3--Manhole Bases. Precast bases shall be set on a concrete foundation or compacted granular material as shown. Precast bases shall be set at the proper grade and carefully leveled and aligned.

907-260.03.4.4--Precast Manhole Sections. Manhole section shall be set in true alignment.

Sections, joints and gaskets shall be set in accordance with manufacturers recommendations.

Lifting holes shall be sealed tight with a solid rubber plug driven into hole and the remaining void filled with 1 to 2 cement-sand mortar.

907-260.03.4.5--Manhole Channels. For straight through flow, channels shall be formed from pipe laid through the manholes. A bench of concrete shall be built up to the 2/3 point of the vertical sewer diameter before the top of the sewer pipe is broken out.

Where side channels and curved sections occur, the channels within the manholes shall be formed of concrete and shall be given a hard trowel finish.

907-260.03.4.6--Grading Rings. Grading rings shall be used for all precast manholes where required. Stacks shall be a maximum of 12 inches in height, constructed on the roof slab or cone section on which the manhole frame and cover shall be placed. The height of the stack shall be such as is necessary to bring the manhole frame to the proper grade.

907-260.03.4.7--Grading at Manholes. All manholes in unpaved areas shall be built as shown or directed to an elevation higher than the surrounding ground.

The ground surface shall be graded to drain away from the manhole. Fill shall be placed around them to the level shown on the plans, and the surface evenly graded on a 1 to 5 slope to the existing surrounding ground unless otherwise shown. The slope shall be covered with four inches (4") of top soil, seeded and maintained until a satisfactory growth of grass is obtained.

907-260.03.4.8--Manhole Watertightness. All manholes shall be free of visible leakage. Each manhole shall be tested for leaks and inspected, and all leaks shall be repaired in a manner subject to Engineer's approval.

907-260.03.4.9--Flexible Pipe Connector and Waterstop at Manhole Base. An approved flexible connector or waterstop shall be provided between each pipe entering and exiting manhole. The joint into the manhole base shall be completely watertight.

907-260.03.4.10--Casting. When installing the castings, the Contractor shall follow the manufacturer's installation instructions. Castings shall be set accurately to required location. Alignment and elevation, plumb, level, true and free of rack, shall be measured from established lines and levels. The casting shall be braced temporarily or anchored temporarily in the formwork.

Castings which are cracked, chipped, distorted or otherwise damaged will not be acceptable.

907-260.04--Method of Measurement. Utility Work - Sewer, Improvements will be measured as a lump sum quantity.

907-260.05--Basic of Payment. Utility Work - Sewer, Improvements, measured as prescribed above, will be paid for at the contract bid price of lump sum, which price shall be full compensation for sanitary sewer pipe, crystalline concrete waterproofing, manhole, steel casing

with end caps and spacers, sanitary sewer cleanout, all labor, materials, tests and incidentals necessary to complete the work.

No separate pay item will be made for sewer connection to existing sewer line or proposed building service lines. Costs shall be included in other items bid.

Payment will be made under:

907-260-A: Utility Work - Sewer, Improvements - per lump sum

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-262-1 **CODE: (SP)**

DATE: 07/10/2017

SUBJECT: Utility Work - Water

PROJECT: STBG-0010-01(180) / 109171301 – JACKSON COUNTY

Section 907-262, Utility Work - Water, is hereby added to and becomes a part of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-262 -- UTILITY WORK- WATER

907-262.01--Description. This work consists of furnishing labor, materials, services, equipment, and other necessary items required for accompanying the construction of the water distribution systems. This shall include, but not be limited to the pipe and fittings for site water line including domestic water line and fire water line, valves and fire hydrants, set lines, elevations, and grades for water distribution systems work and control system for duration of work including careful maintenance of benchmarks, property corners, monuments, or other reference points.

This work also consists of furnishing all labor, materials, equipment and incidentals required for ductile-iron pipe systems and ductile-iron pipe fittings and specials in accordance with the plans and this special provision.

This work also consists of furnishing all labor, materials, equipment and incidentals required to provide all valves and appurtenances as shown and specified.

907-262.01.1--Water Distribution Systems.

907-262.01.1.1--Related Sections. The following related sections shall be followed.

- Special Provision 907-262, entitled Utility Work
- Local Governing Authority and Code Requirements
- All Necessary Construction Permits
- Standard Specifications for Road and Bridge Construction

902-262.01.1.2--References. The following references shall be followed.

- American Association of State Highway and Transportation Officials (AASHTO): T180, Moisture-Density Relations of Soils Using a 10-lb (4.54 kg) Rammer and an 18-Inch (457 mm) Drop.
- ANSI/ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings
- ANSI/ASME B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings

- ANSI/ASTM D1557, Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-Kg) Rammer and 18-Inch (457-mm) Drop
- ANSI/ASTM D2466, Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
- ANSI/AWS A5.8, Brazing Filler Metal
- ANSI/AWWA C104, Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
- ANSI/AWWA C105, Polyethylene Encasement for Ductile Iron Piping for Water and Other liquids
- ANSI/AWWA C11, Rubber-Gasket Joints for Ductile Iron and Grey-Iron Pressure Pipe and Fittings
- ANSI/AWWA C151, Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids
- ANSI/AWWA C500, Gate Valves, 3 through 48 in NPS, for Water and Sewage Systems
- ANSI/AWWA C502, Dry Barrel Fire Hydrants
- ANSI/AWWA C504, Rubber Seated Butterfly Valves
- ANSI/AWWA C508, Swing-Check Valves for Waterworks Service, 2 in through 24 in NPS
- ANSI/AWWA C509, Resilient Seated Gate Valves 3 in through 12 in NPS, for Water and Sewage Systems
- ANSI/AWWA C600, Installation of Ductile-Iron Water Mains and Appurtenances
- ANSI/AWWA C606, Grooved and Shouldered Type Joints
- ANSI/AWWA C900, Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 inch through 12 inch, for Water
- American Society for Testing Materials (ASTM):
  B88, Seamless Copper water Tube
  D1785, Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
  D2241, Poly (Vinyl Chloride) (PVC) Plastic Pipe(SDR-PR)
  D2855, Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings
  D2922, Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
  D3017, Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures
  D3139, Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals
  D3035, Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter
- AWWA C901, Polyethylene (PE) Pressure Pipe, Tubing, and Fittings, 1/2-inch through 3-inch, for Water
- UL 246, Hydrants for Fire-Protection Service

907-262.01.1.3--Submittals. The Contractor shall provide data on pipe materials, pipe fittings, hydrants, valves and accessories.

The manufacture shall certify that products meet or exceed state or local requirements.

907-262.01.1.4--Project Record Documents. The Contractor shall accurately record actual locations of piping mains, valves, connections, and invert elevations. The Contractor shall

identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

907-262.01.1.5--Quality Assurance. The Contractor shall perform work in accordance with utility company and/or municipality requirements.

The valves shall have the manufacturer's name and pressure rating marked on valve body.

907-262.01.2--Ductile-Iron Pipe And Fittings.

907-262.01.2.1--Quality Assurance. All pipes and fittings shall be obtained from no more than one manufacturer.

Pipes and fittings shall comply with the following Standards:

- AWWA C104 (ANSI A21.4), Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
- AWWA C105 (ANSI A21.5), Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids
- AWWA C110 (ANSI A21.10), Gray-Iron and Ductile-Iron Fittings, 3 in. through 48 in., for Water and Other Liquids
- AWWA C111 (ANSI A21.11), Rubber Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
- AWWA C150 (ANSI A21.50), Thickness Design of Ductile-Iron Pipe
- AWWA C151 (ANSI 21.51), Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids
- ASTM A 48, Gray Iron Castings
- ASTM A 123, Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- ASTM A 307, Carbon Steel Externally Threaded Standard Fasteners
- ASTM A 354, Quenched and Tempered Alloy Steel Bolts, Studs and Other Externally Threaded Fasteners

907-262.01.2.2--Submittals. The Contractor shall submit detailed drawings and data on pipe, fittings, gaskets and appurtenances.

907-262.01.3--Valves and Appurtenances.

907-262.01.3.1--Quality. Valves and appurtenances shall be the standard product in regular production by manufacturers whose products have proven reliable in similar service for at least two years. Insofar as possible all valves of the same specific type shall be the product of one manufacturer.

Valves and appurtenances shall comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

- AWWA C500, Gate Valves - 3 Inch through 48 Inch - For Water and Other Liquids
- AWWA C502, Dry Barrel Fire Hydrants
- AWWA C504, Rubber-Seated Butterfly Valves
- AWWA C506, Backflow Prevention Devices – Reduced Pressure Principle and Double Check Valve Types
- AWWA C507, Ball Valves, Shaft or Trunnion-Mounted, 6-Inch Through 48-Inch, For Water Pressure up to 300 PSIG
- AWWA C508, Swing Check Valves for Ordinary Waterworks Service
- ANSI B16.1, Cast-Iron Pipe Flanges and Flanged Fittings
- ANSI B16.4, Cast-Iron Screwed Fittings
- ASTM A 307, Carbon Steel Externally and Internally Threaded Standard Fasteners
- ASTM D 1784, Rigid Polyvinyl Chloride Compounds and Chlorinated Polyvinyl Chloride Compounds
- ASTM D 2464, Threaded-Type Schedule 80 PVC Pressure Fittings
- ASTM D 2467, Socket-Type Schedule 80 PVC Pressure Fittings
- MSS SP-80, Bronze Gate, Globe, Angle and Check Valves
- Standards of National Electrical Manufacturer's Association

907-262.01.3.2--Submittals. The Contractor shall comply with the following submittal requirements.

Shop Drawings: The Contractor shall submit for approval detailed drawings, data, and descriptive literature on all valves and appurtenances, including:

a. Dimensions
b. Size
c. Materials of construction
d. Weight
e. Protective coating
f. Wiring diagram including:
   (1) Ladder diagrams
   (2) Point-to-point wiring.

Manufacturer's Certificates: The Contractor shall submit the Manufacturer's certificates of compliance with ANSI, AWWA and other Standards listed herein.

Manufacturer's Service Report: The Contractor shall certify that valves are properly installed except as noted. The Contractor shall also submit recommended corrective action for any deficiencies noted.

Operation and Maintenance Data: The Contractor shall submit a detailed operation and maintenance manual for all valves and appurtenances provided under this Section including the following information:

a. Product name and number
b. Name, address and telephone number of manufacturer and local distributor

c. Instruction bulletins for operation, maintenance and recalibration
d. Complete parts and recommended spare parts lists.

907-262.01.3.3--Product Delivery Storage and Handling. All valves and appurtenances shall be handled with care. Valves and appurtenances which are cracked, chipped, distorted or otherwise damaged or dropped will not be acceptable. All valves and appurtenances shall be store off the ground in enclosed shelter.

907-262.02--Materials.

907-262.02.1--Water Distribution System.

907-262.02.1.1--Pipe. Pipe sizes less than three inches (3") that are installed below grade and outside building shall comply with Seamless Copper Tubing: Type "K", soft annealed temper, to comply with ASTM B88-62 and installed with wrought copper (95-5 tin antimony solder joint, ASTM B32, Sb5) fittings in accordance with ASTM B16.22.

Pipe sizes three inches (3") and larger that are installed below grade and outside building shall comply with:

1. Polyvinyl Chloride (PVC) Pipe for Water Transmission and Distribution Mains:
   a. Pipe Fitting Material:
      i. Standard: ASTM D 1784.
      ii. Type: Cell Classification, 12454-B.
   b. Pipe:
      i. Standard: ASTM D 2241, AWWA C900, Size 4-inch thru 12-inch, AWWA C905, size 14-inch thru 48-inch
      ii. Schedule: DR 18, PC-150
   c. Joints:
      i. Type: Integral bell and spigot.
      ii. Flexible seals: Elastomeric, conforming to ASTM F 477.
      iii. Lubricant: As recommended by the manufacturer.
   d. Fittings:
      i. Mechanical Joint Ductile Iron Fittings as specified in Contract Documents.
      ii. Restraint Devices: Megalug by EBAA Iron Sales, Inc., or equal.

907-262.02.1.2--Valves And Appurtenances. Valves and appurtenances shall meet the requirements of Special Provision 907-262, entitled Valves and Appurtenances

907-262.02.1.3--Accessories. Joint Restraint Pieces: EBAA Iron Sales Megalug Series 1100 or approved equal. Joint restraints shall be installed on all fittings, specials, valves, and hydrants in accordance with manufacturer's recommended spacing.

Meter Box shall be as required by Utility Owner.

907-262.02.2--Ductile-Iron Fittings. Ductile-Iron pipe and fittings shall comply with the following:

1. Ductile-Iron Fittings:
   a. Joints:
      i. Flanged:
         (1) Standard: AWWA C110 (ANSI A21.10)
         (2) Gaskets: 1/8-inch thick red rubber, full face
         (3) Bolts and Nuts:
            (a) Standard: ANSI B18.2.1 and ANSI B18.2.2, respectively
            (b) Material, Exposed Service: ASTM A 307, Grade B, cadmium plated or hot dipped galvanized
            (c) Material, Buried or Submerged Service: Type 304 stainless steel
      ii. Mechanical Joint:
         (1) Standard: AWWA C111 (ANSI A21.11)
         (2) Gaskets: Plain rubber gaskets
         (3) Bolts and Nuts: High strength low alloy steel
      iii. Push-On: Comply with AWWA C111 (ANSI A21.11)
   b. Fittings:
      i. Standard: ANSI/AWWA C153/A21.53
      ii. Pressure Rating: 350 psi
      iii. Material: Ductile iron or cast-iron
      iv. Gaskets: Comply with specifications for joints
      v. Bolts and Nuts: Comply with specifications for joints
   c. Coatings and Linings:
      i. Inside Wall of Fittings (Except Sewer Pipe):
         (1) Standard: AWWA C104 (ANSI A21.4)
         (2) Cement-Mortar Lining Thickness: Standard
         (3) Seal Coat: Asphaltic
      ii. Outside Wall of Fittings:
         (4) Buried:
            (a) Coating: Bituminous
            (b) Thickness: 1 mil approximate
         (5) Exposed:
            (a) Surface Preparation: SSPC-SP 6 Commercial Blast Cleaning as specified in 3.0C
            (b) Product and Manufacturer: Provide one of the following:
               1) Carboline/Kop-Coat:
                  a) Shop Primer: 340 Gold epoxy – 2 coats, 1.5-2.0 mils per coat, 525-700 square feet per gallon per coat.
                  b) Field Primer or Field Touchup: 340 Gold Epoxy – 1 coat, 1.5-2.0 dry mils per coat, 525-700 square feet per gallon.
                  c) Finish: Hi-Gard – 2 coats, 2.0-3.0 dry mils per coat, 250-370 square feet per gallon per coat.
               2) Tnemec:
                  a) Shop Primer; 66-1211 Epoxy – 2 coats, 1.5-2.5 dry mils

per coat, 270-469 square feet per gallon per coat.
b) Field Primer or Field Touchup: 66-1211 Epoxy – 1 coat, 1.5-2.5 dry mils per coat, 270-460 square feet per gallon.
c) Finish: 14 H.S. Epoxy – 2 coats, 2.0-3.0 dry mils per coat, 240-360 square feet per gallon per coat.

3) Or approved equal.

2. Restrained Joints:
   a. Megalug by EBAA Iron Sales, Inc.
   b. Or approved equal.

3. Specials:
   a. Transition Pieces:
      i. Furnish suitable transition pieces for connections to existing piping.
      ii. Expose existing piping to determine material, dimensions and other data required for transition pieces unless details are shown on Drawings.
   b. Pipe Adapters: Provide necessary adapters to join pipe of different types. Comply with specifications for respective joints.

907-262.02.3--Valves and Appurtenances.

907-262.02.3.1--Valves. Valves shall meet the following requirements.

A. General:
   1. All valves shall have manufacturer's name and working pressure cast in raised letters on valve body.
   2. All manual valve operators shall turn right to close unless otherwise specified. Valves shall indicate the direction of operation.
   3. Unless otherwise specified all flanged valves shall have ends conforming to ANSI B16.1, Class 125.
   4. All buried valves shall be provided with adjustable three piece valve boxes, extension stems, operating nuts, and covers unless otherwise shown or specified.
   5. All bolts, nuts and studs on or required to connect buried or submerged valves shall be stainless steel.
   6. Bolts and nuts shall have hexagon heads and nuts.
   7. Gasket material and installation shall conform to manufacturer's recommendations.

B. Water Air Release Valves: (When Required)
   1. Type: Float with compound lever.
   2. Size: As shown on the Drawings.
   3. Construction:
      a. Body and cover: Semi-steel or cast iron
      b. Float: Stainless steel
      c. Seat: BUNA-N

d. Lever Arms: Bronze or stainless steel

4. Manufacturer and Model:
   a. Valve and Primer Corp., APCO Model No. 200A
   b. Val-Matic Model No. 38
   c. G-A Industries, Fig. No. 2-AR
   d. Or approved equal

C. Ball Valves: (When Required)
1. Type: Standard circular port ball.
2. Construction:
   a. Body and Ball: Bronze
   b. Stem: Bronze or composition alloy
   c. Seat, Stem Seal and Body Seal: TFE
3. End Connections: Threaded unless otherwise shown.
4. Manufacturer and Model:
   a. Jenkins, Fig. 32-A
   b. Or approved equal

D. Corporation Stops: (When Required)
1. Standard: AWWA C800
2. Material: Red brass: 85-5-5-5
3. End Connections: Male Taper Thread and Grip Joint
4. Manufacturer and Model:
   a. Mueller H-1500
   b. Hans No. 5200
   c. Or approved equal

E. Curb Stops: (When Required)
1. Standard: AWWA C800.
2. Material: Red brass: 85-5-5-5
3. End Connections: Grip Joints
4. Manufacturer and Model:
   a. Mueller H-15175
   b. Ford Meter Box Company, Inc., Catalog No. B66 - 444G.
   c. Or approved equal

F. Tapping Saddles:
1. Study: AWWA Manual M23.
2. Material: Red Brass: 85-5-5-5 with Stainless Steel Straps
3. Connection: Saddle thread shall match the threads of the corporation stop.
4. Manufacturer and Model:
   a. Ford Meter Box Company, Inc., Model 101BS
   b. Or approved equal

G. Fire Hydrants: (When Required)
1. Standard: AWWA C502, except as modified herein.

2. Main Valve:
   a. Nominal Size: 5¼ inches
   b. Type: Compression type closing with water pressure for positive sealing.
   c. Direction of Opening: Left
3. Nozzle Connections (Verify with Utility Owner)
   a. Number and Size: Two 2½ (3.09 inches O.D.) inch hose nozzles with National Standard threads and one steamer nozzle with 4½ inch I.D. with 6 threads per inch.
   b. Threads: All threads are to be 6 threads per inch to match Utility Owner's equipment.
   c. Field replaceable
4. Inlet Connection: Shoe inlet with six inch mechanical joint hub inlet, complete with accessories with hydrant bury being suitable for three to eight foot depth.
5. Operating Assembly:
   a. 1½ inch (point to flat) pentagon operating nut.
   b. Operating threads sealed from water in an oil reservoir by two O-ring seals; one sealing the oil and one sealing the water.
   c. Protect by use of weather shield or nut.
6. Cover:
   a. 3-foot minimum.
   b. Provide barrel and stem extension where cover exceeds 3 feet.
7. Materials of Construction:
   a. Hydrant barrels, bonnet, and shoe: ASTM A126, Class B.
8. Required Features:
   a. Provide ground line breakable component that will shear off upon impact at the ground line without damage to the barrel.
   b. Provide cast iron safety stem coupling that will separate upon impact.
   c. Drain assembly: Two drain valves and at least two drain openings to insure quick and complete drainage.
   d. Hydrants shall incorporate no parts which require field adjustments.
   e. Hydrant design shall place nozzles at least 18 inches from ground line when measured not more than two inches below the mating of ground flange complying with NFPA handbook.
   f. Friction losses through the hydrant not to exceed the following:
      (1) 2.5 psi at 1000 gpm through the pumper nozzle.
      (2) 1.25 psi at 1000 gpm through two hose nozzles simultaneously.
   g. Hydrant repair kits and extensions shall interchange with existing City of Jackson equipment.
9. Location: As shown on the drawings.
10. Manufacturer and Model:
    a. M & H.
    b. Or approved equal.

H. Gate Valve:
   1. 2½ inches Diameter and Smaller:

a. Type: Rising stem with solid wedge and union bonnet.
b. Construction:
(1) Body: Bronze.
(2) Packing: TFE impregnated asbestos.
(3) Trim: Bronze.
c. End Connections: Threaded.
d. Manufacturer and Model:
(1) Jenkins Brothers, Fig. 47-U.
(2) Walworth, Fig. 2.
(3) Or approved equal.

2. 3 inches Diameter and Larger:
a. Standard: AWWA C515.
b. Type: Non-Rising Stem, resilient seated.
c. Construction:
(1) Body and Bonnet: Cast iron.
(2) Wedges and Trim: Bronze.
(3) Packing: O-ring.
d. End Connections:
(1) Exposed Valves: Flanged, conforming to ANSI B16.1, Class 125, unless otherwise shown.
(2) Buried Valves: Mechanical joint, conforming to ANSI B21.11.
e. Manufacturer:
(1) American Flow Control, Series 500.
(2) Or approved equal.

I. Sewage Air and Vacuum Valves: (When Required)
1. Type: Elongated Body and Dual Float.
2. Size: 2-inch inlet and 1-inch outlet.
3. Construction:
a. Body, Cover and Baffle: Cast iron.
b. Float: Stainless steel.
c. Seat: Buna-N.
d. Other Internal Parts: Bronze.
4. Required Features:
a. Backflush attachments.
(1) Flushing water inlet valve.
(2) Blowoff valve.
(3) 6 feet of hose for flushing.
(4) Quick-disconnect couplings.
b. Isolation valve to isolate valve from line.
c. End Connection: Threaded.
5. Manufacturer and Model:
a. Valve and Primer Corp., APCO Model 401.
b. Or approved equal.

J. Check Valve: (When Required)

1. Swing Check Valve.
   a. Type: Counter-weighted swing check.
   b. Construction:
      (1) Body, Cover, Disc and Levers: Cast iron.
      (2) Counterweight Arm: Cast iron or manufacturer standard.
      (3) Shaft: 18-8 Stainless steel.
      (4) Body Seat: Bronze.
      (5) Seat Ring: Rubber.
      (6) Shaft Packing Gland: Compression type.
   c. Manufacturer and Model:
      (1) Clow F-5382.
      (2) American Flow Control 50SC.
      (3) Or approved equal.

K. Post Indicator Valve: (When Required)
   1. Manufacturer: American flow control or approved equal.
   2. Series A240-Field adjustable to fit various trench depths.

L. Backflow Preventor: (When Required)
   1. Type: Reduced Pressure Principle
   2. Components:
      a. Reduced Pressure Zone Assembly
      b. Two Gate Valves
      c. All other components recommended by the manufacturer.
   3. Required Features:
      a. Max working pressure: 175 psi
      b. Temp. Range: 33ºF to 140ºF
   4. Manufacturer and Model:
      a. Watts Series 909
      b. or approved equal
   5. Installation:
      a. According to Manufacturer unless noted on plans.
      b. Provide insulated aluminum box for temperatures to -30ºF.
   6. Standard: AWWA C 506

907-262.02.3.2--Valve Appurtenances. Valves Appurtenances shall meet the following requirements.

A. Valve Boxes:
B. Location: Provide for all buried valves.
C. Construction:
   a. Heavy pattern cast iron box.
   b. Type: Three-piece adjustable, telescoping.
   c. Inside Diameter: 4½ inches minimum.
   d. Cover: Heavy-duty cast iron.
   e. The word "WATER" shall be cast in cover.

D. Provide extension stem and operating nut.
E. Operating nut and stuffing box enclosed by lower section which rests on bonnet.

907-262.03--Construction Requirements.

907-262.03.1--Water Distribution System.

907-262.03.1.1--Examination. The existing conditions shall be verified by the Contractor. The Contractor shall verify that building service connection and municipal utility water main size, location and invert are as indicated.

907-262.03.1.2--Preparation. The pipe and tube ends shall be reamed to remove any burrs. Scale and dirt, both inside and outside, shall be removed before assembly. The pipe connections to equipment shall be prepared with flanges or unions.

907-262.03.1.3--Bedding. The pipe trench shall be excavated in accordance with Standard Specification, for work of this section. Excavation shall be hand trimmed for accurate placement of pipe to elevations indicated.

Bedding material shall be placed at the bottom of the trench. The fill materials shall be leveled in one continuous layer not exceeding eight inches compacted depth, compacted to 95 percent.

Fill material shall be used to backfill around the sides and the top of pipe, then tamped in place and compacted to 95 percent.

Optimum moisture content of bedding material shall be maintained to attain required compaction density.

907-262.03.1.4--Installation - Pipe. The Contractor shall maintain separation of water main from sanitary and storm sewer piping in accordance with state or local code. Water mains shall be laid at least 10 feet horizontally and 18 inches vertically from any sanitary sewer or manhole. The bottom of the water line should be at least 18 inches from the top of the sewer line. Sewer lines should always be below water lines.

The pipe shall be installed to the indicated elevation to within a 1-inch tolerance.

Ductile iron piping and fittings shall be installed to ANSI/AWWA C600.

Pipe shall be routed in straight line.

Pipe shall be installed to allow for expansion and contraction without stressing pipe or joints.

Locate wire shall be installed on all pipes 2-inch or larger pipe using No. 12 Solid Copper with Splices as all valves.

Access fittings shall be installed to permit disinfection of water system performed under this Specification.

Water pipe shall be sloped and positioned to drain at low points.

Where connections are made between new work and existing piping, connections shall be made using suitable fittings for conditions encountered. Each connection shall be made with existing pipe at time and under conditions which least interfere with operation of existing pipeline.

Concrete for thrust blocks shall be formed and placed at each elbow or change of direction of pipe main.

Elevations of buried piping shall be established to ensure not less than 36 inches of cover over the top of pipe. In northern climates, elevations of buried piping shall be established to ensure six inches between top of pipe and frost line.

Trench shall be backfilled in accordance with the Standard Specification.

907-262.03.1.5--Installation - Valves And Hydrants. Gate valves shall be installed as indicated on the plans and supported on concrete pads with valve stem vertical and plumb. Valve boxes shall be installed in a manner that will not transmit loads, stress, or shock to valve body. Valve box shall be centered over operating nut of valve vertical and plumb. Valve box shall be securely fitted together leaving cover flush with finished surface.

907-262.03.1.6--Disinfection Of Domestic Water Piping System. All piping shall be thoroughly cleaned and flushed in a manner approved by Engineer prior to placing in service. Piping 48 inches in diameter and larger shall be inspected from inside and all debris, dirt and foreign matter removed.

All filtered water piping and potable water piping shall be disinfected.

Interior of all piping and flush piping shall be completely cleaned prior to disinfection with water at a minimum velocity of 2.5 feet per second.

The procedures shall conform to AWWA C651 unless otherwise approved by Engineer.

Water for flushing, testing and chlorination shall be furnished and paid for by the Contractor. The Contractor shall provide all temporary piping, hose, valves, appurtenances, and services required.

Chlorine shall be supplied by the Contractor.

Bacteriologic tests shall be sampled by the Engineer or a certified water plant operator of the Utility and analyzed by the Mississippi State Department of Health. Bacteriological samples shall be taken from every dead-end line and every major looped line in the project when construction is completed.

Chlorine concentration in the water entering the piping shall be between 50 and 100 parts per million, such that a minimum residual concentration of 25 mg/l will be left after a 24-hour retention period. The operation shall be repeated as necessary to provide complete disinfection. Water being collected for testing shall not have a chlorine residual higher than normally maintained in the water system. No chlorine shall be present as a result of line disinfection.

Complete disinfection shall be defined as no confluent growth for samples taken on two consecutive days.

907-262.03.1.7--Service Connections. Water service shall be provided to utility company requirements with reduced pressure backflow preventer if required and water meter with by-pass valves and sand strainer if required.

All costs for installation of service connection(s) shall be absorbed by Contractor.

907-262.03.1.8--Field Quality Control. The Contractor shall test the water distribution system pipe sized installed below grade and outside building in accordance with following procedures.

All pipework shall be tested at the pressure and leakage tests equal to the design working pressure of the pipe and maintain said pressure for not less than two hours.

The Contractor shall furnish, install, and operate the necessary connections, pump, meter, and gauges. Leakage shall not exceed that permitted by AWWA C600-64 for mechanical joint and push-on joint pipe. Prior to running any filed test, meter shall be tested, sealed, and approved by applicable governing authority at no additional cost to the State.

All leaks shall be located and repaired and repeatedly tests until test results are satisfactory and in compliance with this specification.

A copy of results of meter test and hydrostatic pressure test shall be furnished to the Engineer upon completion of water distribution backfilling operations.

907-262.03.2--Ductile-Iron Pipe and Fittings. Ductile-Iron pipe and fittings shall be installed in accordance with this special provision and the plans.

907-262.03.3--Valves and Appurtenances.

907-262.03.3.1--Installation. All valves and appurtenances shall be installed in accordance with manufacturer's instructions.

Suitable corporation stops shall be installed at all points shown and required where air binding of pipe lines might occur.

Unless otherwise approved, all valves shall be installed plumb and level. Valves shall be installed free from distortion and strain caused by misaligned piping, equipment or other causes.

Valve boxes shall be set plumb, and centered with the bodies directly over the valves. Earth fill shall be carefully tamped around each valve box to a distance of four feet on all sides of the box, or to the undisturbed trench face, if less than four feet.

Hydrants and connecting pipe shall have at least the same depth of cover as the distributing pipe. The hydrants shall be set upon a slab of concrete not less than four inches (4") thick and 15 inches square. Where restrained hydrants are not used, the side of hydrant opposite the pipe connections shall be firmly blocked against the vertical face of the trench with a concrete thrust block. Not less than ½ cubic yard of washed gravel shall be placed around the base of the hydrant at the location of the drain holes.

907-262.03.3.2--Field Test and Adjustments. All parts and components shall be adjusted as required correct operation.

Functional field test shall be conducted of each valve in presence of the Engineer to demonstrate that each part and all components together function correctly. All testing equipment required shall be provided.

907-262.04--Method of Measurement. Utility Work - Water, Improvements will be measured as a lump sum quantity.

Connection to existing water line and proposed building sewer line will be an absorbed item with no separate pay item.

907-262.05--Basic of Payment. Utility Work - Water, Improvements, measured as prescribed above, will be paid for at the contract bid price of lump sum, which price shall be full compensation for water pipe and tubing of the type specified, ductile-iron fittings, gate valve with cover box, water meter with cover box, casing pipe, testing, all labor, materials, testing, and all incidentals necessary to complete the work.

No separate pay item will be made for water connection to existing water line or proposed building service lines. Costs shall be included in other items bid.

Payment will be made under:

907-262-A: Utility Work - Water, Improvements - per lump sum

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-282-3 **CODE: (SP)**

DATE: 02/24/2026

SUBJECT: Irrigation System

PROJECT: STBG-0010-01(180) / 109171301 -- Jackson County

Section 907-282-1, Irrigation System, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

SECTION 907-282 -3 -- IRRIGATION SYSTEM

907-282.01--Description. Lawn and shrub bed irrigation systems shall be constructed to the grades and conform to the areas and locations shown on the plans.

Irrigation lines shown on the plans are essentially diagrammatic. Specific locations of equipment shall be established by the Contractor at the time of construction. Exceed spacing of heads as shown on the plans only with the permission of the Engineer.

907-282.01.1--Irrigation Operations. Irrigation operations shall be performed by a firm having a minimum of two consecutive years of experience in this area of work and having installed other jobs of similar size and scope. Contractor shall provide a minimum of three references and a list of similar projects with the Client's names, addresses, and telephone numbers, when requested by the Engineer.

907-282.01.2--Field Investigations: The Contractor shall visit the job site and become familiar with the nature and location of the work, existing conditions, and other conditions that will be obligated to operate in the performance of the work.

907-282.01.3--Substitutions and Submittals. Substitutions shall be made only with the written approval of the Engineer. Substitutions will not be considered prior to opening of bids. Substitution of an irrigation head shall be accompanied by a Contractor prepared piping diagram noting pipe sizes, pressure loss calculations, and head locations necessary to achieve the desired watering provided by the system as designed.

The Contractor shall submit seven copies of manufacturer’s product data of materials specified herein for review and approval by the Engineer.

907-282.01.4--Department's Instruction and Maintenance Data. General: The Contractor shall furnish the following instructions and maintenance data. Final Acceptance will not be made until the Work has been reviewed and approved by the Engineer.

1) As-built plans: Two sets, noting exact locations of elements and changes to the plans in red.

2) Operation Manual: Two copies, bound in 1-inch diameter three ring binders, indexed and tabbed for easy reference, and labeled on spine and cover. Manual to include:

   A. Approved submittals.
   B. Installation instructions, including mounting details for control valves.
   C. Operating Instructions, including winterization procedures, recommended operation sequence, frequency, and length of operation cycle, as per relationship to estimated absorption rate, evaporation rate and anticipated GPM.
   D Maintenance Instructions: Items requiring manufacturer's product data and installation instructions. Complete warranty information, mail to manufacturer, and provide copies to the Department.

3) Extra Stock: In addition to the installed system, provide one sprinkler head of each size and type, one valve key (per valve) for operating manual valves, one key per valve box, two wrenches for each type of head cover, and two wrenches for removing and installing each type of head.

907-282.02--Materials.

907-282.02.1--General: Materials shall be new and without flaws or defects, and of quality and performance as specified. Overages at completion are property of the Contractor and are to be removed from the site.

Materials and equipment specified by "Proprietary Specification" as manufactured by a particular company, etc., shall be for the express purpose of establishing minimum acceptable performance requirements. Acceptable manufacturers shall include:

A. The Toro Company - Irrigation Division
B. Rain Bird Sales, Inc. - Turf Division
C. Hunter Irrigation

The provision of providing other acceptable manufacturers as potential substitutions shall not disregard the requirements of paragraph Subsection 907-282.01.3.

907-282.02.2--Delivery and Storage. Damaged materials will not be accepted. Any packaged materials shall be delivered to the site in the original, unopened containers. Materials delivered to site prior to actual usage shall be stored in a place not to interfere with other trades or construction operations and protected from damage by weather or other elements as needed.

907-282.02.3--Pipe and Pipe Fittings.

907-282.02.3.1--Plastic Piping. Plastic pipe shall be Class 160 SDR 26 - ASTM D2241 Polyvinyl Chloride (PVC) pipe NSF approved. Pipe up to and including 2½ inches in diameter shall have bell and socket joints. Pipes greater than 2½ inches in diameter shall have snap connections with rubber gasket joints.

907-282.02.3.2--Sleeves. Sleeves shall be of the size noted on the plans and shall be Schedule 40 PVC pipe.

907-282.02.3.3--Plastic Fittings and Risers. Plastic fitting and risers shall be Schedule 40 or Schedule 80 PVC. Risers above finished grade shall receive two coats of black exterior semi-gloss enamel paint.

907-282.02.3.4--PVC Solvent Cement. PVC solvent cement shall meet the requirements of ASTM Designation: D 2564.

907-282.02.3.5--Polyethylene Pipe and Fittings. Polyethylene pipe and fittings shall be installed between supply lines and pressure regulators. Thick wall, flexible, polyethylene pipe, with fittings that have male barbs on one end and either male or female screw ends opposite shall be used. Glue fittings and female barb adapters shall not be allowed. Pipe and fittings shall be Toro Funny Pipe and Fittings as manufactured by Toro-Irrigation Division, Riverside, California, or approved equal. The pipe shall be smooth-walled and shall conform to Subsection 722.05.7.1.

907-282.02.4--Valves.

907-282.02.4.1--Electric Control Valves. Electric control valves shall be as delineated on the drawings or approved equal.

Water-tight connectors shall be Scotch Lock connectors with sealant for wiring connections at electric valves as manufactured by 3M – Scotch Brand, Rain Bird Sales, Inc. - Turf Division, King Innovation Company, or approved equal.

Valve box for electric valves shall be the 12-inch Standard Box with snap lock cover as manufactured by Armor Access Boxes, Rain Bird Sales, Inc. - Turf Division, Carson Industries, or approved equal.

907-282.02.4.2--Quick Couplers. Quick couplers, each with Key and Hose Swivel, shall be the 44 Series Coupler and Coupler Key, and SH series swivel hose connector as manufactured by Rain Bird Sprinkler Mfg. Corp., Glendora, CA, or approved equal.

Quick couplers shall be installed inside a valve box as noted on the plans.

907-282.02.4.3--Isolation Valves. Gate valves shall be manufactured in accordance with AWWA C500 and shall have a rated water working pressure of 200 PSI. Gate valves shall be iron body, bronze mounted, double disc, parallel seat, non-rising stem type. Each valve shall have "O" ring type stem seal, standard 2-inch AWWA square operating nut, and shall be opened by COUNTER-CLOCKWISE stem rotation. Except where otherwise specified, indicated, or required for the application involved, gate valves ends shall be AWWA Specification C111 mechanical joint type, with plain rubber gaskets. Gate valves shall be as manufactured by Waterous Company, Clow, Mueller, or approved equal.

One (1) key for every three valves installed shall be provided.

With each valve, install a valve box which shall be standard cast iron two-piece 5¼-inch inside shaft diameter screw adjustable type, consisting of a cover marked "WATER", and upper telescoping section, and a lower section. Where necessary to provide extra depth, provide cast iron extension pieces as required.

907-282.02.5--Sprinkler Heads.

907-282.02.5.1--Full or Part Circle Pressure Regulating Pop-Up Fixed Spray Sprinkler. Fixed spray sprinkler heads shall be 1812 Series heads with pressure regulators (PRS) and nozzles as manufactured by Rain Bird Sprinkler Mfg. Corp., Glendora, California, or approved equal.

907-282.02.5.2--Full or Part Circle Pop-up Gear Driven Rotor Sprinkler. Rotor sprinkler heads shall be 1812 Series heads with pressure regulation (PRS) as manufactured by Rain Bird Sprinkler Mfg. Corp., Glendora, California, or approved equal.

907-282.02.6--Control Wire. Control Wire and common wire shall be a minimum AWG 14 size, copper wire suitable for direct burial.

907-282.02.7--Low Point Drains. Low-point drains shall be an Automatic Valve model number 290-02 as manufactured by Toro-Irrigation Division or approved equal. The Contractor shall provide two drains at the lowest points of each zone, with each atop an 8-inch by 8-inch by 8-inch area of coarse gravel.

907-282.02.8--Automatic Controller. Automatic controllers shall be as delineated on the drawings or approved equal. With each controller, the Contractor shall provide one Automatic Rain/ Freeze Switch, the Rain/Freeze-Clik, as manufactured by Hunter Irrigation, or approved equal.

907-282.02.9--Backflow Preventer. The backflow preventer shall be as manufactured by Watts, Orbit Irrigation Products, Inc, Febco, or approved equal. With each backflow preventer, the Contractor shall provide one above ground enclosure as specified on the drawings, or an approved equal.

907-282.02.10--Pressure Regulator. The pressure regulator shall be as manufactured by Senninger, The Toro Company, Rain Bird Sales, Inc, or approved equal. Outlet water pressure shall not exceed 20 psi. Installation of pressure regulators shall be under-ground at the end of supply pipe nearest the point of irrigation.

907-282.02.11--Meter and Meter Box. Meter and meter box shall be as required/ provided by the local water authority.

907-282.03--Construction Requirements.

907-282.03.1--Pressure/ Flow Test. Immediately after installation of meters, and before installing pipe, the Contractor shall test and provide written results to the Engineer of the static pressure, dynamic pressure, and gallons per minute. Tests shall be performed at the beginning tap or meter and note as such on the written results.

The Contractor shall receive approval from the Engineer to proceed with construction along with proposed revisions (if required due to test results) prior to installation.

907-282.03.2--Execution and Trenching. Trenches shall be excavated to pipe grade depth. The width of trench shall be at least 3½ inches. Any over-excavation shall be backfilled and hand tamped prior to installing piping. In soils containing rock or other hard material that may damage the pipe, the trench shall be excavated deeper than required and backfilled to pipe grade with selected fine earth or sand. The trenches shall be kept free of obstructions and debris that would damage pipe.

More than one pipe may utilize the same trench, however, pipe arrangement in the trench shall remain continuous throughout the run of pipe/ trench and the amount of cover shall not be reduced to accommodate additional pipe.

907-282.03.3--Piping System.

907-282.03.3.1--Cover. Pipe system cover shall be as follows:

Lawn and planting areas ..... 14 inches below finish grade
Roadways .....36 inches below finish grade
Parking areas .....24 inches below finish grade

907-282.03.3.2--Clearances. A minimum 1-inch vertical clearance shall be maintained between lines crossing at an angle greater than 45 degrees.

907-282.03.4--Piping Erections.

907-282.03.4.1--Threaded Plastic Pipe. Do not use solvent cement on threaded joints. Threaded joints are to be wrapped with Teflon tape. When threaded pipe is used, material shall be Schedule 80 PVC.

907-282.03.4.2--Cemented Joints for PVC Bell End Pipe and PVC Pipe with Socket Fittings. These joints shall meet the requirements of ASTM Designation: D 2855.

907-282.03.5--Valves. Values shall be installed plumb to within 1/16 inch. Wire connectors shall be installed to wiring in accordance with the manufacturer's written instructions. A 2-foot section, beginning at the Wire connection, is to be wrapped around a minimum 1/2-inch diameter pipe to protect against electrical surges from lightning.

907-282.03.6--Sprinklers. Sprinklers shall be installed plumb to within 1/16 inch. Heads along walks and curbs shall be set flush to within 1/8 inch. Other heads shall be set as per details and plans.

907-282.03.7--Control Wire. Control wire shall be buried in the same pipe trench, and bundle and tape together at not more than 10-foot intervals.

907-282.03.8--Backfill: Do not backfill until system, or that portion thereof, has been tested and approved. Trench shall be filled to within three inches of top with excavated soil and water to compact soil. Fill the top three inches of the trench with existing topsoil in planting areas and wheel roll until compaction of backfill is same as surrounding soil.

907-282.03.9--Electrical Connections. Electrical connections shall be in strict accordance with the latest edition of the National Electrical Code. Contractor shall provide the electrical connection to the system as designated on the plans and as specified herein. Splices to electrical wire between the controller to valves or power supply shall be made within watertight junction boxes.

907-282.03.10--Automatic Controller. Location and installation of the automatic controller shall be as per plans, and approved by Engineer prior to installation.

Rain–Freeze device shall be located where approved by the Engineer.

907-282.03.11--Flushing. Following installation of piping, risers and valves, but prior to installation of sprinkler heads, the piping system shall be thoroughly flushed under a full head of water. Flushing shall continue for three minutes through the furthermost valve. After flushing, the risers shall be capped.

907-282.03.12--Backflow Preventer. Backflow preventer shall be set in a level horizontal position twelve inches above grade inside of an insulated backflow preventer box, as noted on the plans.

907-282.03.13--Testing. The tests shall be performed in the presence of the Engineer.

907-282.03.13.1--Pressure Test. The Contractor shall hydrostatically test the main piping system between meter and regulators in place prior to backfilling. A minimum pressure of 50 PSI shall be maintained without pumping for period of one hour. The test shall be considered acceptable if no leakage or loss of pressure is evident during test period. Any leaks shall be repaired. Retests shall be performed until test pressure can be maintained for duration of test. It is assumed that a water supply with a 50-PSI pressure is available on site, wherein no mechanical pumping equipment is required.

907-282.03.13.2--Operation Test. At the conclusion of pressure test, sprinkler heads shall be installed and entire system tested for operation under normal operating pressure. Heads shall be adjusted as noted on plans. The entire system shall then be retested. Test is acceptable if the system operates in a satisfactory manner, with uniform coverage of areas to be irrigated.

907-282.03.14--Guarantee. The Work shall be guaranteed for one year from date of final acceptance against defects in material, equipment and workmanship. The Contractor shall repair damage to the premises resulting from leaks or other defects in material, equipment and workmanship to the satisfaction of the Department. Repairs, if required, shall be done promptly at no cost to the Department.

907-282.03.15--Final Acceptance. Final acceptance shall be in accordance with Section 105 of the Standard Specifications.

907-282.04--Method of Measurement.

907-282.04.1--Sprinkler Heads. Sprinkler heads, accepted in place, will be measured per each for the type of head specified, including nozzle.

Excavation, fittings to lateral pipe including risers, if necessary, adjustment of spray pattern, setting to proper grade, and backfilling, will not be measured for separate payment.

907-282.04.2--Piping. Piping, as noted on the plans and as adjusted by the Contractor in the field, will be measured per linear foot for each size specified.

Miscellaneous fittings, PVC cleaner and glue, and operations necessary to fit and contour pipe to the trench will not be measured for separate payment.

907-282.04.3--Sleeves. Sleeves, as noted on the plans and as adjusted by the Contractor in the field, will be measured per linear foot for each size specified.

Sleeves, bored and jacked as noted on the plans and as adjusted by the Contractor in the field, will be measured per linear foot for each size specified.

Miscellaneous fittings, PVC cleaner and glue, and operations necessary for setup and removal of equipment to install bored and jacked sleeves will not be measured for separate payment.

907-282.04.4--Valve Control Wire. Valve control wire, as needed for power supply and control of the electric control valves from the electric controllers, shall be measured per linear foot.

Miscellaneous fittings, water–tight junction boxes, if necessary, and curling of wire at valves will not be measured for separate payment.

907-282.04.5--Trench Excavation and Backfill. Trench excavation and backfill, will not be considered for separate payment.

Depth or width of trench will not be considered for separate payment.

907-282.04.6—Meter with Meter Box. Meters with meter box, complete and in place, will be measured per each.

Tap or connection to existing tap, cut off valves, meter deposit, or backfilling will not be measured for separate payment.

907-282.04.7--Electric Controller. Electric controllers, complete and in place, will be measured per each.

Connection to power supply, installation of rain-freeze switch, rigid galvanized conduit above grade with straps, ground rod and ground wire will not be measured for separate payment.

907-282.04.8--Electric Control Valve, Isolation Valve, and Quick Coupler Valve. Electric control valves, isolation valves, and quick coupler valves, complete and in place, will be measured per each.

Excavation, installation of valve box, backfilling, scotch lock protectors, and connection to valve wiring will not be measured for separate payment.

907-282.04.9--Backflow Preventer. Where noted on the plans, backflow preventer, complete and in place, will be measured per each.

Installation of backflow preventer box, backfilling, miscellaneous fittings and piping, gravel, adjusting, and connection to piping will not be measured for separate payment.

907-282.04.10--Pressure Regulator. Where noted on the plans, pressure regulator, complete and in place, will be measured per each.

Backfilling, miscellaneous fittings and piping, gravel, adjusting, and connection to piping will not be measured for separate payment.

907-282.05--Basis of Payment.

907-282.05.1--Sprinkler Heads. Sprinkler heads, measured as prescribed above, will be paid for at the contract unit price per each, which price shall be full compensation for completing the work.

907-282.05.2--Piping and Sleeves. Piping and sleeves, measured as prescribed above, will be paid for at the contract unit price per linear foot, which price shall be full compensation for completing the work.

Sleeves that are to be bored and jacked shall be paid for under the pay item as noted on the drawings and shall be full compensation for completing the work.

907-282.05.3--Valve Control Wire and Trench Excavation and Backfill. Valve control wire, and trench excavation and backfill, measured as prescribed above, will be paid for at the contract unit price per linear foot, which price shall be full compensation for completing the work.

907-282.05.4--Meter with Meter Box, Electric Controller, Electric Control Valve, Isolation Valve, and Quick Coupler with Key and Hose Swivel, Backflow Preventer, and Pressure Regulator. Meter with meter box, electric controller, electric control valve, isolation valve, and quick coupler, measured as prescribed above, will be paid for at the contract unit price per each, which price shall be full compensation for completing the work.

Payment will be made under:

907-282-A:	Sprinkler Head, Type	- per each
907-282-B:	Piping, Size	- per linear foot
907-282-C:	Sleeves, Size	- per linear foot
907-282-D:	Valve Control Wire	- per linear foot
907-282-E:	Trench Excavation and Backfill	- per linear foot
907-282-F:	Meter with Meter Box, Size	- per each
907-282-G:	Electric Controller, Type	- per each
907-282-H:	Electric Control Valve, Size	- per each
907-282-I:	Backflow Preventer, Size- per each	
907-282-J:	Isolation Valve, Size	- per each
907-282-K:	Quick Coupler with Key and Hose Swivel	- per each
907-282-L:	Pressure Regulator	- per each

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-290-2 **CODE: (SP)**

DATE: 1/27/2026

SUBJECT: Flagpole

PROJECT: STBG-0010-01(180) / 109171301 -- Jackson County

Section 907-290-1, Flagpole, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

SECTION 907-290-2--FLAGPOLE

907-290.01--Description. This work shall consist of furnishing all materials and erecting a flagpole as indicated on the plans or established.

907-290.02--Materials.

907-290.02.1--General. Unless otherwise stipulated, the materials used in this construction, in addition to the general requirements of this Special Provision, shall conform to the applicable sections of the Standard Specifications.

907-290.02.2--Concrete for Flagpole Footing. Concrete for the flagpole footing shall conform to Class "B" Concrete, meeting the requirements of applicable subsections of Section 804 of the Standard Specifications.

907-290.02.3--Flagpole. The flagpole shall be fabricated from seamless, extruded tubing complying with ASTM B 221, alloy 6063-T6, having a tensile strength not less than 30,000 psi with a yield point of 25,000 psi. Heat treat after fabrication to comply with ASTM B 597, temper T6. Provide cone-tapered flagpoles, per manufacturer's standard rate of taper.

Provide one (1) 50 ft. nominal mounting height (55'-0" overall height), single section, with a minimum base wall thickness of 0.50 in., top diameter of 4", and a 10 in. butt diameter. Finish to be Clear Anodized – ACL.

Max wind speed w/ flag: 140 mph
Max wind speed no flag: 191 mph

Mounting:

Foundation tube shall be galvanized corrugated steel, .0635 inch 16 Gauge minimum wall thickness, sized to suit flagpole and installation. Provide with 3/16 inch steel bottom plate and steel centering wedges all welded together. Furnish with 3/16 inch support plate, 3/4 inch diameter X 18 inch long steel ground (lightning) spike, all welded construction.

Fittings:

Finial Ball: Manufacturer's standard flush seam ball, sized as indicated or, if not indicated, to match pole butt diameter; 0 .063 inch spun aluminum with satin anodized finish

Single Revolving Truck Assembly: Cast aluminum non-fouling revolving with single pulley and pin, sealed upper and lower stainless steel ball bearing assemblies, and threaded aluminum spindle for attachment to pole top.

Halyard: Provide 3/8-inch braided rope (polyester or polypropylene, continuous length ≈ 100 ft (≈ pole height × 2) for a 50' pole, spliced with thimbles as required. Provide UV-resistant cordage.

Halyard Flag Snaps: Provide four (4) stainless swivel snap hooks with vinyl covers to attach two flags; include flag spreader/weights as recommended to prevent tangling when flying two flags.

Cleat(s): Provide one cast aluminum cleat (9") with (2) 5/16" stainless steel screws; Provide cylinder cleat cover lockbox.

Collar: Manufacturer's standard spun aluminum flash collar to match flagpole.

U.S. Flag:

Size: 10' × 15' (per manufacturer's sizing for 50' pole).

Construction: Fully sewn stripes; embroidered or appliqué stars (as applicable for size); heavy-duty outdoor nylon (200-denier) or 2-ply spun polyester for high-wind sites; quadruple-stitched fly hem with bar-tacked corners; canvas header with #2 stainless D-rings sized for snap hooks.

Compliance/Etiquette: When flown with another flag on the same halyard, the U.S. flag shall be at the peak. Legal Information Institute+2The American Legion+2

Mississippi State Flag (2021 Magnolia design):

Design: Official Mississippi state flag ("In God We Trust" Magnolia); Proportion: 3:5.

Size (to fly beneath the U.S. flag on a 50' pole): 8' × 12' (one size smaller than the U.S. flag to maintain visual hierarchy and reduce entanglement/wind load when sharing one pole/halyard).

Construction: Match U.S. flag in outdoor grade, stitching, header, and attachment method.

Rigging for Two Flags:

Snap spacing: Space pairs of snap hooks on the halyard to match the hoist (vertical grommet spacing) of each flag furnished; provide additional intermediate snap(s) if the flag has more than two attachment points.

Clearance: Provide sufficient interval between the lower edge of the upper flag and the upper edge of the lower flag to prevent overlap under normal wind (3–6 in. typical at rest; verify in the field).

907-290.02.4--Descriptive Data. Six (6) copies of material descriptive data, in the form of brochures or shop drawings, shall be submitted for review and approval prior to installation of the materials.

907-290.03--Construction Requirements. The flagpole shall be erected plumb in an approved manner to the satisfaction of the Engineer and in accordance with the manufacturer's details and recommendations. Material excavated in flagpole construction shall be disposed of as directed by the Engineer.

907-290.04--Method of Measurement. Flagpole, complete in place and accepted, will be measured per each. Separate measurement for payment will not be made of any individual unit, operation, or incidental item involved in this construction.

907-290.05--Basis of Payment. Flagpole, measured as prescribed above, will be paid for at the contract unit price per each complete unit, which price shall be full compensation for furnishing all materials and supplies, for all excavation, backfilling and disposal of surplus material, and for any other work required to complete the flagpole installation.

Payment will be made under:

907-290-A: Flagpole - per each

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-401-3 **CODE: (SP)**

DATE: 01/16/2026

SUBJECT: Asphalt Pavement - General

Section 401, Asphalt Pavement - General, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows..

907-401.02--Materials.

907-401.02.6--Standards of Acceptance.

907-401.02.6.4—Acceptance Procedure for Density.

Delete the paragraph and Lot Determination table of Subsection 401.02.6.4 and substitute the following:

Each completed lift will be accepted with respect to compaction on a lot to lot basis from density tests performed by the Department. For normal production days, every 350 tons will be considered a lot. When cores are being used for the compaction evaluation, randomly obtain one core from each lot. When the nuclear density gauge is being used for compaction evaluation, obtain two random readings from each lot and average the results. See Chapter 7 of the latest edition of MDOT's Field Manual for Asphalt Mixtures for more details. Additional tests may be required by the Engineer to determine acceptance of work appearing deficient. The Contractor shall furnish and maintain traffic control for all compaction evaluations, including coring, required in satisfying specified density requirements.

907-401.02.6.4.1 –Roadway Density.

Delete the last sentence in section 1 of Subsection 401.02.6.4.1 on page 250 and substitute the following:

For all other leveling, no density shall be required but the pavement shall be rolled to refusal densification as defined in Subsection 907-401.02.6.4.3.

907-401.02.6.4.3—Roll to Refusal Densification.

Roll to refusal densification is defined as the number of roller passes to maximize the in-place unit weight of the mixture. A density gauge shall be used to determine the number of passes to achieve the maximum in-place unit weight.

907-401.02.6.4.4—Irregular Areas.

Irregular areas are defined as a mat with a width of less than 8 feet or shorter than 300 feet in length, pre-leveling, wedging [less than fifty percent (50%) of width greater than minimum lift thickness], ramp pads, median crossovers, turnouts, and other areas where an established rolling pattern cannot be obtained.

907-401.02.6.8--Acceptance Procedure for Pavement Smoothness Using Mean Roughness Index (MRI). Delete the third sentence of the second paragraph of Subsection 401.02.6.8 on page 253, and substitute the following.

The surface shall be tested and corrected to a smoothness index as described herein except those locations or specific projects that are excluded from smoothness testing with an IPS.

Delete the third, fourth and fifth paragraphs of Subsection 401.02.6.8 on pages 253 & 254, and substitute the following.

The smoothness of the surface lift will be determined for traffic lanes, auxiliary lanes, climbing lane and two-way turn lanes. Areas excluded from a smoothness test with the IPS are acceleration and deceleration lanes, tapered sections, transition sections for width, shoulders, crossovers, ramps, side street returns, etc. The roadway pavement on bridge replacement projects having 1,000 feet or less of pavement on each side of the structure will be excluded from a smoothness test. Smoothness testing shall exclude 264 feet from each transverse joint that separates the pavement from a bridge deck, bridge approach slab or existing pavement not constructed under the contract. This can apply to any other exceptions including, but not limited to, railroad crossings and manholes. Segments containing a considerable number of encroachments such as intersections, manholes, curb and gutter sections, etc. may be excluded at the Engineer's discretion.

Once paving has concluded, one final smoothness measurement shall be performed for both pay adjustments and corrective action. Multiple smoothness measurements for pay adjustments and correction can still be performed at the Engineer's discretion. These measurements must be performed at the posted speed limit or 50 miles per hour (±5 miles per hour), whichever is lower. Measurements will be made in both wheel paths of exterior and interior lanes. The wheel paths shall be designated as being located three feet (3') and nine feet (9') from centerline or longitudinal joint, respectively. Testing will also be required on sections that have been surface corrected. No smoothness testing shall be performed when there is any residual moisture on the pavement surface. Any additional testing shall meet the requirements of Subsection 907-403.03.2.

The surface lift will be accepted on a continuous interval basis for pavement smoothness. Continuous reporting is based upon all MRI values for a specified running interval. These values are averaged and presented at the midpoint of the specified running interval.

Delete the last sentence of the last paragraph of Subsection 401.02.6.8 on page 254, and substitute the following.

All tests and corrections shall be in accordance with AASHTO R 54, Accepting Pavement Ride Quality When Measured Using Inertial Profiling Systems.

Delete Subsection 401.02.6.9 on pages 254 & 255, and substitute the following.

907-401.02.6.9--Inertial Profiling System.

907-401.02.6.9.1--General. The Inertial Profiling System (IPS), furnished and operated by the Contractor under the supervision of the Engineer or the Engineer's representative, shall be a dual-line laser on a high speed vehicle meeting the requirements of AASHTO M 328, Standard Specification for Inertial Profiler. Additionally, each IPS should be equipped with a GPS to ensure distance measurement accuracy. The profiler system and operator shall be certified at an MDOT approved regional calibration facility in accordance with AASHTO R 56, Standard Practice for Certification of Inertial Profiler Systems and AASHTO R 57, Operating Inertial Profiler Systems.

907-401.02.6.9.2--Computer Requirements. The computer measurement program must be menu driven, Windows compatible, and able to produce unfiltered profiler runs in the Pavement Profile (*.ppf) file format. The computer shall have the ability to display and print data on site for verification and shall have the ability to save and transfer data via Universal Serial Bus (USB) flash drive, which shall be provided by the Contractor.

All runs must be stored in a directory named in the following format for acceptance by the Project Engineer:

Project_County_Route

All profiler runs must be named in the following format for acceptance by the Project Engineer:

Direction_Lane_BeginStation_EndStation

In addition to manufacturers' software; the latest version of FHWA's ProVAL software shall be installed on the IPS computer.

907-401.03--Construction Requirements.

907-401.03.1--Specific Requirements.

907-401.03.1.2--Tack Coat. Delete the fourth sentence of Subsection 401.03.1.2 and substitute the following:

A hand wand will only be allowed for applying tack coat on irregular areas as defined in Subsection 907-401.02.6.4.4 if the distributor bar is not a feasible option.

907-401.03.1.4--Density. In the first sentence of the first paragraph of Subsection 401.03.1.4 on page 256, change "preleveling" to "pre-leveling".

907-401.03.9--Material Transfer Equipment. In the third sentence of Subsection 401.03.9 on page 261, change "include:" to "include".

907-401.03.14--Shoulder Wedge. In the second sentence of the first paragraph of Subsection 401.03.14 on page 263, change "cross roads" to "crossroads".

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-403-4 **CODE: (SP)**

DATE: **03/19/2025**

SUBJECT: **Asphalt Pavements**

Section 403, Asphalt Pavements, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-403.03--Construction Requirements.

907-403.03.2--Smoothness Tolerances. In the tenth paragraph of Subsection 403.03.2 on page 283, change "Sections(s)" to "Segment(s)".

907-403.03.2.1--Smoothness Tolerances for Mean Roughness Index (MRI). After the second paragraph of Subsection 403.03.2.1 on page 283, add the following.

For all projects, smoothness data shall be reported by two MRI methods:

1. A continuous long interval MRI report
2. A continuous 25-foot short interval MRI report

At the bottom of page 283 and top of 284 in Subsection 403.03.2.1, delete the paragraphs for Category, A, Category B, and Category C, and substitute the following.

Category A projects shall have a long interval surface MRI of not more than 60 inches per mile.

Category B projects shall have a long interval surface MRI of not more than 70 inches per mile.

Category C projects shall have the existing surface profiled at no additional cost to the State. These projects shall be measured by a long fixed interval (528-foot) surface MRI and meet the following requirements:

A 50% improvement in MRI from the existing surface
or
80 inches per mile (whichever value is higher)

Delete the first, second, and third full paragraphs on page 284, and substitute the following.

For all projects, areas of the surface lift with localized roughness greater than 160 inches per mile as determined by the continuous short interval (25') report will be identified for correction by the Contractor.

When a project has multiple lifts, the intermediate lift shall meet the short interval requirement of 200 inches per mile. Corrective action must be taken on those segments that do not meet this requirement. No unit price adjustment will be applied on the underlying lift.

Delete the table at the bottom of page 284, and substitute the following.

Mean Roughness Index (inches / mile)	Contract Price Adjustment Percent of Asphalt Unit Bid Price
Above 20.0 Over	REMOVE AND REPLACE *
15.1 to 20.0 Over	80
10.1 to 15.0 Over	85
5.1 to 10.0 Over	90
0.1 to 5.0 Over	95
Required Surface MRI	100

* In lieu of removal and replacement, segments may be brought into compliance through corrective action at the discretion of the Project Engineer.

Delete the table and footnote at the top of page 285, and substitute the following.

Mean Roughness Index (inches/mile) Percent Improvement	Contract Price Adjustment Percent of Asphalt Unit Bid Price
Below 30.1 Percent	80 **
30.1 to 35.0 Percent	80
35.1 to 40.0 Percent	85
40.1 to 45.0 Percent	90
45.1 to 50.0 Percent	95
Above 50%	100

** Segments that show less than 30 percent improvement as well as a final surface MRI greater than 100 inches/mile will be subject to removal.

Before the last paragraph on Subsection 403.03.2.1 on page 285, add the following.

Corrective action for all categories must be taken on those segments that exceed the localized roughness or the 'Remove and Replace' threshold. All locations must be located and marked by the Contractor and approved by the Project Engineer before corrective action shall take place. The minimum remove and replace length will be 528 feet (0.1 mile). Additional smoothness testing shall be required on segments following corrective action and/or replacement and will be required to meet *at least* the maximum surface MRI short of 'Remove and Replace' tolerance.

907-403.05--Basis of Payment.

907-403.05.2--Pay Items. Add the "907" prefix to the list of pay items on page 291.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-601-1 **CODE: (IS)**

DATE: 11/21/2023

SUBJECT: Structural Concrete

Section 601, Structural Concrete, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-601.02--Materials.

907-601.02.1--General. Delete the first sentence of Subsection 601.02.1 on page 377, and substitute the following.

Materials for structural concrete and their use, care, and handling shall be in accordance with Subsection 907-804.02.

907-601.02.2--Classification of Concrete. Delete the second sentence of Subsection 601.02.2 on page 377, and substitute the following.

Classes of concrete are identified in Subsection 907-799.01.

907-601.03--Construction Requirements.

Delete Subsection 601.03.1 on page 378 and substitute the following.

907-601.03.1--Blank.

907-601.05--Basis of Payment. Delete the pay items listed at the end of Subsection 601.05, and substitute the following.

907-601-A: Class ___ Structural Concrete - per cubic yard

907-601-B: Class ___ Structural Concrete, Minor Structures - per cubic yard

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-605-1 **CODE: (IS)**

DATE: 11/21/2023

SUBJECT: Underdrains

Section 605, Underdrains, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-605.02--Materials.

907-605.02.4--Edge Drain Pipe and Fittings.

907-605.02.4.4--Miscellaneous. Delete the first paragraph of Subsection 605.02.4.4 on page 398, and substitute the following.

Concrete for aprons shall be Class "C" concrete meeting the requirements of Section 907-799.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-608-2 **CODE: (IS)**

DATE: 11/12/2019

SUBJECT: Detectable Warning Panels

Section 608, Concrete Sidewalks, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as hereby amended as follows.

907-608.02--Materials. Delete the fourth paragraph of Subsection 608.02 on page 414, and substitute the following.

Detectable warning panels for Americans with Disabilities Act (ADA) compliance shall meet the requirements of the plans, standard specifications, contract documents, and AASHTO M 333. The panels shall be precast, modular, or prefabricated.

907-608.04--Method of Measurement. Delete the first paragraph of Subsection 608.04 on page 416, and substitute the following.

Concrete sidewalks of the type specified will be measured for payment by the square yard. Transition slopes, turning space, and ramps necessary for detectable warning panels will be measured as concrete sidewalk.

907-608.05--Basis of Payment. Add the following to the list of pay items in Subsection 608.05 on page 416.

907-608-C: Detectable Warning Panels per square foot

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-616-1 **CODE: (SP)**

DATE: 01/17/2017

SUBJECT: Colored and Imprinted Concrete Median and Island Pavement

Section 616, Median and Island Pavement, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as amended by this special provision is applicable to Colored and Imprinted Concrete Median and Island Pavement Only.

907-616.01--Description. This work consists of furnishing all labor, materials, tools, tests, royalties, services and other incidentals as may be required for the good and proper completion of the colored and imprinted (stamped) concrete median and island pavement.

The locations for the concrete median and island pavement are shown on the plans, but generally are limited to all proposed concrete islands and concrete median end noses.

The Contractor is advised of additional notes on the plans which call attention to particular requirements or conditions regarding colored and imprinted concrete median and island pavement.

Quality Assurance. Installation shall be performed by an installer with at least one year experience in the placement of stamped and stained concrete paving systems.

907-616.02--Materials. Colored concrete materials and imprinting tools shall meet the following requirements.

A. Colors for stamped and stained concrete shall be selected by the Engineer from Standard or Designer color charts, or an approved manufacturer's color charts.

B. Curing and Finishing Material: Contractor shall utilize curing and finishing material recommended by the manufacturer. Curing materials or methods for unstained concrete shall not be used with stamped and stained concrete. The use of liquid curing materials for areas receiving staining will not be allowed.

C. Stamping: Tools for stamping shall be of high quality and shall provide uniform control of joint depth.

D. Stamping Pattern: The pattern to be used for all concrete stamping shall have a surface texture that is of the appearance of naturally worn European Fieldstone. The edges shall be irregular and corners rounded. The Contractor shall reference the plans for pattern layout and orientation of the imprint patterns.

Once the color and the stamping tools have received approval from the Engineer, the Contractor shall provide a 4-foot square test panel, separate from proposed island and median end nose areas, to be reviewed and approved by the Engineer. Engineer will evaluate color as compared to color chart and texture of broom finish.

Subsequent test panels may be required, if the finish, stamping quality, or color is unacceptable to the Engineer. The Contractor shall remove unaccepted test panels immediately from site. Accepted panel shall remain until all stamped and stained concrete islands and median end noses have been completed by the Contractor, at which time the Contractor shall then remove the acceptable test panel from the site.

907-616.03.4--Protection and Curing. Protection and curing materials and methods of application for stamped and stained concrete shall be in strict accordance with the approved manufacturer's written instructions. Copies of the manufacturer's written instructions shall be furnished to the Engineer prior to manufacture and placement of stamped and stained concrete.

907-616.04--Method of Measurement. Colored and Imprinted Concrete Median and Island Pavement of the type specified will be measured by the square foot or square yard. Test panels will not be measured for separate payment.

907-616.05--Basis of Payment. Colored and Imprinted Concrete Median and Island Pavement, measured as prescribed above, will be paid for at the contract unit price per square foot or square yard, which price shall be full compensation for all labor, tools, materials, equipment, test panels, placement of concrete, imprinting the concrete, and all incidental necessary to complete the work.

Payment will be made under:

907-616-C: Colored and Imprinted Concrete Median and Island Pavement, Thickness	- per square foot or square yard

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-618-12 **CODE: (SP)**

DATE: 05/03/2024

SUBJECT: Traffic Control Management

Section 618, Maintenance of Traffic and Traffic Control Plan, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-618.01--Description.

907-618.01.2--Traffic Control Management. Delete subparagraph (g) of Subsection 618.01.2 on page 441, and substitute the following.

g) Perform a minimum of once-a-week inspections from the Notice to Proceed until a Partial or Final Maintenance Release is obtained. Once work begins, daily daytime inspections and weekly nighttime inspections are required on projects with predominantly daytime work, and daily nighttime inspections and weekly daytime inspections are required on projects with predominantly nighttime work. Weekly inspections will be allowed for periods outside of active construction. When lane closures are present or any non-fixed signs or traffic handling devices such as cones or barrels are in place, inspections shall be performed daily whether work is being performed or not.

907-618.05--Basis of Payment. Delete pay item 618-A on page 449 and substitute the following.

907-618-A: Maintenance of Traffic - lump sum

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-619-5 **CODE: (IS)**

DATE: 01/17/2018

SUBJECT: Traffic Control for Construction Zones

Section 619, Traffic Control for Construction Zones, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-619.02--Materials.

907-619.02.8--Traffic Signals and Flashers. Delete Subsection 619.02.8.1 on pages 452 thru 455, and substitute the following.

907-619.02.8.1-Portable Traffic Signals. Portable traffic signals shall be trailer or pedestal mounted units that provide for easy, legal transportation and quick setup and deployment. Each unit shall be self-contained. The types of portable traffic signals are as follows.

- Type 1 portable traffic signal shall include two signal heads per trailer with one signal head mounted on an overhead mast arm that can be extended over the travel lane, and the other signal head shall be mounted on the vertical upright of the trailer.

- Type 2 portable traffic signal shall include one signal head that is mounted on the vertical upright of the pedestal/cart or trailer. Pedestal/Cart mounted shall be designated as Type 2A and Trailer mounted shall be designated as Type 2B. Type 2 portable traffic signals shall be tested to MASH Standards or NCHRP Test Level 3 crash testing requirements by an accredited independent test facility, with supporting documentation available upon request.

- Type 3 portable traffic signal shall be the same as Type 1 mentioned above but with enhanced capabilities as mentioned in each applicable section below.

The portable traffic signals shall be MUTCD Compliant and utilize standard ITE signal heads, and adhere to the ITE Specifications and Standards for Vehicle Traffic Control Signal Heads, Light Emitting Diode (LED) Circular Signal Supplement. The units shall be battery powered with a solar charging system, and be equipped with an onboard battery charger capable of being used with a 120V AC power source. Portable traffic signals shall be able to communicate with other portable signals via 900 MHz or other accepted wireless communications. If wireless connectivity is not feasible, hardwired connectivity shall be an acceptable alternative, as approved by the Engineer. Portable Traffic Signals shall include all the major components listed below or be able to perform the functions of these components. The major components of the unit shall include, but are not limited to, the trailer or pedestal/cart, telescoping mast arm (on Type 1 and 3), signal head(s) and back plates, traffic signal controller with operating software, solar charging system with batteries, input and output devices, vehicle detection, flasher units, conflict monitor, relays,

communications system and other equipment required for the safe operation and installation of the unit.

907-619.02.8.1.1--Signal Heads. The signal heads and all applicable components of the portable traffic signal shall meet the physical display and operational requirements of conventional traffic signals as specific in the Manual on Uniform Traffic Control Devices (MUTCD). The signal heads shall be cast aluminum or polycarbonate and shall meet the requirements laid out in the Mississippi Standard Specification for traffic signal heads and associated MDOT material specifications for traffic signal heads. The signal heads shall accommodate standard 12-inch LED indications meeting the ITE Specification "Vehicle Traffic Control Signal Heads" and ITE Specifications and Standards for Vehicle Traffic Control Signal Heads, Light Emitting Diode (LED) Circular Signal Supplement.

For Type 1, Type 2 and Type 3 portable traffic signals, the signal heads shall have the ability to be rotated 180 degrees to face in the opposite direction and shall have the ability to rotate and lock in approximately 10 degree increments to position the signal head for the optimum visibility to motorists.

For Type 1 portable traffic signals, each unit shall contain two signal heads with one signal head mounted on an overhead mast arm that can be extended over the travel lane with a minimum clearance of 17 feet measured from the bottom of the signal head unit to the road surface. The lower signal head shall be mounted to the vertical upright of the trailer at a minimum height of eight feet (8') from the bottom of the signal head unit to the road surface.

For Type 2 portable traffic signals, the signal head shall be mounted to the vertical upright of the trailer at a minimum height of eight feet (8') from the bottom of the signal head unit to the road surface.

For Type 3 portable traffic signals, each unit shall be the same as Type 1 mentioned above but with enhanced capabilities as mentioned below.

907-619.02.8.1.2--Controller and Operating Requirements. The portable traffic signal (Types 1, 2, and 3) shall include a solid state Controller Unit (CU) that is in compliance with NEMA TS 5 Performance Standard. The CU shall have an easy to read front panel backlit display for viewing and programming the configuration settings and CU status. The CU shall be capable of operating the portable traffic signal system in a fixed time, traffic actuated or manual control mode. Multiple portable traffic signals shall have the capability to be interconnected to form a portable traffic signal system. Each portable traffic signal within a connected system shall have the capability to serve as either the master or remote signal. Each portable traffic signal shall include a Conflict Monitor Unit (CMU), or Malfunction Management Unit (MMU) to ensure phase conflicts do not exist during operation.

For Type 1 and Type 2 portable traffic signals, a minimum of five (5) automatic time-of-day timing plans within a 24-hour period should be available in fixed time mode. The CU should have the ability to control a minimum of four (4) traffic phases with programmable cycle time adjustments and user adjustable red, amber, minimum green and maximum green times. The CU shall have

the capability of programming green and red times from 1 to 999 seconds and yellow times up to 15 seconds in one-second increments. The CU shall also have the capability of facilitating standby modes of red, red flash and yellow flash.

For Type 3 portable traffic signals, a minimum of ten (10) automatic time-of-day timing plans within a 24-hour period should be available in fixed time mode. The CU should have the ability to control a minimum of 16 traffic phases with programmable cycle time adjustments and user adjustable red, amber, minimum green and maximum green times. The CU shall have the capability of programming green and red times from 1 to 999 seconds and yellow times up to 15 seconds in one-second increments. The CU shall also have the capability of facilitating standby modes of red, red flash and yellow flash.

The system shall also have the ability to operate in vehicle actuation mode when vehicle detection components are used. The operating system shall have the capability to allow the Portable Traffic Signal to be connected to and controlled by a standard NEMA controller.

The system shall have the capability to be controlled remotely using a hardwired or wireless remote. The wireless radio remote shall be capable of communicating at a clear line of site distance up to ¼ mile from the master.

The CU shall have the capability of interfacing with a Remote Monitoring System (RMS) capable of reporting signal location, battery voltage, and system faults. The RMS shall include a password-protected web site, viewable via an internet connection. In the event of a system fault, the RMS shall provide specific information concerning the cause of the system fault (example: "red lamp on signal number 1 out"). The RMS shall immediately contact previously designated individuals via SMS text messaging or email, upon a fault event.

The active timing program operating the PTS system shall be available and viewable through the RMS website at all times. The RMS shall maintain a history of the operating system in each signal including total operating hours, alerts, and the location of the PTS trailer.

907-619.02.8.1.3--Wireless Communications. The portable traffic signals shall communicate with other portable traffic signals within the signal system via license-free wireless 900 MHZ radio link communications as specified in Subsection 662.02.2 of the radio Interconnect System specification. The radio units shall maintain communications at a minimum distance of one (1) mile. The radio system shall conform to the applicable Federal Communications Commission requirements and all applicable state and local requirements.

The portable traffic signals shall be in direct communication at all times either by wireless or hardwire connection to provide for the required conflict monitoring / malfunction management system.

907-619.02.8.1.4--Power Requirements. Each Portable Traffic Signal shall be equipped with a power source consisting of a solar collection array, solar controller and/or charging unit and batteries sufficient to operate the signal system. The number and size of batteries shall be sufficient to operate the Type 1 and Type 3 signals for a minimum of 30 days and Type 2A signals for

minimum of five (5) days, and Type 2B signals for minimum of 15 days without additional charging or assist from the solar array. An on-board battery charger shall be compatible with both the solar array and with a 120V AC power source.

For Type 1 signals, the solar panel array shall provide for a minimum of 440 watts of solar collection capability.

For Type 2A signals, the solar panel array shall provide for a minimum of 90 watts of solar collection capability.

For Type 2B signals, the solar panel array shall provide for a minimum of 110 watts of solar collection capability.

For Type 3 signals, the solar panel array shall provide for a minimum of 480 watts of solar collection capability and shall include a tilt and rotate system to optimally position the panels.

All instrumentation for the electrical system and battery compartment shall be contained in a lockable weatherproof enclosure. Solar panels shall be secured to the mounting brackets for theft prevention.

907-619.02.8.1.5--Trailer and Lift System. The trailer or pedestal/cart and all mounted components shall conform to the wind loading requirements as follows: 100 mph minimum for Type 1 portable traffic signals, 55 mph minimum for Type 2A portable traffic signals, 75 mph minimum for Type 2B portable traffic signals, and 90 mph minimum for Type 3 portable traffic signals as described in the AASHTO *Standard Specifications for Highway Signs, Luminaries and Traffic Signals*, as specified in the plans including all interims and updates. At the request of the Engineer, proof of conformance to these wind load ratings shall be verified by a third-party. No additional loose ballast shall be used to meet these wind load requirements. The trailer shall be made of structural steel and shall include four (4) leveling/stabilizer jacks capable of lifting the trailer a minimum of six inches (6").

The trailer or pedestal shall be equipped with a mechanical, hydraulic or electric lift system sufficient for one person to be able to raise and lower the vertical upright and/or horizontal mast arm to and from the operating position.

For Type 1, 2B, and Type 3 signals, the trailer shall be equipped to provide legal and safe transport on the public highway system at speeds up to 55 mph.

All exterior metal surfaces, except signal heads and back plates, shall be powder-coat painted highway safety orange.

907-619.02.9--Impact Attenuators. Delete the sentence in the first paragraph of Subsection 619.02.9 on page 455, and substitute the following.

Impact attenuators must be listed on the Department's APL.

907-619.02.11--Snap-Back Delineators. Delete the sentence in the paragraph of Subsection 619.02.11 on page 456, and substitute the following.

Snap-back delineators shall be selected from the list of surface mounted flexible delineator posts as shown on the Department's APL.

907-619.02.14--Changeable Message Sign.

907-619.02.14.5--PCMS Controller and Storage Cabinets. Delete the fifth sentence in the first paragraph of Subsection 619.02.14.5 on pages 462 and 463, and substitute the following.

The controller cabinet shall be illuminated.

907-619.05--Basis of Payment. Add the following to the list of pay items ending on page 480.

907-619-E3: Changeable Message Sign ***** - per each

907-619-H2: Traffic Signal, Portable, Type ___ - per each

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-626-12 **CODE: (IS)**

DATE: 06/17/2025

SUBJECT: Thermoplastic Traffic Markings

Section 626, Thermoplastic Traffic Markings, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

Delete Section 626 on pages 492 thru 496, and substitute the following.

SECTION 626 - THERMOPLASTIC TRAFFIC MARKINGS

907-626.01--Description. This work consists of furnishing materials and placing thermoplastic pavement markings of the type specified in conformity with these specifications and the details shown on the plans or established. All hot-applied thermoplastic pavement markings shall be coated with a double-drop combination of optics.

This work may also consist of placing an audible bump or puck style marking system on the edge line that provides an audible and vibratory warning when driven over. The marking system shall be a road marking system of the dimensions indicated at regular and predetermined intervals.

This work may also consist of placing a profile or raised shape marking system on centerline or edge line that provides audible and vibratory warning when driven over. The marking system shall be a road marking system of the dimensions indicated and at regular and predetermined intervals. When placed on centerline, the markings system shall consist of an extruded black transverse thermoplastic bar of the dimensions indicated at regular and predetermined intervals.

This work may also consist of placing high contrast thermoplastic markings. High contrast thermoplastic markings shall consist of placing thermoplastic pavement markings over a black thermoplastic pavement marking to enhance the marking's visibility.

All pavement marking material, excluding lines over rumble strips, shall be applied using the extrusion/ribbon method. Lines placed over rumble strips shall be applied using the atomization/spray method, unless the extrusion/ribbon method can be demonstrated to perform adequately and is approved by the Engineer.

Permanent pavement marking tape (permanent cold plastic tape) may be used in lieu of hot applied thermoplastic markings. Substitution will only be allowed for pay items 907-626-A through H. Substituted pavement marking tape shall be of the same color and width as that required for the hot applied thermoplastic. Unless otherwise specified, the markings, whether hot applied or pavement marking tape, shall be of the same type of material for the entire project. Stop bars and crosswalks shall not be substituted with pavement marking tape and shall be alkyd hot-applied thermoplastic markings or heat-fused preformed pavement markings. Material and construction

requirements for substituted pavement marking tape shall meet the requirements of Special Provision 907-628. The layout and spacing for substituted pavement markings will remain as shown in the plans, or in the contract documents, for hot applied thermoplastic markings. Measurement of adhesive substituted pavement markings shall be made in accordance with Special Provision 907-628. Payment for adhesive substituted pavement markings shall be made at the unit price for the appropriate hot applied thermoplastic marking.

When thermoplastic pavement markings are used on bridge decks or concrete surfaces, the surface shall be sealed with an epoxy sealer prior to the application of thermoplastic.

907-626.02--Materials. All pavement marking materials shall meet the requirements of Special Provision 907-720.

907-626.02.1--Audible Bumps. Audible bumps shall have a profile such that the leading and trailing edges are sloped at a sufficient angle to create an audible and vibratory warning.

Audible bumps shall be at least 0.45 inches above the pavement surface at the highest point of the bump. The height shall be measured after the application of drop-on material. The bumps shall have a minimum dimension of two and one-half inches (2½") in both transverse and longitudinal directions. The bumps may have a drainage channel. The width of each drainage channel shall not exceed one-quarter of an inch (¼") at the bottom of the channel.

907-626.02.2--Audible Transverse Bars. The length of transverse bars is the measurement lateral to the direction of travel, also known as transverse width. The width of transverse bars is the measurement parallel to the travel way.

Transverse bars on centerline shall have a length of 10 inches, a width of three inches (3"), and a height of 350 mils. Transverse bars on centerline shall be placed on 2-foot centers through no-passing zones and 5-foot centers through passing zones. Transverse bars on centerline shall be placed in advance of permanent thermoplastic markings.

Transverse bars on edge lines shall have a length of six inches (6"), a width of three inches (3"), and a height of 350 mils. Transverse bars on edge lines shall be placed on 2-foot centers. Tolerance for the longitudinal and transverse measurements shall be one quarter of an inch (¼") and the tolerance for height shall be 50 mils. The above dimensions are based on 6-inch strip application.

Thermoplastic material for edge line transverse bars shall be as specified on the Plans and meet the requirements of Special Provision 907-720 or as specified on the plans. Thermoplastic material for centerline transverse bars shall be black and shall meet the requirements of Special Provision 907-720.

907-626.02.3--High Contrast Markings. High contrast markings shall be black with the pertinent marking color overlaid on top and shall meet the requirements of Special Provision 907-720.

907-626.03--Construction Requirements.

907-626.03.1--Equipment. Equipment for hot application shall be of sufficient size and stability to ensure smooth, uniform, properly aligned markings of the dimensions specified. The equipment shall be suitably equipped for heating and controlling the flow of the material. The equipment shall be constructed to provide continuous mixing and agitation of the material. The conveying parts of the equipment, between the main material reservoir and applicator, shall be so constructed as to prevent accumulation and clogging. The equipment shall be constructed so that all mixing and conveying parts, up to and including the applicator, maintain the material at the plastic temperature. The thermoplastic material shall be dispensed at a temperature recommended by the manufacturer. The applicator shall include a cutoff device remotely controlled to provide clean, square stripe ends and to provide a method for applying skip lines. The thermoplastic reservoir shall be insulated and equipped with an automatic thermostatic control to maintain the proper temperature of the material.

The application equipment shall be capable of automatic placement of intermittent and continuous line patterns in single or double line applications simultaneously. The intermittent timer mechanism shall provide a variable ratio of materials applied and variable cycle length such that accurate placement of new patterns, or replacement of existing patterns can be achieved.

The equipment shall also be capable of applying the top dressing of optics (beads) in a manner that firmly embeds them into the surface of the thermoplastic material for at least one half of the diameter of the larger gradation sizes of the optics. The dispensing equipment shall be equipped with an automatic cut-off control for the application of the optics that is synchronized with the cut-off of the thermoplastic material.

Optics applied to the surface of the completed stripe shall be applied by an automatic dispenser attached to the pavement marking equipment in such a manner that the optics are immediately dispensed upon the completed line. The dispenser shall be equipped with an automatic cutoff control, synchronized with the cutoff of the pavement marking equipment. The double-drop optics as defined in 907-720 shall be automatically applied at a uniform rate to achieve the minimum retroreflectivity requirements of 907-626.

907-626.03.2--Construction Details. The thermoplastic compound shall be screed or ribbon extruded to the pavement surface. Heat-fused, pre-formed pavement markings shall be fusible to asphalt surfaces by means of the normal heat of a propane weed-burner type of torch or other heating device as recommended by the manufacturer. Heat-fused, pre-formed pavement markings shall be instantly highly reflective without the application of additional optics.

Thermoplastic markings shall not be applied to the pavement surface when the pavement surface temperature is less than 55°F. The pavement surface shall be dry, to the satisfaction of the Engineer, before application will be permitted. Unless otherwise specified by the manufacturer, thermoplastic pavement marking material shall be applied to the surface between 400°F and 450°F with a recommended application temperature being 420°F.

Immediately before application, all areas to be marked shall be thoroughly cleaned. Cleaning may be done by rotary brooms, air blast, scrapers, or whatever combination of equipment is necessary to clean the pavement thoroughly without damage to the pavement surface. On areas of pavement

cured with compound, the membrane shall be removed completely by shot blasting, sand blasting or other approved method. Before edge striping, particular care shall be taken to remove all vegetation, loose soil, and the like from the area to be marked. Should other methods fail, the surface shall be wetted with a water jet and scrubbed as necessary to dislodge all foreign material. After washing, the surface shall be allowed to dry thoroughly, and all films of dried mud apparent after surface drying shall be removed before application of markings. Marking shall follow as closely as practicable after the surface has been cleaned and dried, but no markings shall be applied until the surface has been inspected and permission given to proceed. The cost for preparing the surface shall be included in the contract unit prices for the marking items.

Unless otherwise directed by the Engineer, traffic stripes that are conflicting with the thermoplastic stripe shall be removed prior to placement of the thermoplastic material. Removal of pavement markings shall be done by a means that will not gouge the surface of the pavement in a manner that requires patching to ensure the integrity of the pavement. Temporary paint stripe may be left in place when satisfactorily placed in the proper location. Any temporary stripe not covered shall be removed. Payment for removal of stripe, except temporary stripe, will be made under Section 202.

On newly constructed asphalt pavements, any sand, grit, or other surface contaminants shall be removed using compressed air and/or sweeping. Water blasting may be necessary to remove surface contaminants which cannot be removed by the use of compressed air and/or sweeping. This work is considered surface preparation.

The finished lines shall have well defined edges and the thickness of thermoplastic markings above the roadway surface shall be no less than 90 mils for edge lines, center lines, lane lines, barrier lines, and detail stripe including gore markings, and no less than 120 mils for crosswalks, stop lines, and railroad, word and symbol markings. The minimum thickness, as required above, will be measured in the center of the line when gauged. The minimum thickness one-half inch (½") from the edges shall not be less than 75% of the thickness required in the center.

Any thermoplastic traffic marking less than the required thickness shall be corrected by recapping at no additional costs to the Department. Although a thickness tolerance of 25 percent from center to edge is allowed, a consistent underrun of any amount in thickness as determined by the Engineer will not be acceptable.

The length and width of lines shall be within a tolerance of ±3 inches and ±1/8 inch, respectively. For skip markings, the tolerance for intervals shall not exceed the line length tolerance. On curves, unsightly variations from the normal curvature will not be permitted unless specifically shown on the plans or ordered by the Engineer.

Heat-fused, pre-formed pavement markings shall be supplied with a minimum average thickness of 90 mils before application on the roadway surface.

All newly applied thermoplastic material shall be protected from traffic until the material is sufficiently dry so as not to sustain damage from vehicle tires. Any material so damaged by traffic shall be repaired, and the thermoplastic material tracked onto the pavement shall be removed and

replaced.

907-626.03.3--Reflectivity Requirements. The longitudinal pavement markings shall meet the following retroreflectivity values when measured within 10 to 30 calendar days of placement, after removing loose beads.

Table 1. Minimum Dry Retroreflectivity

Color	All Stripe without Rumble mcd/m²/lx	Rumble Stripe mcd/m²/lx
White	375	250
Yellow	225	150

For projects with less than two miles between the BOP and EOP, retroreflectivity measurements will not be required.

907-626.03.3.1--Measuring Devices. Retroreflectivity measurements are required to be taken using a vehicle mounted mobile retroreflectometer using 30-meter geometry with video and mapping capabilities as per AASHTO T-398. The retroreflectometer and operator shall be certified by the manufacturer, authorized representative of the manufacturer, or an MDOT approved program such as the Texas A&M Transportation Institute (TTI) Mobile Retroreflectometer Certification Program. The Contractor shall provide copies of current certifications for the operator(s) and the device(s) to the Engineer.

907-626.03.3.2--Acceptance Procedure. Averages of the mobile measurements shall be provided for every 0.1 miles unless otherwise specified or approved. Take measurements on each section of roadway for each series of markings (i.e., edge line, center skip line, each line of a double line, etc.) and for each direction of traffic flow. Measure each line in both directions for centerlines on two-way roadways (i.e., measure both double solid line in both directions and measure all center skip lines in both directions). Furnish measurements in compliance with the below requirements. Use all equipment in accordance with the manufacturer's recommendations and directions. Inform the Engineer at least 24 hours before taking any measurements.

A marking meets the retroreflectivity requirements if:

- The combined average retroreflectivity value for a one-mile segment meets the minimum retroreflectivity values specified, and
- Within the one-mile segment, no more than three consecutive 0.1 mile intervals shall have an average retroreflectivity value below the minimum required value.

The one-mile segment will start from the beginning of the data collection and end after a mile worth of measurements have been taken; each subsequent mile of measurements will be a new segment. If the remainder is 0.5 miles or less, it shall be included in the previous mile segment, otherwise the remaining segment of greater than 0.5 mile shall be its own segment. Centerlines with 2 stripes (either solid or broken) will result in 2 miles of data for each mile segment. Each centerline stripe must be tested for compliance as a stand-alone stripe.

The Contractor may elect to restripe with a minimum of 0.060 in. (60 mils) at no cost to the Department each one-mile segment that failed to meet the minimum retroreflectivity requirements.

Measurements shall be retaken within 10 to 30 calendar days after the second application for the mile segment for that series of markings. If the markings do not meet minimum retroreflectivity after the second application, the Engineer may require removal of all existing markings, a new application as initially specified, and a repeat of the application process until minimum retroreflectivity requirements are met.

907-626.03.3.3--Mobile Retroreflectivity Data Collection. Mobile Retroreflectivity Data Collection (MRDC) shall be conducted on dry pavement only and when the ambient air temperature is greater than 40°F. Data shall be submitted to the Engineer no later than 3 working days after the day the data is collected. Submit all raw data collected in addition to all other data submitted. Provide data files in Microsoft Excel format or a format approved by the Engineer. The data file and video must contain the following information.

907-626.03.3.3.1--Data File. Data files shall be provided with the following:

- Date;
- District;
- County;
- Name of mobile retroreflectometer operator;
- Route number with reference markers or other reference information provided by the Engineer to indicate the location of beginning and end data collection points on that roadway;
- Cardinal direction;
- Line type (single solid, single broken, double solid, etc.);
- Line color;
- File name corresponding to video;
- Data for each centerline listed separately;
- Average reading taken for each 0.1-mi. interval (or interval designated by the Engineer);
- Accurate GPS coordinates (within 20 ft.) for each interval;
- Color-coding for each interval indicating passing or failing, unless otherwise directed by the Engineer (passing and failing thresholds provided by the Engineer);
- Graphical representation of the MRDC (y-axis showing retroreflectivity and x-axis showing intervals) corresponding with each data file;
- Distance in miles driven while measuring the pavement markings;
- Event codes (pre-approved by the Engineer) indicating problems with measurement;
- Upper validation threshold (may be included separately with the raw data but must be clearly identified with the data collected using that threshold).

907-626.03.3.3.2--Map. A map shall be provided in an electronic format approved by the Engineer with each MRDC submission that includes the following information:

- Date;
- District number;
- County;

- Color-coded 1-mi. intervals (or interval length designated by the Engineer) for passing and failing retroreflectivity values or retroreflectivity threshold values provided by the Engineer; and
- Percentage of passing and failing intervals, if required by the Engineer.

907-626.03.3.3.3--Video. A high-quality video file shall be provided with the following information:

- Date and corresponding data file name on label;
- District number;
- County;
- Route number with reference markers or other designated reference information to indicate the location of beginning and end collection points on that roadway; and
- Retroreflectivity values presented on the same screen with the following information:
    - Date;
    - Location;
    - Starting and ending mileage;
    - Total miles;
    - Retroreflectivity readings; and
    - Upper validation thresholds (may be included separately with the raw data but must be clearly identified with the data collected using that threshold).

907-626.03.4--Reflectivity Verification Testing. The Engineer or a third party may perform retroreflectivity verification testing on any project. At a minimum, each Contractor performing work for the Department will be verified on an annual basis. The Contractor-submitted retroreflectivity data will be compared to the verification test data to determine acceptability of the Contractor's mobile retroreflectometer data. Comparison of the data will result in one of the two scenarios below:

- Contractor's Data is Validated – If the difference between Contractor's and Engineer/third party data is 20% or less, then the Contractor's data is validated. The Contractor's data will be used for acceptance.
- Contractor's Data is not Validated – If the difference between the Contractor's and Engineer/third party data is more than 20%, then the Contractor's data is not validated. The Engineer/third party data will be used for acceptance and the Contractor will be required to take corrective action prior to additional Contractor data collection and may require re-certification of the mobile retroreflectometer.

907-626.04--Method of Measurement. Thermoplastic stripe completed in accordance with the plans and specifications will be measured by the mile or by the linear foot, as indicated, from end-to-end of individual stripes. In the case of skip lines the measurement will include skip intervals. The length used to measure centerline, lane lines, and edge stripes will be the horizontal length computed along the roadway.

Detail traffic stripe will be measured by the linear foot from end-to-end of individual stripes. Measurements will be made along the surface of each stripe and will exclude skip intervals where

skips are specified. Stripes more than six inches (6") in width will be converted to equivalent lengths of 6-inch stripe.

Hot-applied legend, which is to include railroad markings, pedestrian crosswalks, and stop lines, will be measured by the square foot or linear foot. Pay areas of individual letters and symbols will usually be shown on the plans and measured by the square foot. Transverse railroad bands, pedestrian crosswalks and stop lines will generally be measured by the linear foot, in which case, stripes more than six inches (6") in width will be converted to equivalent lengths of 6-inch widths.

Pre-formed legend which is to include railroad markings and pedestrian crosswalks will be measured and paid for by each.

The length measured for thermoplastic audible bump edge stripe will not include the permanent thermoplastic edge stripe. Permanent thermoplastic edge stripe will be measured for payment under a separate pay item.

Thermoplastic audible bar centerline skip stripe will be measured by the linear foot or mile. Measurements will be made along the surface from end-to-end of the stripe and will include skip intervals. The length used to measure audible bar centerline stripe will be the horizontal length computed along the roadway. The length measured for thermoplastic audible bar centerline skip stripe will not include the permanent centerline continuous or skip stripe. Permanent centerline continuous and skip stripe will be measured for payment under separate pay items.

Thermoplastic audible bar edge stripe will be measured by the linear foot or mile. Measurements will be made along the surface from end-to-end of the stripe. The length used to measure thermoplastic audible bar edge stripe will be the horizontal length computed along the roadway. The length measured for thermoplastic audible bar edge stripe will not include the permanent thermoplastic edge stripe. Permanent thermoplastic edge stripe will be measured for payment under a separate pay item.

907-626.05--Basis of Payment. Thermoplastic traffic markings will be paid for at the contract unit price per mile, linear foot, square foot or each as applicable. Any deductions for non-satisfactory material test results will be made after final testing has been performed.

Payment will be made under:

907-626-A:	6" Thermoplastic Traffic Stripe, Skip White	- per linear foot or mile
907-626-B:	6" Thermoplastic Traffic Stripe, Continuous White	- per linear foot or mile
907-626-C:	6" Thermoplastic Edge Stripe, Continuous White	- per linear foot or mile
907-626-D:	6" Thermoplastic Traffic Stripe, Skip Yellow	- per linear foot or mile
907-626-E:	6" Thermoplastic Traffic Stripe, Continuous Yellow	- per linear foot or mile

907-626-F:	6" Thermoplastic Edge Stripe, Continuous Yellow	- per linear foot or mile
907-626-G:	Thermoplastic Detail Stripe, Color *	- per linear foot
907-626-H:	Thermoplastic Legend, Color *	- per linear foot, square foot, or per each
907-626-Q:	Thermoplastic Audible Bump Edge Stripe	-per linear foot or mile
907-626-R:	Thermoplastic Detail Audible *** Stripe, Color **,	-per mile
907-626-AA:	6" High Contrast Thermoplastic Traffic Stripe, Skip White	- per linear foot or mile
907-626-BB:	6" High Contrast Thermoplastic Traffic Stripe, Continuous White	- per linear foot or mile
907-626-CC:	6" High Contrast Thermoplastic Edge Stripe, Continuous White	- per linear foot or mile
907-626-DD:	6" High Contrast Thermoplastic Traffic Stripe, Skip Yellow	- per linear foot or mile
907-626-EE:	6" High Contrast Thermoplastic Traffic Stripe, Continuous Yellow	- per linear foot or mile
907-626-FF:	6" High Contrast Thermoplastic Edge Stripe, Continuous Yellow	- per linear foot or mile
907-626-GG:	High Contrast Thermoplastic Detail Stripe, Color *	- per linear foot
907-626-HH:	High Contrast Thermoplastic Legend, Color *	- per linear foot, square foot, or each

* Indicate Blue - ADA if applicable
** Indicate White or Black
*** Indicate Centerline - Passing Zone, Centerline - No-Passing Zone, or Edge Line

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-627-1 **CODE: (IS)**

DATE: 06/24/2024

SUBJECT: Raised Pavement Markers

Section 627, Raised Pavement Markers, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

Delete Subsection 627.02 on page 496, and substitute the following.

907-627.02--Materials. Pavement and jiggle markers of the types specified shall conform to the applicable requirements of Subsection 907-720.06 and shall be listed on the Department's APL.

Type B through G High Performance reflective markers shall be listed on the Department's APL for high performance raised pavement markers.

The bituminous adhesive for pavement markers shall meet the requirements of Subsection 907-720.07.3.

907-627.05--Basis of Payment. Add the "907" prefix to the pay items listed on page 498.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-628-6 **CODE: (IS)**

DATE: 06/24/2024

SUBJECT: Cold Plastic Pavement Markings

Section 628, Cold Plastic Pavement Markings, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction, is hereby amended as follows.

Delete Section 628 on pages 498 through 500, and substitute the following.

SECTION 628 – COLD PLASTIC PAVEMENT MARKINGS

907-628.01--Description. This work consists of furnishing materials and installing cold plastic pavement markings of the type specified in reasonably close conformity with the plans and these specifications.

High performance cold plastic tape (permanent pavement marking tape) may be used in lieu of hot applied thermoplastic markings. Substitution will only be allowed for pay items 907-626-A through H. Substituted pavement marking tape shall be of the same color and width as that required for the hot applied stripe. Unless otherwise specified, the markings, whether hot applied or pavement marking tape, shall be of the same type of material for the entire project. Material and construction requirements for substituted pavement marking tape shall meet the requirements of this section of the Specifications. The layout and spacing for substituted pavement marking tape will remain as shown in the plans, or in the contract documents, for hot applied thermoplastic markings. Measurement of substituted pavement marking tape shall be made in accordance with this subsection of the Specifications. Payment for substituted pavement marking tape shall be made at the unit price bid for the appropriate hot applied thermoplastic marking.

High contrast cold plastic tape (permanent high contrast pavement marking tape) may be used in lieu of hot applied thermoplastic markings. Substitution will only be allowed for pay items 907-626-A through H. Substituted pavement marking tape shall be of the same color and width as that required for the hot applied stripe. Unless otherwise specified, the markings, whether hot applied or pavement marking tape, shall be of the same type of material for the entire project. Material and construction requirements for substituted pavement marking tape shall meet the requirements of this section of the Specifications. The layout and spacing for substituted pavement marking tape will remain as shown in the plans, or in the contract documents, for hot applied thermoplastic markings. Measurement of substituted pavement marking tape shall be made in accordance with this subsection of the Specifications. Payment for substituted pavement marking tape shall be made at the unit price bid for the appropriate hot applied thermoplastic marking.

907-628.02--Materials. Pavement marking tape shall meet the requirements of Special Provision 907-720.

907-628.03--Construction Requirements.

907-628.03.1--Equipment. The manufacturer shall provide application equipment, manual or automatic, as necessary for the job requirements. These applicators shall be capable of applying pavement marking tape to the required alignment and dimensions shown on the plans or in the contract documents. The mechanical applicator shall be provided on location at the time designated and for the duration of the application period. The material manufacturer shall provide technical assistance for operation and maintenance of the mechanical applicator at the discretion of the Engineer.

907-628.03.2--General. The free-air temperature shall be at least 60°F. The pavement surface shall be dry and clean. All dirt, loose particles of pavement, and other foreign material shall be removed prior to application of the pavement marking tape. All longitudinal stripes shall be mechanically applied. Detail stripe and legend may be applied manually. Only butt splices without overlay will be permitted for multiple piece and line type markings. Except for legend, the specified width of the markings shall be made in a single tape application. Where possible the markings shall be placed adjacent to rather than on longitudinal construction joints in the pavement. Placement tolerance will be as set out in Subsection 625.03.3. Markings not meeting these tolerances shall be removed and replaced at no additional costs to the Department.

907-628.03.3--Application. Both mechanical and manual application shall be in accordance with the manufacturer's instructions. A liquid contact shall be used at the rate recommended by the manufacturer for detail stripe and legend symbols. Liquid contact cement shall not be used elsewhere unless specified by the manufacturer. When liquid contact cement is used, the newly placed markings shall be protected from traffic for the period of time recommended by the manufacturer of the cement.

907-628.04--Method of Measurement. Pavement marking tape will be measured for payment in accordance with Special Provision 907-626-11.

907-628.05--Basis of Payment. Pavement marking tape will be paid for at the contract unit price per mile, linear foot, square foot or each which shall be full compensation for completing the work.

Payment will be made under:

907-628-G:	6" High Performance Cold Plastic Traffic Stripe, Skip White	- per linear foot or mile
907-628-H:	6" High Performance Cold Plastic Traffic Stripe, Continuous White	- per linear foot or mile
907-628-I:	6" High Performance Cold Plastic Traffic Stripe, Skip Yellow	- per linear foot or mile
907-628-J:	6" High Performance Cold Plastic Traffic Stripe, Continuous Yellow	- per linear foot or mile
907-628-K:	High Performance Cold Plastic Detail Stripe, Color	- per linear foot

907-628-L:	High Performance Cold Plastic Legend, Color *	- per square foot, linear foot or each
907-628-AA:	6" High Contrast Cold Plastic Traffic Stripe, Skip White	- per linear foot or mile
907-628-BB:	6" High Contrast Cold Plastic Traffic Stripe, Continuous White	- per linear foot or mile
907-628-CC:	6" High Contrast Cold Plastic Traffic Stripe, Skip Yellow	- per linear foot or mile
907-628-DD:	6" High Contrast Cold Plastic Traffic Stripe, Continuous Yellow	- per linear foot or mile
907-628-EE:	High Contrast Cold Plastic Detail Stripe, Color	- per linear foot or mile
907-628-FF:	High Contrast Cold Plastic Legend, White	- per square foot or linear foot

* Indicate Handicap Symbol, if applicable

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-630-1 **CODE: (SP)**

DATE: 01/17/2017

SUBJECT: Remove and Reset Signs

Section 630, Traffic Signs and Delineators of the Mississippi Standard Specifications for Road and Bridge Construction, 2017 Edition, is hereby amended as follows.

907-630.01--Description. After the last paragraph of Subsection 630.01 on page 503, add the following.

Selected existing, temporarily installed, and/or permanently installed signs other than construction traffic control signs shall be removed and reset as shown on the plans, in the contract documents, or as directed by the Engineer. Removing and resetting of signs may include provisions of continuous sign visibility by the traveling public before, during, and after the operation. The Contractor shall provide all materials necessary to remove and reset the sign, including any footings, supports, brackets, hardware, breakaway features and other incidentals. All installations within 30 feet of the pavement edge of temporary or permanent thru lanes shall include breakaway support features certified to meet NCHRP Report 350 prior to the removal and resetting of the sign.

Selected existing overhead sign shall be removed and reset as shown on the plans, in the contract documents, or as directed by the Engineer. The Contractor shall provide all materials necessary to remove and reset the sign, including any supports, brackets, hardware, and other incidentals. The Contractor shall take all precautions necessary when removing, transporting, storing, and re-installing to protect the sign from any damage to the sign panel or reflective sign surface.

907-630.04--Method of Measurement. After the last paragraph of Subsection 630.04 on page 510, add the following.

Remove and reset signs will be measured per each or square foot.

If a sign assembly is removed and temporarily placed in storage, then later reset as directed by the Engineer, measurement for payment will be made one time only, after the stored sign is reset.

No separate measurement will be made for removal only of a sign assembly, as said removal shall be included in the appropriate pay item for removal of signs.

907-630.05--Basis of Payment. After the first paragraph of Subsection 630.05 on page 510, add the following.

Remove and reset sign, measured as prescribed above, will be paid for at the contract unit price per each or square foot, which price shall be full compensation for furnishing and placing all

materials necessary to effect the removal and resetting, including footings, supports, brackets, hardware, breakaway features, transporting, storage, and for all labor, equipment, tools and incidentals necessary to complete the work.

Add the following to the list of pay items on pages 510 & 511.

907-630-O: Remove and Reset Sign, Description - per each or square foot

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-700-2 **CODE: (IS)**

DATE: 10/01/2025

SUBJECT: Materials and Tests

Section 700, Materials and Tests, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

Delete fourth, fifth, sixth, and seventh paragraph of Subsection 700.01 on page 713, and add the following.

907-700.01.1--Buy America Requirements.

Iron or Steel Products. Iron or steel or wire products (including prestressed cables and strands) are products that consist wholly or predominantly of iron or steel or a combination of both.

Predominantly of iron or steel or a combination of both means that the cost of the iron and steel content exceeds 50 percent of the total cost of all components. The cost of iron and steel is the cost of the iron or steel mill products (such as bar, billet, slab, wire, plate, or sheet), castings, or forgings utilized in the manufacture of the product and a good faith estimate of the cost of the iron and steel components.

Iron or steel or wire products, as described above, that are permanently incorporated into a construction project must be produced domestically. All manufacturing processes for iron or steel or wire products, from the initial melting stage through the application of coatings, that are permanently incorporated into a construction project, must occur domestically. However, pig iron and processed, pelletized, and reduced iron ore manufactured outside of the United States may be used in the domestic manufacturing process for iron and/or steel and/or wire products. Coating includes all processes that protect or enhance the value of the material to which the coating is applied.

Construction Materials. Construction materials are articles, materials, or supplies that consist of only one of the items listed (non-ferrous metals, plastic and polymer-based products, glass, fiber-optic cables (including drop cables), optical fibers, lumber, drywall, and engineered woods). Minor additions of articles, materials, supplies, or binding agents to a construction material do not change the categorization of the construction material. All manufacturing processes for the listed construction materials, from the initial processes as described within 2 CFR 184.6 to the final processes as described within 2 CFR 184.6, that are permanently incorporated into a construction project, must occur domestically.

Manufactured Products. Manufactured products are articles, materials, or supplies that have been processed into a specific form or shape; or when combined with other articles, materials, or supplies create a product with different properties than the individual articles, materials, or supplies. An item that is classified as an iron or steel product, a construction material, or an excluded material is not a manufactured product. However, an article, material, or supply classified as a manufactured product

may include components that are iron or steel products, excluded materials, or other product categories as specified by law or in 2 CFR part 184. Mixtures of excluded materials delivered to a work site without final form for incorporation into a project are not a manufactured product. For construction projects obligated on or after October 1, 2025, the manufactured product must be manufactured domestically. For construction projects obligated on or after October 1, 2026, the manufactured product must be manufactured domestically and the cost of the components of the manufactured product that are mined, produced, or manufactured domestically is greater than 55 percent of the total cost of all components of the manufactured product.

Excluded Materials. Excluded materials, as listed in Section 70917(c) of the Build America, Buy America Act, are cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives. However, an article, material, or supply classified as a manufactured product may include components that are iron or steel products, excluded materials, or other product categories as specified by law or in 2 CFR part 184. Mixtures of excluded materials delivered to a work site without final form for incorporation into a project are not a manufactured product.

Domestically shall be understood to mean all States of the United States, District of Columbia, Puerto Rico, American Samoa, Guam, and Virgin Islands and any other place subject to the jurisdiction of the United States.

907-700.01.2—Certificate of Compliance Requirements. Prior to incorporation into the work, the Contractor shall furnish the Project Engineer with a Domestic Materials Self-Certification Form documenting conformance to the requirements of Subsection 907-106.14. Attached hereto is the Domestic Materials Self-Certification Form that shall be furnished by the Contractor to the Project Engineer.

Domestic Materials
Self-Certification Form

This certification is for a manufacturer/supplier to certify the below articles, materials, or supplies are in compliance with the applicable domestic material content procurement preferences found in the Buy America Act requirements (23 CFR 635.410) and the Build America, Buy America Act (BABA) requirements (2 CFR part 184). The individual completing this form takes full responsibility for the information included in the form. State agencies have the authority to request additional details related to the information provided in the form. All forms shall be submitted via AASHTO DataMine for delivery to authorized governmental users through the Industry Document Repository. The manufacturer/supplier is required to include updates to process changes within 10 days of the change occurring via uploading a revised form into DataMine.

PART 1: COMPANY CONTACT INFORMATION

Company/Producer/Manufacturer Name:

Supplier Representative Name:

Contact Email Address: Contact Phone Number:

Date Form is Being Submitted:

PART 2: DETAILS OF THE ARTICLE, MATERIAL, OR SUPPLY:

Using Table 1 below, provide the classification of the article, material, or supply as one of the following: (1) iron or steel product; (2) construction material (3) manufactured product; or (4) excluded materials including Section 70917(c) materials.

Classification	
Producer of the Article, Material, or Supply:	
Product/Model/Part/Material:	
Manufacturing Address:	
Manufacturing City:	
Manufacturing State:	
Manufacturing Zip Code:	
DataMine # (if applicable):	
Federal/State/Local Project number(s):	
Pay Code Number (PCN):	
Project Item code:	
Project Item Description:	
Quantity Certified:	

TABLE 1: Material Classifications

(1) Iron or Steel Product	
Wholly or predominantly Iron or Steel, or a combination of both (23 CFR 635.410(b)(1)(ii))	Certification requires predominantly of iron or steel or a combination of both means that the cost of the iron and steel content exceeds 50 percent of the total cost of all its components. The cost of iron and steel is the cost of the iron or steel mill products (such as bar, billet, slab, wire, plate, or sheet), castings, or forgings utilized in the manufacture of the product and a good faith estimate of the cost of iron or steel components.
(2) Construction Material	
Non-Ferrous Metals (2 CFR 184.6(a)(1))	Certification requires all manufacturing processes, from initial smelting or melting through final shaping, coating, and assembly, occurred in the United States.
Plastic and Polymer based products (including polyvinyl chloride, composite building materials, and polymers used in fiber optic cables) (2 CFR 184.6(a)(2))	Certification requires all manufacturing processes, from initial combination of constituent plastic or polymer-based inputs, or where applicable, constituent composite materials, until the item is in its final form, occurred in the United States.
Glass (including optic glass) (2 CFR 184.6(a)(3))	Certification requires all manufacturing processes, from initial batching and melting of raw materials through annealing, cooling, and cutting, occurred in the United States.
Fiber Optic Cable (including drop cable) (2 CFR 184.6(a)(4))	Certification requires all manufacturing processes, from the initial ribboning (if applicable), through buffering, fiber stranding and jacking, occurred in the United States. All manufacturing processes also include the standards for glass and optical fiber, but not for non-ferrous metals, plastics and polymer-based products, or any others.
Optical Fiber (2 CFR 184.6(a)(5))	Certification requires all manufacturing processes, from the initial preform fabrication stage through the completion of the draw, occurred in the United States
Lumber (2 CFR 184.6(a)(6))	Certification requires all manufacturing processes, from initial debarking through treatment and planing, occurred in the United States.
Drywall (2 CFR 184.6(a)(7))	Certification requires all manufacturing processes, from initial blending of mined or synthetic gypsum plaster and additives through cutting and drying of sandwiched panels, occurred in the United States.
Engineered Wood (2 CFR 184.6(a)(8))	Certification requires all manufacturing processes, from initial combination of constituent materials until the wood product is in its final form, occurred in the United States.
(3) Manufactured Product	
Manufactured Products other than Precast Concrete Products and Intelligent Transportation Systems and Other Electronic Hardware Systems Installed on the Highway ROW or Other Real Property (23 CFR 635.410(c)(1)(vii)) and 23 CFR 635.410(c)(1)(iv)	• Certification requires for projects obligated before October 1, 2025, no certification is required (excludes EV chargers). • Certification requires for projects obligated on or after October 1, 2025, certification requires the final manufacturing process occurred in the United States (excludes EV chargers). • Certification requires for projects obligated on or after October 1, 2026, and all EV chargers , certification requires the final manufacturing process occurred in the United States and the cost of the components that are mined,

	produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product.
Precast Concrete Products (23 CFR 635.410(c)(2)(i))	Classified as a manufactured product must comply with both the wholly or predominantly iron or steel or a combination of both product and manufactured product certification requirements as stated above.
Intelligent Transportation Systems and Other Electronic Hardware Systems Installed on the Highway ROW or Other Real Property (23 CFR 635.410(c)(2)(ii))	Classified as a manufactured product must comply with both the wholly or predominantly iron or steel or a combination of both product certification requirements for any iron or steel enclosures as well as the manufacturing certification requirements as stated above.
(4) Excluded Materials	
Excluded Materials Including Section 70917(c) Materials (23 CFR 635.410(c)(1)(ii))	No certification is required for excluded materials including Section 70917(c) materials. Section 70917(c) materials means cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives.

PART 3: DECLARATION OF SUBMITTAL

Do the articles, materials, or supplies submitted in this form comply with applicable domestic materials content procurement preferences found in the Buy America Act requirements (23 CFR 635.410) and the Build America, Buy America Act requirements (2 CFR part 184) (Y/N)? _____

PART 4: CERTIFICATION (Read and check all boxes before signing)
Note: State Departments of Transportation may have different language requirements for this section.

☐ I certify that the description above is a true and accurate description of the article, material, or supply provided, and that the undersigned is in a position to legally bind the Company/Organization represented in this form.

☐ I certify that the iron or steel product, construction material, or manufactured product complies with the applicable Buy America or BABA requirements.

Signature: Date:

Printed Name:
Title:
Company/Organization:
Company/Organization address:

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-701-4

DATE: 11/05/2024

SUBJECT: Hydraulic Cement

907-701.04--Blended Hydraulic Cement.

907-701.04.1--Types of Blended Hydraulic Cement. After the last paragraph of Subsection 907-701.04.1 on page 1, add the following.

Blended cement Types IL meeting the "HE" high early strength requirement listed in AASHTO M 240, Table 3 shall have the "(HE)" suffix added to the type designation.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-701-4 **CODE: (IS)**

DATE: 11/21/2023

SUBJECT: Hydraulic Cement

Section 701, Hydraulic Cement, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-701.01--General. In the first sentence of the second paragraph of Subsection 701.01 on page 718, change "mills" to "plants."

In the second sentence of the sixth paragraph of Subsection 701.01 on pages 718 and 719, change "shall" to "will."

907-701.02--Portland Cement.

907-701.02.1-General. Delete Subsections 701.02.1.1, 701.02.1.2, 701.02.2, 701.02.2.1, and 701.02.2.2 on pages 719 and 720, and substitute the following.

907-701.02.1.1--Types of Portland Cement. Portland cement shall be either Type I, Type II, or Type III conforming to AASHTO M85 or Type III (MS). Type III (MS) is defined as a Type III cement conforming to AASHTO M85 having a maximum tricalcium aluminate (C_3A) content of 8%.

907-701.02.2--Blank.

907-701.02.2.1--Blank.

907-701.02.2.2--Blank.

Delete Subsection 701.04 on pages 720 and 721, and substitute the following.

907-701.04--Blended Hydraulic Cement.

907-701.04.1--Types of Blended Hydraulic Cement. Blended hydraulic cements (blended cements) shall be of the following types and conform to AASHTO M 240:

Type IL – Portland-limestone cement
Type IP – Portland-pozzolan cement
Type IS – Portland blast-furnace slag cement

Blended cement Types IL, IP, and IS meeting the "MS" sulfate resistance requirement listed in AASHTO M 240, Table 3 shall have the "(MS)" suffix added to the type designation.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-702-4 **CODE: (IS)**

DATE: 09/11/2018

SUBJECT: Bituminous Materials

Section 702, Bituminous Materials, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-702.04--Sampling. Delete the sentence in Subsection 702.04 on page 722, and substitute the following.

Sampling of bituminous materials shall be as set out in AASHTO R 66.

907-702.07--Emulsified Asphalt. Delete the last sentence in Subsection 702.07 on page 724, and substitute the following.

Asphalt for fog seal shall conform to the requirements of Subsection 907-702.12, Table V.

907-702.12--Tables. Delete Table V in Subsection 702.12 on page 729, and substitute the following.

TABLE V
SPECIFICATION FOR FOG SEAL

	LD-7		CHPF-1		
Test Requirements	**Min.**	**Max.**	**Min.**	**Max.**	**Test Method**
Viscosity, Saybolt Furol, @ 25°C, Sec.	10	100	-	100	AASHTO T 72
Storage Stability Test, 24 hr, %	-	1	-	1	AASHTO T 59
Settlement, 5 day, %	-	5	-	-	AASHTO T 59
Oil Distillate, %	-	1	-	-	AASHTO T 59
Sieve Test, % *	-	0.3	-	0.1	AASHTO T 59
Residue by Distillation, %	40	-	40	-	AASHTO T 59
Test on Residue from Distillation					
Penetration @ 25°C, 100g, 5 sec	-	20	40	90	AASHTO T 49
Softening Point, °C	65	-	-	-	ASTM D 36
Solubility in trichloroethylene, %	97.5	-	-	-	AASHTO T 44
Elastic Recovery @ 25°C, %	-	-	40	-	AASHTO T 301
Original DSR @ 82° (G*/Sinδ, 10 rad/sec)	1	-	-	-	AASHTO T 111

* The Sieve Test result is tested for reporting purposes only and may be waived if no application problems are present in the field.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-703-2 **CODE: (SP)**

DATE: **11/29/2022**

SUBJECT: **Gradation**

Section 703, Aggregates, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-703.03--Coarse Aggregates for Hydraulic Cement Concrete.

907-703.03.2--Detail Requirements.

907-703.03.2.4--Gradation. In the table in Subsection 703.03.2.4 on page 734, add 100 for the percent passing by weight on the 1½-inch sieve for Size No. 67 aggregates.

Delete Note 2 under the table in Subsection 703.03.2.4 on page 734, and substitute the following.

Note [2] – 100 percent shall pass the 1-inch sieve for Size 67 used in Class F and Class FX concrete.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-705-1 **CODE: (IS)**

DATE: 06/13/2018

SUBJECT: Stone Riprap

Section 705, Stone Blanket Protection and Filter Blanket Materials, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-705.04--Stone Riprap. Delete the last sentence of the first paragraph of Subsection 705.04 on page 750, and substitute the following.

Quality requirements for rock to be furnished under these specifications will come from a pre-approved source and be visually approved prior to use.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-707-3 **CODE: (IS)**

DATE: **10/27/2021**

SUBJECT: **Joint Materials**

Section 707, Joint Materials, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-707.02--Joint Filler.

907-707.02.2--Preformed Sponge, Rubber, Cork and Closed-Cell Polypropylene Foam Joint Fillers for concrete Paving and Structural Constructions. Delete the two paragraphs of Subsection 707.02.2 on page 755, and substitute the following.

Preformed joint filler shall conform to AASHTO M 153 for sponge, rubber, and cork and tested according to ASTM D545. The type required will be indicated on the plans.

Closed-cell polypropylene foam shall conform to the requirements in ASTM D8139 and tested in accordance with ASTM D545.

907-707.02.3--Wood. Delete paragraph (b) of Subsection 707.02.3 on page 755, and substitute the following:

(b) Dimensions shall be as shown on the plans Dimensions shown on the plans are "dressed" sizes in accordance with Table 3 of the American Softwood Lumber Standard, SP-20. At the discretion of the Engineer, a 3/4-inch dressed board may be used in lieu of a 1-inch dressed board. A tolerance of plus or minus 1/16 inch thickness and plus or minus 1/8 inch width will be permitted. For slip-form paving a tolerance of minus 1/4 inch on each end in length will be permitted.

907-707.06--Flexible Plastic Gasket for Joining Conduit. Delete the third paragraph of Subsection 707.06 on page 756, and substitute the following.

The Department may require the performance test described in ASTM C 990.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-708-4 **CODE: (IS)**

DATE: **09/21/2021**

SUBJECT: **Concrete Pipe**

Section 708, Non-Metal Structures and Cattlepasses, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-708.02--Concrete Pipe.

907-708.02.1--Materials for Use in Concrete Pipe.

907-708.02.1.2--Fly Ash. Delete Subsection 708.02.1.2 on page 758, and substitute the following.

Fly ash conforming to the requirements of Subsection 714.05 may be used to replace hydraulic cement on a one to one replacement rate. If a type IL cement conforming to the requirements of Subsection 701.04 is used, the fly ash replacement shall not exceed 35% by weight of the cement. For all other Types of cement, the fly ash replacement rate shall not exceed 25% by weight of hydraulic cement.

907-708.02.3--Exceptions to AASHTO Standard Specifications. After Subsection 708.02.3.7 on page 760, add the following.

907-708.02.3.8--Lifting Device. In lieu of lift holes, the producer may cast an approved lifting device in the pipe during the manufacturing process. Should a lifting device be included with the pipe, the Contractor shall cut off or grind down the lifting device flush with the pipe surface after placement of the pipe. The area around the lifting device shall be coated with a sealer approved by the Engineer.

907-708.02.5--Reinforced Concrete Pipe. Delete the second paragraph in Subsection 708.02.5 on page 760, and substitute the following.

907-708.02.5.1--Class V Pipe With Diameter 54 Inches and Greater. Class V pipe with diameters of 54 inches and larger shall meet the requirements of AASHTO M 170 or M 242 as modified by Subsection 708.02 and herein.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-711-2 **CODE: (IS)**

DATE: 09/11/2018

SUBJECT: Plain Steel Wire

Section 711, Reinforcement and Wire Rope, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-711.02--Deformed and Plain Carbon-Steel Bars for Concrete Reinforcing.

907-711.02.3--Steel Welded and Non-Welded Wire Reinforcement, Plain and Deformed, for Concrete.

907-711.02.3.1--Plain Steel Wire. Delete the sentence in Subsection 711.02.3.1 on pages 780 and 781, and substitute the following.

Plain steel wire and plain steel welded wire shall conform to the requirements of AASHTO M 336.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-712-1 **CODE: (SP)**

DATE: 12/07/2021

SUBJECT: Fence and Guardrail

Section 712, Fence and Guardrail, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-712.01--General. After the sentence in Subsection 712.01 on page 785, add the following.

All materials' inspection, testing, and certification will be performed in accordance with the requirements of the current version of the Department's *Materials Division Inspection, Testing, and Certification Manual*.

Delete Subsections 712.02 and 712.03 on page 785, and substitute the following.

907-712.02--Barbed Wire. Barbed wire shall conform to the requirements of AASHTO M 280. In the coastal counties of Hancock, Harrison, and Jackson, either Coating Type Z Class 3 or Coating Type A shall be furnished. In all other areas of the State, either Coating Type Z Class 1, Coating Type Z Class 3, Coating Type ZA Class 60, or Coating Type A shall be furnished.

907-712.03--Metallic-Coated, Steel Woven Wire Fence Fabric. Woven wire fencing (i.e., "hog wire") shall conform to the requirements of AASHTO M 279. In the coastal counties of Hancock, Harrison, and Jackson, either Coating Type Z Class 3 or Coating Type A shall be furnished. In all other areas of the State, either Coating Type Z Class 1, Coating Type Z Class 3, Coating Type ZA Class 60, or Coating Type A shall be furnished.

907-712.04--Chain Link Fence. Delete Subsections 712.04.1 thru 712.04.7 on pages 785 & 786, and substitute the following.

907-712.04.1--Fabric. In the coastal counties of Hancock, Harrison, and Jackson, either Type I Class D, Type II, Type III, or Type IV fabrics shall be furnished. In all other areas of the State, either Type I Class C, Type I Class D, Type II, Type III, or Type IV fabrics shall be furnished.

907-712.04.2--Tie Wire. Tie wire shall be of the same material as the fencing wire being used, shall be of good commercial quality, and shall meet the requirements of AASHTO M 181. Either Type I, Type II, Type III, or Type IV tie wire shall be furnished.

907-712.04.3--Tension Wire. Tension wire shall be of the same material as the fencing wire being used, shall be of good commercial quality, and shall meet the requirements of AASHTO M 181. In the coastal counties of Hancock, Harrison, and Jackson, either Type I Class 3, Type II, Type III, or Type IV tension shall be furnished. In all other areas of the State, either Type II, Type III, Type IV, or Type I Classes 1, 2, or 3 tension wires shall be furnished.

907-712.04.4--Posts Rails, Gate Frames, and Expansion Sleeves. Posts, rails, gate frames, and expansion sleeves shall conform to the requirements for posts in Subsection 712.05.2, unless otherwise designated in the contract.

907-712.04.5--Miscellaneous Fittings and Hardware. Miscellaneous fittings and hardware shall conform to the requirements of Subsection 712.16.

907-712.05--Fence Posts and Braces.

907-712.05.1--Treated Timber Posts and Braces.

907-712.05.1.1--General. Delete the third, fourth, fifth, and sixth paragraphs of Subsection 712.05.1.1 on page 787, and substitute the following.

All wood posts and braces shall be treated in accordance with Subsections 718.03 and 718.04.

907-712.05.1.2--Round Posts. Delete the last sentence of the last paragraph of Subsection 712.05.1.2 on page 788.

907-712.05.1.3--Sawed Posts. Delete the last sentence of the paragraph of Subsection 712.05.1.3 on page 788.

907-712.05.1.4--Sawed Braces. Delete the last sentence of the paragraph of Subsection 712.05.1.4 on page 788.

Delete Subsection 712.05.2 on page 788, and substitute the following.

907-712.05.2--Metal Posts.

907-712.05.2.1--Round Steel Pipe. Round steel pipe shall meet the requirements of AASHTO M 181, either Grade 1 (i.e., meeting the requirements in ASTM F 1083) or Grade 2 (i.e., meeting the requirements of ASTM F 1043).

Round steel pipe shall be sized in accordance with NPS (nominal pipe size) designations as shown on Plans, and not according to the outer or inner pipe diameter.

907-712.05.2.2--Steel Fence Post and Assemblies, Hot-Wrought. Steel posts with the following section shapes, Tee, channel or U, and Y-Bar shall meet the requirements of AASHTO M 281, galvanized in accordance with the requirements of AASHTO M 111, unless otherwise specified in the contract. Acceptance of these steel posts shall be by certification from the manufacturer, producer, supplier, or fabricator, as applicable.

907-712.05.2.3--Blank.

907-712.05.2.4--Steel H-Beam Posts. Steel H-Beam posts shall be produced from structural quality weldable steel having a minimum yield strength of 45,000 psi and shall be galvanized in accordance with ASTM A 123. Steel H-Beam line posts shall be 2.250 inches by 1.625 inches and shall weigh 3.43 pounds per foot. A tolerance of plus or minus 5.0 percent is allowed for

weight per foot. A tolerance of plus or minus 1.0 percent is allowed for dimensions.

907-712.05.2.5--Aluminum-Alloy Posts and Assemblies. Round aluminum-alloy posts shall meet the requirements of ASTM B 241, Alloy 6061, T6. Aluminum-Alloy H-Beam posts shall meet the requirements of ASTM B 221, Alloy 6061, T6.

907-712.05.2.6--Formed Steel Section Posts. Formed steel section posts, "C" sections, shall be formed from sheet steel conforming to ASTM A 1011, Grade 45, and shall be galvanized in accordance with ASTM A 123.

907-712.06--Guard and Guardrail Posts.

907-712.06.2--Treated Wood Posts.

907-712.06.2.1--Square Posts. Delete the paragraph in Subsection 712.06.2.1 on page 789, and substitute the following.

All square posts shall be inspected for conformance with Section 712.05, except that the posts may be rough and shall be within ±3/8" of the dimensions shown on the plans.

907-712.06.2.2--Round Posts. Delete the paragraph in Subsection 712.06.2.2 on page 789, and substitute the following.

All round posts shall be inspected for conformance with Section 712.05, except that the posts shall be of the shape and dimensions shown on the plans.

907-712.06.5--Treated Wood Blocks for Use with Metal Guardrail Posts. Delete the paragraphs of Subsection 712.06.5 on pages 789 & 790, and substitute the following.

Treated wood blocks for use with metal guardrail posts shall be within ±3/8" of the size and dimensions shown on the plans, except that a minus tolerance shall not be allowed for the slotted width in which the metal post must fit.

Delete Subsection 712.16 on page 791, and substitute the following.

907-712.16--Hardware. All ferrous metal hardware for fencing such as bolts, nuts, washers, and metal straps shall be as specified on the plans and galvanizing shall not be less than 1.0 ounce per square foot of uncoated area. Aluminum coated hardware shall be coated with aluminum meeting the requirements of AASHTO M 181 for aluminum coating and at the rate of not less than 0.4 ounces per square foot of uncoated area.

Aluminum alloy hardware shall conform to the requirements of ASTM B 221 for extruded aluminum alloy 6063, T6. The finished members shall be of uniform quality.

Aluminum-zinc coated hardware shall be coated with an aluminum-zinc alloy meeting the chemical requirements and weight of coating specified for aluminum-zinc alloy coated metal gates.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-714-4 **CODE: (SP)**

DATE: **07/28/2025**

SUBJECT: **Miscellaneous Materials**

Section 714, Miscellaneous Materials, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-714.01--Water.

907-714.01.1--General. Delete the last sentence of the second paragraph in Subsection 714.01.1 on page 794.

907-714.01.2--Water for Use in Concrete. Delete Subsection 714.01.2 on page 794, and substitute the following:

Water from municipal sources is permitted be used as mixing water in concrete, mortar, and grout without Department testing. Water from non-municipal water sources used in mixing of concrete, mortar, and grout which does not meet the requirements in Subsection 714.01.1 shall be tested for conformance as required in AASHTO M157, Table 1 and Table 2.

907-714.01.3--Water for Use in Chemically Stabilized Based. Delete the first sentence of first paragraph in Subsection 714.01.3 on page 794, and substitute the following:

Water used in the construction of bases that contain cement, lime, or other chemical additive shall be as set out in Subsection 714.01.1. Water from municipal sources is permitted to be used without testing for conformance to the requirements below. If water is not from a municipal source, it shall not contain impurities in excess of the following limits:

Delete Subsection 714.01.6 on page 795, and substitute the following.

907-714.01.6--Blank.

907-714.05--Fly Ash.

907-714.05.1--General. Delete the first sentence of the fifth paragraph in Subsection 714.05.1 on page 797.

Delete Subsection 714.06 on page 798, and substitute the following.

907-714.06--Slag Cement.

907-714.06.1--General. The slag cement source must be approved for listing in the Department's

APL prior to use. The acceptance of slag cement shall be based on certified test reports, certification of shipment from the supplier, and tests performed on samples obtained after delivery in accordance with the Department's *Materials Division Inspection, Testing, and Certification Manual* and Department SOP.

The Contractor shall provide suitable means for storing and protecting the slag cement against dampness and contamination. Separate storage silos, bins, or containers shall be provided for slag cement. Slag cement that is partially set, caked or contains lumps shall not be used.

The State Materials Engineer shall be notified in writing of the nature, amount and identity of any processing or other additions made to the slag cement during production.

Slag cement from different mills shall not be mixed or used alternately in any one class of construction or structure without written permission from the Engineer; except that this requirement will not be applicable to cement treatment of design soils or bases.

No additional cementitious materials, such as blended hydraulic cement, fly ash, metakaolin, or others, shall be added to or as a replacement for hydraulic cement when used with slag cement in the production of concrete. The replacement of hydraulic cement with slag cement shall be in accordance with the applicable replacement content specified in Subsection 701.02.2.

907-714.06.2--Specific Requirements. Slag cement shall meet the requirements of AASHTO M 302, Grade 100 or 120. Slag cement shall contain no chlorides.

907-714.13--Geotextiles.

907-714.13.11--Tables. Delete Table 1 in Subsection 714.13.11 on page 813, and substitute the following.

Table 1 - Geotextiles

Type Designation	I[1]	II[1]	III	IV	V	VI		VII		VIII	IX	
	Sediment Control		Drainage	Paving	Separation & Drainage	Separation, Stabilization & Reinforcement				High Strength		
Physical Property[2]						Woven	Non-Woven	Woven	Non-Woven			**Test Method**
Grab Strength (lb)	50	90	110	90	200	280	180	450	280	----	----	ASTM D 4632
Elongation (%)	----	50% max @ 45 lb	20% min	50% min @ break	50% min	50% max	50% Min	50% max	50% Min	----	----	ASTM D 4632
Seam Strength (lb)	----	----	70	----	180	240	160	400	240	----	----	ASTM D 4632
Puncture Strength (lb)	----	----	40	----	80	110	75	180	115	----	----	ASTM D 6241
Trapezoidal Tear (lb)	----	----	40	----	80	100	70	150	100	----	----	ASTM D 4533
Asphalt Retention (gal/yd^2)	----	----	----	0.2	----	----	----	----	----	----	----	ASTM D 6140
Permittivity (sec^{-1}) min	0.05	0.05	0.5	----	0.2	0.2	0.2	0.2	0.2	----	----	ASTM D 4491
AOS Woven (mm) max	0.60	0.60	0.6	----	0.6	0.43	----	0.43	----	----	----	ASTM D 4751
AOS Non-Woven (mm) max	0.84	0.84	0.43	----	0.43	----	0.43	----	0.43	----	----	
Tensile Strength after UV (% Retained)	70% @ 500 hr	70% @ 500 hr	50% @ 500 hr	----	50% @ 500 hr	50% @ 500 hr	50% @ 500 hr	50% @ 500 hr	50% @ 500 hr	----	----	ASTM D 4355
Melting Point °(F)	----	----	----	325	----	----	----	----	----	----	----	ASTM D 276
Minimum Ultimate Tensile Strength[3] (lb/in)	----	----	----	----	----	----	----	----	----	660	2000	ASTM D 4595

Notes: 1 - All property values, with the exception of apparent opening size (AOS), represent minimum average roll values in the weakest principal direction. Values for AOS represent the maximum average roll values, 2 - Values not identified in this table should meet manufacturer certification for the use and application, 3- Machine direction

Delete Subsec

907-714.15--Geogrids.

907-714.15.1–General. A geogrid is defined as a geosynthetic formed by a regular network of connected elements with apertures greater than 0.25 inch to allow interlocking with surrounding soil, rock, and other surrounding materials to function primarily as reinforcement.

Geogrid shall be manufactured from an expanded strain hardened monolithic polymer sheet composed of one or more synthetic polymers and shall be mildew resistant and inert to biological degradation and naturally encountered chemicals, alkalis and acids. The geogrid shall contain stabilizers and/or inhibitors, or a resistance finish or covering to make it resistant to deterioration from direct sunlight, ultraviolet rays, and heat.

Geogrid manufacturers shall participate in and be in compliance with the American Association of State Highway Transportation Officials (AASHTO) National Transportation Product Evaluation Program's (NTPEP) Geosynthetics audit program. Geogrid shall meet the requirements of Table II for the application and type shown on the plans and shall be selected from the Department's Approved Lists.

907-714.15.1.1--Geogrid for Retaining Walls and Reinforced Soil Slopes. Geogrid for retaining walls and reinforced soil slopes shall be creep tested in accordance with AASHTO R69 and meet Long Term Design Load, Minimum Ultimate Tensile Strength, and open area criteria listed in Table II. Manufacturers shall perform at least one long-term creep test for no less than 10,000 hours in accordance to ASTM D 5262 for each polymer or composition of polymers from which the geogrid is produced. The long-term design load that shall be reported for design use, shall be that load at which no more than 10% strain occurs over a 100-year design life of the geogrid, as calculated in accordance with AASHTO R69. Long-term design loads shall be reported unfactored, and the AASHTO strength reduction factors (Durability and Installation, and safety factors) will be considered by the Department's Geotechnical Branch on a site specific design basis.

907-714.15.1.2--Geogrid for Subgrade Stabilization. Geogrid for subgrade stabilization shall meet Minimum Ultimate Tensile Strength and open area criteria listed in Table II.

907-714.15.2--Marking, Shipment, and Storage. Each roll or container of geogrid shall be visibly labeled with the name of the manufacturer, trade name of the product, lot number, and quantity of material. In addition, each roll or container shall be clearly tagged to show the type designation that corresponds to that required by the plans. During shipment and storage the geogrid shall be protected from direct sunlight, and temperatures above 120°F or below 0°F. The geogrid shall either be wrapped and maintained in a heavy duty protective covering or stored in a safe enclosed area to protect from damage during prolonged storage.

907-714.15.3--Manufacturer Certification. The Contractor shall furnish the Engineer three copies of the manufacturer's certified test reports indicating that the geogrid furnished conforms to the requirements of the specifications and is of the same composition as the originally approved by the Department.

907-714.15.4--Acceptance Sampling and Testing. Final acceptance of each shipment will be

based upon results of tests performed by the Department on verification samples submitted from the project, as compared to the manufacturer's certified test reports. The Engineer will select one roll or container at random from each shipment for sampling. As sample extending full width of the randomly selected roll or container and being at least five (5) square yards in area will be obtained and submitted by the Engineer. All material samples shall be provided at no cost to the State.

TABLE II
GEOGRIDS

Physical Properties	Type Designation						Test Method
	I	II	III	IV	V	VI	
Long Term Design Load[1], pounds per foot, Machine Direction	250	500	750	1500	2500	3500	AASHTO R69, ASTM D5262
Minimum Ultimate Tensile Strength[2], pounds per foot, Machine Direction	500	1000	1500	3000	5000	7000	ASTM D6637
Open Area, percent	70	70	50	50	50	50	Direct Measurement

[1] Minimum design criteria requirement.
[2] Minimum Average Roll Value (MARV).

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-718-1 **CODE: (SP)**

DATE: 12/07/2021

SUBJECT: Timber and Dimension Lumber

Section 718, Timber and Dimension Lumber, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

Delete the Subsections in Section 718 on pages 836 thru 838, and substitute the following.

907-718.01--General. All timber and dimension lumber shall be Southern pine and shall conform in all respects to applicable requirements of AASHTO M 168. The Department reserves the right to sample and to test all materials at any time; all inspection, testing, and certification of materials will be performed in accordance with the requirements of the current version of the Department's *Materials Division Inspection, Testing, and Certification Manual*.

Timber and dimension lumber shall be furnished in the sizes shown on the plans or as specified. Unless otherwise specified, timber and dimension lumber shall be No. 1, or better, graded according to the latest American Lumber Standards.

Only one type of preservative shall be used for the treatment of materials for any one class of construction on a project, unless otherwise specified.

Where treated timber and dimensional lumber is to be used in non-highway construction or use, such as decking, handrails in walking trails, or in any manner where general public exposure by touch is possible, the treatment requirements will be as per project plans and/or approved by the State Materials Engineer.

907-718.02--Untreated Timber and Dimension Lumber. Untreated timber and dimension lumber shall conform to the requirements of AASHTO M 168.

907-718.03--Treated Timber and Dimension Lumber. Timber and dimension lumber to be treated shall meet the requirements herein specified and shall be treated as specified. Treated timber or dimensional lumber will not be accepted for use unless it has been inspected by an authorized representative of the Department and found to be satisfactory after treatment.

907-718.03.1--Blank.

907-718.03.2--Treatment.

907-718.03.2.1--General. All materials shall be treated in accordance with AASHTO M 133 unless otherwise directed by the Environmental Protection Agency (EPA).

907-718.03.2.2--Blank.

907-718.03.2.3--Inspection. Treated timber and dimension lumber shall be inspected by an authorized representative of the Department before being incorporated into the work. Treatment reports shall be provided to the Department for each lot of material supplied.

907-718.03.3--Blank.

907-718.03.4--Storage of Treated Material. All material treated for stock shall be stacked as compactly as possible on a well-drained surface. Material shall be supported on sills spaced as necessary, not to exceed 10 foot intervals and shall have at least one foot of air space beneath the stacks.

All materials treated with preservatives for use in buildings and applications where painting is required shall be dried after treatment. The treated wood shall be dried in accordance with American Lumber Standards.

907-718.04--Preservative. Preservatives shall be as specified in AASHTO M 133 unless otherwise directed by the Environmental Protection Agency (EPA).

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-720-4 **CODE: (IS)**

DATE: **06/17/2025**

SUBJECT: **Pavement Marking Materials**

Section 720, Pavement Marking Materials, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

Delete Section 720 on pages 840 thru 854, and substitute the following.

SECTION 720 - PAVEMENT MARKING MATERIALS

907-720.01--General. The Department reserves the right to perform sampling and testing of any materials at any time. Upon request of the Engineer, samples of the material shall be furnished.

907-720.02--Color Requirements. All pavement markings except raised pavement markers are required to meet the color requirements of ASTM D6628.

907-720.03--Optics. Optics used in thermoplastic pavement markings shall consist of a double-drop system of glass beads or advanced optics.

907-720.03.1--Glass Beads. The manufacturer shall furnish the Engineer with a certified test report indicating that the glass beads meet AASHTO M 247. AASHTO Type 4 beads shall be applied to the newly placed stripe first, followed by the application of AASHTO Type 1 or Type 2 beads. Type 1, 2, and 4 glass beads shall be transparent, clean, colorless glass, smooth and spherically shaped, free from milkiness, pits, or excessive air bubbles. Type 1, 2, and 4 glass beads shall be coated with a bead coating that is compatible with the traffic marking material to which the glass beads will be applied and will provide adequate moisture proofing, increased adhesion, and optimum embedment of the glass beads.

907-720.03.1.1—Acceptance Procedure. The Contractor shall furnish the Engineer with a copy of the manufacturer's certified test reports for the lot(s) of materials from which the shipment originated. The test report shall show all the test results for the material properties and characteristics as specified herein. The test report shall state that the material represented by the test results meets all the requirements of the contract. It shall be the Contractor's responsibility to furnish the manufacturer's test report to the Engineer for each shipment of material to the project.

Acceptance sampling and testing will be in accordance with the Materials Division Inspection, Testing, and Certification Manual (Materials Manual).

907-720.03.2--Advanced Optics. Advanced optics are materials that do not meet the specific requirements of AASHTO M 247 but produce a final drop-on optics system that meets or exceeds the reflectivity requirements in Special Provision 907-626. Advanced optics shall be a double-

drop system that is pre-approved and listed on the Department's Approved Products List.

907-720.03.2.1—Acceptance Procedure. The Contractor shall furnish the Engineer with a copy of the manufacturer's certified test reports for the lot(s) of materials from which the shipment originated. The test report shall show all the test results for the material properties and characteristics as specified herein. The test report shall state that the material represented by the test results meets all the requirements of the contract. It shall be the Contractor's responsibility to furnish the manufacturer's test report to the Engineer for each shipment of material to the project.

Acceptance sampling and testing may be conducted at the request of the Engineer.

907-720.04--Thermoplastic Marking Material. Thermoplastic marking material shall meet the color requirements of Subsection 907-720.02.

There shall be no obvious change in the color of the material if held at its plastic temperature for a period of four (4) hours nor by reason of four (4) re-heatings to its plastic temperature.

The pavement markings shall maintain its original dimension and placement. The material shall not be slippery when wet and it shall not lift from the pavement in freezing weather.

907-720.04.1--Extruded Thermoplastic Material. Extruded thermoplastic pavement marking material shall meet the requirements of AASHTO M 249, and shall meet the requirements of 907-720.04 with the following exceptions:

- Blue - ADA thermoplastic marking material shall meet the requirements of Subsection 907-720.04.2 with the exception that the color shall be Blue – ADA, and the Contractor may use hot applied thermoplastic materials meeting the satisfaction of the Engineer.

907-720.04.2--Spray-Applied Thermoplastic Material. Spray-applied thermoplastic pavement marking material shall meet the requirements of AASHTO M 249 and shall meet the requirements of 907-720.04.

907-720.04.3--Pre-formed Thermoplastic Material. Heat-fused, pre-formed thermoplastic pavement marking material shall meet the color requirements of 907-720.02.

907-720.04.4—Acceptance Procedure. The Contractor shall furnish the Engineer with a copy of the manufacturer's certified test reports for the lot(s) of materials from which the shipment originated. The test report shall show all the test results for the material properties and characteristics as specified herein. The test report shall state that the material represented by the test results meets all the requirements of the contract. It shall be the Contractor's responsibility to furnish the manufacturer's test report to the Engineer for each shipment of material to the project.

907-720.05--Pavement Marking Tape. Pavement marking tape shall be listed on the Department's Approved Lists.

907-720.05.1—Cold Plastic Pavement Markings (Permanent Pavement Marking Tape). Pavement marking tape for use in roadway applications shall be designated on the Department's Approved Lists as permanent.

The prefabricated markings described shall consist of white or yellow pigmented plastic films with reflective optics uniformly distributed throughout their entire cross-sectional area, and be capable of being affixed by either a pressure sensitive pre-coated adhesive or a liquid contact cement. The markings shall be provided complete in a form that will facilitate rapid application and protect the markings in shipment and storage. The manufacturer shall identify proper solvents and/or adhesives to be applied at the time of application, all equipment necessary for proper application, and recommendations for application that will assure an effective performance life.

Prefabricated legends and symbols shall conform to the applicable shapes and sizes as outlined in the current "Manual on Uniform Traffic Control Devices."

907-720.05.1.1--Specific Requirements. Unless otherwise indicated on the plans, the patterned material without adhesive shall have a minimum caliper of 0.065 inch at the thickest portion of the patterned cross-section and a minimum caliper of 0.020 inch at the thinnest portion of the cross-section. The material shall be a pliant polymer film with 50±15% of the surface are raised and presenting a near vertical face angle of 0° to 60° to traffic from any direction. The channels between the raised areas shall be substantially free of exposed optics or particles.

The size and quality of the optics will be such that performance requirements of Subsection 907-720.02 for the retroreflective pliant polymer film shall be met. The pigments shall be selected and blended to provide a marking film that is white or yellow conforming to the performance requirements of Subsection 907-720.02 through the expected life of the film.

907-720.05.1.2--Conformability and Resealing. The marking shall be capable of conforming to pavement contours, breaks, faults, etc. through the action of traffic at normal pavement temperatures.

The marking shall have resealing characteristics that allows it to be capable of fusing with itself and previously applied marking of the same composition under normal conditions of use. The marking shall be capable of use for patching worn areas of the same type in accordance with manufacturer's instructions.

907-720.05.1.3--Tensile Strength and Elongation. The material shall have a minimum tensile strength of 40 pounds per square inch of cross section when tested according to ASTM D 638. A 6-inch x 1-inch x 0.06-inch sample shall be tested at a temperature between 70°F and 80°F using a jaw speed of 12 inches per minute.

The material shall have a minimum elongation of 75% at break when tested according to ASTM D 638 using a jaw speed of 12 inches per minute.

907-720.05.1.4--Skid Resistance. The surface of the material shall provide a minimum skid resistance value of 45 BPN when tested according to ASTM E 303 except values will be taken at

downweb and at a 45-degree angle from downweb. These two values will then be averaged to find the skid resistance of the patterned surface.

907-720.05.1.5--Effective Performance Life and Warranty. When applied according to the recommendations of the manufacturer the pavement marking tape shall provide a neat and durable marking that will not flow or distort due to temperature if the pavement surface remains stable. The film shall be weather resistant and through normal traffic wear shall show no appreciable fading, lifting, or shrinkage throughout the useful life of the marking, nor shall it show significant tearing, roll back, or other signs of poor adhesion.

All manufacturer's standard warranties and guarantees on pavement marking tape, which are provided as customary trade practice, shall be delivered to the Engineer at the final inspection. All warranties and guarantees shall be made out to the Department.

907-720.05.1.6—Acceptance Procedure. The Contractor shall furnish the Engineer with a copy of the manufacturer's certified test reports for the lot(s) of materials from which the shipment originated. The test report shall show all the test results for the material properties and characteristics as specified herein. The test report shall state that the material represented by the test results meets all the requirements of the contract. It shall be the Contractor's responsibility to furnish the manufacturer's test report to the Engineer for each shipment of material to the project.

Acceptance sampling and testing will be in accordance with the Materials Division Inspection, Testing, and Certification Manual (Materials Manual). Samples of the material shall be furnished and shall be provided at no cost to the State.

907-720.05.2--Preformed Pavement Markings for Construction Zones. Preformed pavement markings for construction zones shall be designated Department's Approved Lists as temporary. Retroreflective preformed pavement markings for construction zones shall be as specified on the plans or in the contract documents.

The markings shall be provided in specified widths and shapes. Preformed words and symbols shall conform to the applicable shapes and sizes as outlined in the current "Manual on Uniform Traffic Control Devices for Streets and Highways," or as modified.

The materials shall be packaged in accordance with accepted commercial standards and when stored indoors in a cool dry place, shall be suitable for use one year after date of purchase.

907-720.05.2.1--Specific Requirements. Preformed markings shall consist of retroreflective materials on a conformable backing and shall meet the performance requirements of Subsection 907-720.02. The markings shall consist of a mixture of high-quality polymeric materials, pigments, and optics with a reflective layer of optics bonded to the top surface. The markings shall be pre-coated with a pressure sensitive adhesive capable of adhering to pavement in accordance with the manufacturer's instructions without the use of heat, solvents, or other additional adhesives. The markings and/or adhesive shall not require any curing time after application. A coated non-metallic medium shall be incorporated with the pressure sensitive adhesive to facilitate removal.

907-720.05.2.2—Acceptance Procedure. The Contractor shall furnish the Engineer with a copy of the manufacturer's certified test reports for the lot(s) of materials from which the shipment originated. The test report shall show all the test results for the material properties and characteristics as specified herein. The test report shall state that the material represented by the test results meets all the requirements of the contract. It shall be the Contractor's responsibility to furnish the manufacturer's test report to the Engineer for each shipment of material to the project.

907-720.06--Raised Pavement Markers. Pavement markers shall be listed on the Department's Approved Lists and shall conform to ASTM D 4280.

907-720.06.1--Packaging. Shipments shall be made in containers acceptable to common carriers and packaged in such a manner as to ensure delivery in perfect condition. All damaged shipments shall be replaced by the Contractor. Each package shall be clearly marked as to the name of the manufacturer, type, quantity enclosed, lot number, and date of manufacture.

907-720.06.2--Non-Reflective Pavement Markers. Non-reflective pavement markers are occasionally referred to as "jiggle markers". Non-reflective markers consisting of a heat-fired, vitreous, ceramic base, and a heat-fired, opaque, glazed surface are permitted for use; the bottom of the marker shall not be glazed. Ceramic markers shall be produced from any suitable combination of intimately mixed clays, shales, talcs, flints, feldspars, or other inorganic material. Ceramic markers shall be thoroughly and evenly matured, and all non-reflective pavement markers shall be free from defects which affect appearance or serviceability.

Ceramic non-reflective markers shall conform to the following finish and testing requirements in Table 2 below.

Table 2

Ceramic Non-Reflective Marker Requirements	
Glaze Thickness	0.005 inch, minimum
Mohs Hardness	6, minimum
Autoclave	Glaze shall not spall, craze, or peel.
Compressive Strength	750 psi, minimum
Water Absorption	2.0%, maximum

907-720.06.3—Acceptance Procedure. The Contractor shall furnish the Engineer with a copy of the manufacturer's certified test reports for the lot(s) of materials from which the shipment originated. The test report shall show all the test results for the material properties and characteristics as specified herein. The test report shall state that the material represented by the test results meets all the requirements of the contract. It shall be the Contractor's responsibility to furnish the manufacturer's test report to the Engineer for each shipment of material to the project.

907-720.07--Adhesive for Pavement Markers. The adhesive shall be listed on the Department's Approved Lists and shall be an asphaltic material suitable for bonding pavement markers to surfaces when the road surface and marker temperatures are in the range of 50°F to 160°F. The composition of the adhesive must be such that its properties will not deteriorate when heated to and applied at temperatures up to 425°F. Samples may be submitted in the form of an adhesive

testing package from each batch or material obtained from a package shipped to the project.

907-720.07.1--Packaging and Labeling. The adhesive shall be packaged in self-releasing cardboard containers that will stack properly. The label shall show the manufacturer, quantity, and lot or batch number. "Adhesive for Pavement Markers" or "Adhesive for Traffic Markers" shall be printed in bold lettering on the label.

907-720.07.2--Bituminous Adhesive. The asphaltic adhesive material shall be flexible type.

907-720.07.2.1--Flexible Bituminous Adhesive. Flexible bituminous adhesive shall be designated on the Department's Approved Lists as flexible and shall comply with requirements of Table 3 below.

Table 3

Flexible Bituminous Adhesive Properties			
	Min	Max	Test Method
Penetration @ 77°F	-	25	ASTM D 5
Softening Point, °F	200	-	ASTM D 36
Brookfield Viscosity @ 400°F, cp.	-	10,000	ASTM D 3236
Ductility @ 77°F, 5 cm/min	15	-	ASTM D 113
Ductility @ 39.2°F, 1 cm/min	5	-	ASTM D 113
Asphalt Compatibility	Pass		ASTM D 5329
Flexibility @ 20°F	Pass		Per Subsection

907-720.07.3—Acceptance Procedure. The Contractor shall furnish the Engineer with a copy of the manufacturer's certified test reports for the lot(s) of materials from which the shipment originated. The test report shall show all the test results for the material properties and characteristics as specified herein. The test report shall state that the material represented by the test results meets all the requirements of the contract. It shall be the Contractor's responsibility to furnish the manufacturer's test report to the Engineer for each shipment of material to the project.

Acceptance sampling and testing will be in accordance with the Materials Division Inspection, Testing, and Certification Manual (Materials Manual). Samples of the material shall be furnished and shall be provided at no cost to the State.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-721-4 **CODE: (IS)**

DATE: **04/19/2022**

SUBJECT: **Materials for Signing**

Section 721, Materials for Signing, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-721.06--Reflective Sheeting.

907-721.06.2--Performance Requirements. Delete Table 4 and Table 5 in Subsection 721.06.2 on pages 860 & 861, and substitute the following.

MINIMUM COEFFICIENTS OF RETROREFLECTION
Candela per foot candle per square foot (cd/fc/ft^2)
Per ASTM Designation D4956

TABLE 4
Type IX Sheeting

Observation Angle	Entrance Angle	White	Yellow	Green	Red	Blue	Fluorescent Yellow/Green	Fluorescent Yellow	Fluorescent Orange
0.2°	-4.0°	380	285	38	76	17	300	230	115
0.2°	+30.0°	215	162	22	43	10	170	130	65
0.5°	-4.0°	240	180	24	48	11	190	145	72
0.5°	+30.0°	135	100	14	27	6.0	110	81	41
1.0°	-4.0°	80	60	8.0	16	3.6	64	48	24
1.0°	+30.0°	45	34	4.5	9.0	2.0	36	27	14

TABLE 5
Type XI Sheeting

Observation Angle	Entrance Angle	White	Yellow	Green	Red	Blue	Brown	Fluorescent Yellow/Green	Fluorescent Yellow	Fluorescent Orange
0.2°	-4.0°	580	435	58	87	26	17	460	350	175
0.2°	+30.0°	220	165	22	33	10	7.0	180	130	66
0.5°	-4.0°	420	315	42	63	19	13	340	250	125
0.5°	+30.0°	150	110	15	23	7.0	5.0	120	90	45
1.0°	-4.0°	120	90	12	18	5.0	4.0	96	72	36
1.0°	+30.0°	45	34	5.0	7.0	2.0	1.0	36	27	14

After Subsection 721.10 on page 864, add the following.

907-721.11--Digital Applied Printing. The following addresses the requirements for digitally printed finished retroreflective traffic control signs on flat sheet aluminum and digitally printed traffic sign faces intended to be applied to a sign substrate.

907-721.11.1--Digitally Printed Ink Systems. Traffic signs must be produced using components, and processes that comply with the retroreflective sheeting manufacturer's recommendations.

Digital printed ink systems used to print traffic signs must meet and comply with daytime and nighttime chromaticity (color standards) as recognized in ASTM D4956 "Standard Specification for Retroreflective Sheeting for Traffic Control."

Digital printed ink systems must meet 70% of the initial retroreflectivity specifications of each respective reflective film color as found in ASTM D4956 "Standard Specification for Retroreflective Sheeting for Traffic Control."

Prior to fabrication and preferably at the preconstruction meeting, the Contractor shall advise the Project Engineer in writing as to which signs on the project will be digitally printed and which ones will be screen printed. The Contractor shall submit to the Project Engineer certifications for all digitally printed signs, which will be forwarded to the State Traffic Engineer for review.

907-721.11.2--Protective Overlay Film. Permanent traffic signs printed with digital ink systems will be fabricated with a full sign protective overlay film designed to provide a smooth surface needed for retroreflectivity, and to protect the sign from fading and UV degradation. The overlaminate shall comply with the retroreflective sheeting manufacturer's recommendations to ensure proper adhesion and transparency and will also meet the reflective film durability as identified in Table 1.

Table 1
Retroreflective Film Minimum Durability Requirements

ASTM D4956 Type	Full Sign Replacement Term (years)	Sheeting Replacement Term (years)
IV	7	10
VIII	7	10
IX	7	12
XI	7	12

Temporary signs used in work zones printed with black ink only will not require a protective overlay film as long as the finished sign is warranted for a minimum outdoor durability of three years by the sheeting manufacturer.

907-721.11.3--Inspection. During fabrication, the Contractor shall provide sufficient testing and quality control throughout fabrication to insure good workmanship. Once the material has been received, it may be subject to random testing to ensure compliance with all requirements. If any test samples do not conform to the requirements, the entire order may be returned at the vendor's expense.

907-721.11.4--Traffic Sign Performance Warranty Provisions. Based on the ASTM Type of sheeting specified, traffic control signs shall be warranted for the duration shown in Table 1. The Contractor shall supply a copy of the warranty document with complete details of terms and conditions upon request of the Department.

907-721.11.5--Certified Digital Sign Fabricator. Sign fabricators using digital imaging methods to produce regulated traffic signs must be certified by the reflective sheeting manufacturer whose materials are used to produce the delivered signs.

Certified sign fabricators must undergo an audit process by the sheeting manufacturer to ensure they have the proper equipment, manufacturing capabilities, manufacturing application processes and the materials required to fulfill the sheeting manufacturer's warranty obligations. Sign fabricators must recertify annually with reflective sheeting manufacturers or utilize a 3rd party certifier approved by the reflective sheeting manufacturer.

The Contractor shall submit proof of Sign Fabricator Certification as issued by the retroreflective sign sheeting manufacturer to the Project Engineer upon delivery of the signs, or with the Shop Drawings.

S E C T I O N 9 0 5 - P R O P O S A L

Date _____

Mississippi Transportation Commission
Jackson, Mississippi

Sirs: The following proposal is made on behalf of _____
_____ of _____
_____
for constructing the following designated project(s) within the time(s) hereinafter specified.

The plans are composed of drawings and blue prints on file in the offices of the Mississippi Department of Transportation, Jackson, Mississippi.

The Specifications are the current Standard Specifications of the Mississippi Department of Transportation approved by the Federal Highway Administration, except where superseded or amended by the plans, Special Provisions and Notice(s) to Bidders attached hereto and made a part thereof.

I (We) certify that I (we) possess a copy of said Standard and any Supplemental Specifications.

Evidence of my (our) authority to submit the Proposal is hereby furnished. The proposal is made without collusion on the part of any person, firm or corporation. I (We) certify that I (we) have carefully examined the Plans, the Specifications, including the Special Provisions and Notice(s) to Bidders, herein, and have personally examined the site of the work. On the basis of the Specifications, Special Provisions, Notice(s) to Bidders, and Plans, I (we) propose to furnish all necessary machinery, tools, apparatus and other means of construction and do all the work and furnish all the materials in the manner specified. I (We) understand that the quantities mentioned herein are approximate only and are subject to either increase or decrease, and hereby propose to perform any increased or decreased quantities of work at the unit prices bid, in accordance with the above.

I (We) acknowledge that this proposal will be found irregular and/or non-responsive unless a certified check, cashier's check, or Proposal Guaranty Bond in the amount as required in the Advertisement (or, by law) is submitted electronically with the proposal or is delivered to the Contract Administration Engineer prior to the bid opening time specified in the advertisement.

INSTRUCTION TO BIDDERS: Alternate and Optional Items on Bid Schedule.

1. Two or more items entered opposite a single unit quantity WITHOUT DEFINITE DESIGNATION AS "ALTERNATE ITEMS" are considered as "OPTIONAL ITEMS". Bidders may or may not indicate on bids the Optional Item proposed to be furnished or performed WITHOUT PREJUDICE IN REGARD TO IRREGULARITY OF BIDS.
2. Items classified on the bid schedule as "ALTERNATE ITEMS" and/or "ALTERNATE TYPES OF CONSTRUCTION" must be preselected and indicated on bids. However, "Alternate Types of Construction" may include Optional Items to be treated as set out in Paragraph 1, above.
3. Optional items not preselected and indicated on the bid schedule MUST be designated in accordance with Subsection 102.06 prior to or at the time of execution of the contract.
4. Optional and Alternate items designated must be used throughout the project.

I (We) further propose to perform all "force account or extra work" that may be required of me (us) on the basis provided in the Specifications and to give such work my (our) personal attention in order to see that it is economically performed.

I (We) further propose to execute the attached contract agreement (Section 902) as soon as the work is awarded to me (us), and to begin and complete the work within the time limit(s) provided for in the Specifications and Advertisement. I (We) also propose to execute the attached contract bond (Section 903) in an amount not less than one hundred (100) percent of the total of my (our) part, but also to guarantee the excellence of both workmanship and materials until the work is finally accepted.

I (We) shall submit electronically with our proposal or deliver prior to the bid opening time a certified check, cashier's check or bid bond for **five percent (5%) of total bid** and hereby agree that in case of my (our) failure to execute the contract and furnish bond within Ten (10) days after notice of award, the amount of this check (bid bond) will be forfeited to the State of Mississippi as liquidated damages arising out of my (our) failure to execute the contract as proposed. It is understood that in case I am (we are) not awarded the work, the check will be returned as provided in the Specifications.

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SECTION 905 -- PROPOSAL (CONTINUED)

I (We) hereby certify by digital signature and electronic submission via Bid Express of the Section 905 proposal below, that all certifications, disclosures and affidavits incorporated herein are deemed to be duly executed in the aggregate, fully enforceable and binding upon delivery of the bid proposal. I (We) further acknowledge that this certification shall not extend to the bid bond or alternate security which must be separately executed for the benefit of the Commission. This signature does not cure deficiencies in any required certifications, disclosures and/or affidavits. I (We) also acknowledge the right of the Commission to require full and final execution on any certification, disclosure or affidavit contained in the proposal at the Commission's election upon award. Failure to so execute at the Commission's request within the time allowed in the Standard Specifications for execution of all contract documents will result in forfeiture of the bid bond or alternate security.

Respectfully Submitted,

DATE _____

_____
Contractor

BY _____
Signature

TITLE _____

ADDRESS _____

CITY, STATE, ZIP _____

PHONE _____

FAX _____

E-MAIL _____

(To be filled in if a corporation)

Our corporation is chartered under the Laws of the State of _____ and the names, titles and business addresses of the executives are as follows:

_____
President Address

_____
Secretary Address

_____
Treasurer Address

The following is my (our) itemized proposal.

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I-10 Jackson County Welcome Center, known as Federal Aid Project No. STBG-0010-01(180) / 109171301 in Jackson County.

Line no.	Item Code	Adj Code	Quantity	Units	Description[Fixed Unit Price]
				Roadway Items	
0010	201-B001		26	Acre	Clearing and Grubbing
0020	202-B007		23,807	Square Yard	Removal of Asphalt Pavement, All Depths
0030	202-B038		14	Each	Removal of Building Picnic Shelter
0040	202-B038		1	Each	Removal of Building Security Building
0050	202-B038		1	Each	Removal of Building Welcome Center
0060	202-B063		314	Square Yard	Removal of Concrete Paved Ditch
0070	202-B073		8,111	Square Yard	Removal of Concrete Pavement, All Depths
0080	202-B080		3,425	Square Yard	Removal of Concrete Sidewalk
0090	202-B089		2,645	Linear Feet	Removal of Curb &/or Curb and Gutter, All Types
0100	202-B126		3,210	Linear Feet	Removal of Fence, All Types
0110	202-B164		11	Each	Removal of Inlet and Junction Box, All Types & Sizes
0120	202-B178		43	Each	Removal of Low Mast Lighting Assembly and Foundation
0130	202-B180		9	Each	Removal of Manhole
0140	202-B191		404	Linear Feet	Removal of Pipe, 8" And Above
0150	202-B215		65	Each	Removal of Sign Including Post & Footing
0160	202-B242		1	Each	Removal of Treatment Plant Sturctures and Appurtenances
0170	203-A001	(E)	8,750	Cubic Yard	Unclassified Excavation, FM, AH
0180	203-EX012	(E)	2,000	Cubic Yard	Borrow Excavation, AH, FME, Class B3
0190	203-EX018	(E)	34,550	Cubic Yard	Borrow Excavation, AH, FME, Class B7-6
0200	203-G001	(E)	2,050	Cubic Yard	Excess Excavation, FM, AH
0210	203-I002		8,265	Square Yard	Site Grading
0220	206-A001	(S)	1,800	Cubic Yard	Structure Excavation
0230	206-B001	(E)	700	Cubic Yard	Select Material for Undercuts, Contractor Furnished, FM
0240	209-A004		41,840	Square Yard	Geotextile Stabilization, Type V , Woven
0250	211-A001		82,210	Square Yard	Topsoil for Slope Treatment, From Right-of-Way
0260	211-B001	(E)	1,688	Cubic Yard	Topsoil for Slope Treatment, Contractor Furnished
0270	211-C001	(E)	195	Cubic Yard	Topsoil for Plant Holes, Contractor Furnished
0280	213-C001		9	Ton	Superphosphate
0290	216-B002		23,891	Square Yard	Solid Sodding, Centipede
0300	219-A001		1,665	Thousand Gallon	Watering ($20.00)
0310	220-A001		17	Acre	Insect Pest Control ($30.00)
0320	221-A001	(S)	31	Cubic Yard	Concrete Paved Ditch
0330	223-A001		62	Acre	Mowing ($70.00)
0340	225-A001		17	Acre	Grassing
0350	225-B001		9	Ton	Agricultural Limestone

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Line no.	Item Code	Adj Code	Quantity	Units	Description[Fixed Unit Price]
0360	225-C001		34	Ton	Mulch, Vegetative Mulch
0370	226-A001		12	Acre	Temporary Grassing
0380	227-A001		5	Acre	Hydroseeding
0390	230-A036		167	Each	Shrub Planting, Dwarf Maiden Grass 1 Gallon
0400	230-A041		131	Each	Shrub Planting, Dwarf Wax Myrtle 3 Gallon
0410	230-A049		58	Each	Shrub Planting, Francis Mason Abelia 3 Gallon
0420	230-A100		88	Each	Shrub Planting, Parsons Juniper 3 Gallon
0430	230-A102		162	Each	Shrub Planting, Pink Creeping Phlox 1 Gallon
0440	230-A119		127	Each	Shrub Planting, Saw Palmetto 3 Gallon
0450	230-A121		74	Each	Shrub Planting, Shi-Shi Gashira Camellia 3 Gallon
0460	230-A126		265	Each	Shrub Planting, Spirea 'Anthony Waterer' 1 Gallon
0470	230-A142		84	Each	Shrub Planting, Wheeler's Dwarf Pittosporum 3 Gallon
0480	230-A143		11	Each	Shrub Planting, Formosa Azalea 3 Gallon
0490	230-A144		211	Each	Shrub Planting, Blue Cascade Distylium 3 Gallon
0500	230-A145		18	Each	Shrub Planting, Oakleaf Hydrangea 3 Gallon
0510	230-A146		87	Each	Shrub Planting, Autumn Fern 1 Gallon
0520	230-A147		50	Each	Shrub Planting, Cast Iron Plant 3 Gallon
0530	230-A148		36	Each	Shrub Planting, Sand Cordgrass 1 Gallon
0540	230-A149		190	Each	Shrub Planting, Little Bluestem 1 Gallon
0550	230-A150		127	Each	Shrub Planting, Bicolor African Iris 1 Gallon
0560	230-A151		111	Each	Shrub Planting, Copper Iris 1 Gallon
0570	230-A152		156	Each	Shrub Planting, Giant Blue Iris 1 Gallon
0580	230-A153		40	Each	Shrub Planting, Evergreen Daylily 1 Gallon
0590	230-A154		22	Each	Shrub Planting, Variegated Hosta 1 Gallon
0600	230-A155		37	Each	Shrub Planting, Beautyberry 3 Gallon
0610	230-A156		5	Each	Shrub Planting, Coral Drift Rose
0620	230-B006		26	Each	Tree Planting, Bald Cypress 65 Gallon
0630	230-B015		4	Each	Tree Planting, Chaste Tree 30 Gallon
0640	230-B039		3	Each	Tree Planting, Flowering Dogwood 30 Gallon
0650	230-B050		57	Each	Tree Planting, Live Oak 65 Gallon
0660	230-B057		21	Each	Tree Planting, Nutall Oak 65 Gallon
0670	230-B064		5	Each	Tree Planting, Redbud 30 Gallon
0680	230-B067		4	Each	Tree Planting, Savannah Holly 45 Gallon
0690	230-B078		12	Each	Tree Planting, Southern Wax Myrtle 30 Gallon
0700	230-B084		31	Each	Tree Planting, Sweetbay Magnolia 45 Gallon
0710	230-B104		15	Each	Tree Planting, Black Gum 65 Gallon
0720	230-B105		34	Each	Tree Planting, Bosque Elm 65 Gallon
0730	230-B106		1	Each	Tree Planting, Japanese Maple 45 Gallon

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Line no.	Item Code	Adj Code	Quantity	Units	Description[Fixed Unit Price]
0740	230-B107		37	Each	Tree Planting, Longleaf Pine 30 Gallon
0750	230-B108		5	Each	Tree Planting, Bottlebrush 15 Gallon
0760	230-B109		9	Each	Tree Planting, Buttonbush 7 Gallon
0770	230-D001		33,814	Square Feet	Bed Preparation
0780	233-A003		313	Cubic Yard	Tree Bark Mulch, Type III
0790	233-C005		35	Cubic Yard	Straw Mulch, Class II
0800	237-A002		1,700	Linear Feet	Wattles, 20"
0810	246-B001		50	Each	Rockbags
0820	249-A001		75	Ton	Riprap for Erosion Control
0830	249-A001		53	Ton	Riprap for Erosion Control Washed Gravel for Landscaped Areas
0840	406-D001		1,131	Square Yard	Fine Milling of Bituminous Pavement, All Depths
0850	407-A001	(A2)	2,297	Gallon	Asphalt for Tack Coat
0860	501-A004	(C)	25,624	Square Yard	10" Reinforced Cement Concrete Pavement, Broom Finish
0870	501-D001		338	Linear Feet	Expansion Joints, With Dowels
0880	501-F001		76	Linear Feet	Concrete Lug Anchors
0890	602-A001	(S)	2,012	Pounds	Reinforcing Steel
0900	603-CA012	(S)	656	Linear Feet	18" Reinforced Concrete Pipe, Class III, Rubber Type Gaskets
0910	603-CA027	(S)	240	Linear Feet	24" Reinforced Concrete Pipe, Class III, Rubber Type Gaskets
0920	603-CB003	(S)	10	Each	18" Reinforced Concrete End Section
0930	603-CB004	(S)	6	Each	24" Reinforced Concrete End Section
0940	603-CE001	(S)	72	Linear Feet	18" x 11" Concrete Arch Pipe, Class A III
0950	603-CE003	(S)	312	Linear Feet	22" x 13" Concrete Arch Pipe, Class A III, Flexible Plastic Gaskets
0960	603-CE014	(S)	72	Linear Feet	36" x 23" Concrete Arch Pipe, Class A III, Flexible Plastic Gaskets
0970	603-CF002	(S)	4	Each	22" x 13" Concrete Arch Pipe End Section
0980	603-CF004	(S)	2	Each	36" x 23" Concrete Arch Pipe End Section
0990	603-PE001	(S)	571	Linear Feet	12" Corrugated Polyethylene Pipe
1000	603-PE003	(S)	704	Linear Feet	18" Corrugated Polyethylene Pipe
1010	603-PE009	(S)	176	Linear Feet	8" Corrugated Polyethylene Pipe
1020	604-A001		79	Pounds	Castings
1030	604-B001		1,776	Pounds	Gratings
1040	607-B026		874	Linear Feet	72" Type I Chain Link Fence, Class I , With Top Guard
1050	607-B027		2,940	Linear Feet	72" Type I Chain Link Fence, Class II
1060	607-G061		1	Each	Gate, 12' x 6' Double Chain Link
1070	607-G098		1	Each	Gate, 16' x 6' Double Chain Link with Top Guard
1080	607-P1018		347	Each	Line Post, 9' x 2" Galvanized Steel
1090	607-P2013		49	Each	Brace Post, 10' x 2 1/2" Galvanized Steel
1100	607-P3009		4	Each	Gate Post, 9' x 3 1/2" Galvanized Steel

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Line no.	Item Code	Adj Code	Quantity	Units	Description[Fixed Unit Price]
1110	608-A001	(S)	4,245	Square Yard	Concrete Sidewalk, Without Reinforcement
1120	609-B002	(S)	283	Linear Feet	Concrete Curb, Header
1130	609-C003	(S)	2,212	Linear Feet	Concrete Integral Curb, Type 3
1140	609-D001	(S)	1,593	Linear Feet	Combination Concrete Curb and Gutter Type 1
1150	609-D004	(S)	207	Linear Feet	Combination Concrete Curb and Gutter Type 2 Modified
1160	609-D013	(S)	2,474	Linear Feet	Combination Concrete Curb and Gutter Type 3B
1170	612-A001		15	Cubic Yard	Flowable Fill, Excavatable
1180	616-A001	(S)	748	Square Yard	Concrete Median and/or Island Pavement, 10-inch
1190	619-A5001		1,480	Linear Feet	Temporary Traffic Stripe, Detail
1200	619-D1001		52	Square Feet	Standard Roadside Construction Signs, Less than 10 Square Feet
1210	619-D2001		304	Square Feet	Standard Roadside Construction Signs, 10 Square Feet or More
1220	619-F1001		1,480	Linear Feet	Concrete Median Barrier, Precast
1230	619-F2001		1,480	Linear Feet	Remove and Reset Concrete Median Barrier, Precast
1240	619-G4005		24	Linear Feet	Barricades, Type III, Single Faced
1250	619-G5001		31	Each	Free Standing Plastic Drums
1260	619-G7001		2	Each	Warning Lights, Type "B"
1270	619-G8001		3	Each	Warning Lights, Type "C"
1280	620-A001		1	Lump Sum	Mobilization
1290	630-A001		204	Square Feet	Standard Roadside Signs, Sheet Aluminum, 0.080" Thickness
1300	630-A003		62	Square Feet	Standard Roadside Signs, Sheet Aluminum, 0.125" Thickness
1310	630-A005		121	Square Feet	Standard Roadside Signs, Sheet Aluminum, 0.1" Thickness
1320	630-B002		100	Square Feet	Interstate Directional Signs, Bolted Extruded Aluminum Panels, Ground Mounted
1330	630-C001		299	Linear Feet	Square Tube Posts, 4.0 lb/ft
1340	630-C004		202	Linear Feet	Square Tube Posts, 9.0 lb/ft
1350	630-C005		533	Linear Feet	Square Tube Posts, 2.0 lb/ft
1360	630-C1001		56	Linear Feet	Square Post Inner Sleeve
1370	699-A001		1	Lump Sum	Roadway Construction Stakes
1380	815-A002	(S)	60	Ton	Loose Riprap, Size 100
1390	815-E001	(S)	85	Square Yard	Geotextile under Riprap
1400	815-E001	(S)	226	Square Yard	Geotextile under Riprap for ditch in Landscape Area
1410	907-234-A001		6,400	Linear Feet	Temporary Silt Fence
1420	907-234-D001		12	Each	Inlet Siltation Guard
1430	907-234-E001		12	Each	Reset Inlet Siltation Guard
1440	907-240-A001		938	Square Yard	Interlocking Flexible Block Erosion Control System
1450	907-242-A001		1	Lump Sum	Construction of Welcome Center Facility
1460	907-242-PP003		1	Each	Installation of Irrigation System Pump
1470	907-260-A005		1	Lump Sum	Utility Work - Sewer,

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Line no.	Item Code	Adj Code	Quantity	Units	Description[Fixed Unit Price]
1480	907-262-A007		1	Lump Sum	Utility Work - Water,
1490	907-282-A068		16	Each	Sprinkler Head, 1812-RVAN-18
1500	907-282-A069		36	Each	Sprinkler Head, 1812-RVAN-24
1510	907-282-A070		11	Each	Sprinkler Head, 1812-RVAN-24-360
1520	907-282-A071		3	Each	Sprinkler Head, 1812-RVAN-LCS
1530	907-282-A072		2	Each	Sprinkler Head, 1812-RVAN-RCS
1540	907-282-A073		1	Each	Sprinkler Head, 1812-RVAN-SST
1550	907-282-A074		162	Each	Sprinkler Head, 1812-RVAN-14
1560	907-282-B001		300	Linear Feet	Piping, 1 1/2" Diameter
1570	907-282-B003		4,400	Linear Feet	Piping, 1" Diameter
1580	907-282-B006		1,975	Linear Feet	Piping, 2" Diameter
1590	907-282-C003		500	Linear Feet	Sleeves, 4"
1600	907-282-D001		13,950	Linear Feet	Valve Control Wire
1610	907-282-G008		1	Each	Electric Controller, 16 Station
1620	907-282-H001		3	Each	Electric Control Valve, 1 1/2"
1630	907-282-H002		8	Each	Electric Control Valve, 1"
1640	907-282-H003		2	Each	Electric Control Valve, 2"
1650	907-282-J003		5	Each	Isolation Valve, 2"
1660	907-282-J003		1	Each	Isolation Valve, 2" Master Valve
1670	907-290-A001		1	Each	Flagpole
1680	907-403-A002	(BA1)	2,038	Ton	12.5-mm, MT, Asphalt Pavement
1690	907-403-A005	(BA1)	2,815	Ton	19-mm, MT, Asphalt Pavement
1700	907-403-A014	(BA1)	1,313	Ton	9.5-mm, MT, Asphalt Pavement
1710	907-601-B001	(S)	38	Cubic Yard	Class "B" Structural Concrete, Minor Structures
1720	907-604-PP002	(S)	37	Linear Feet	8" Trench Drain, Per Plans Inline Drain
1730	907-604-PP002	(S)	56	Linear Feet	8" Trench Drain, Per Plans Slot Drain
1740	907-607-PP005		1	Each	Cantilever Gate, Per Plans Tubular Steel Gate
1750	907-608-C001		282	Square Feet	Detectable Warning Panels
1760	907-608-D002	(S)	4,070	Square Feet	Stamped and Colored Concrete Sidewalk
1770	907-616-C001	(S)	2,833	Square Feet	Colored and Imprinted Concrete Median and Island Pavement, 10-inch Thickness
1780	907-618-A001		1	Lump Sum	Maintenance of Traffic
1790	907-619-E3001		1	Each	Changeable Message Sign
1800	907-626-B003		2,447	Linear Feet	6" Thermoplastic Double Drop Traffic Stripe, Continuous White
1810	907-626-F004		1,672	Linear Feet	6" Thermoplastic Double Drop Edge Stripe, Continuous Yellow
1820	907-626-G003		670	Linear Feet	Thermoplastic Detail Stripe, Blue-ADA
1830	907-626-G006		5,376	Linear Feet	Thermoplastic Double Drop Detail Stripe, White
1840	907-626-G007		422	Linear Feet	Thermoplastic Double Drop Detail Stripe, Yellow

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Line no.	Item Code	Adj Code	Quantity	Units	Description[Fixed Unit Price]
1850	907-626-H001		6	Each	Thermoplastic Legend, Blue-ADA Handicap Symbol
1860	907-626-H006		55	Square Feet	Thermoplastic Double Drop Legend, White
1870	907-626-H007		456	Linear Feet	Thermoplastic Double Drop Legend, White
1880	907-627-K001		49	Each	Red-Clear Reflective High Performance Raised Markers
1890	907-628-E002		1,144	Linear Feet	6" Cold Plastic Detail Stripe, Blue-ADA
1900	907-628-H004		2	Each	Cold Plastic Legend, Blue-ADA Handicap Symbol
1910	907-628-K003		9,201	Linear Feet	High Performance Cold Plastic Detail Stripe, White
1920	907-628-K004		1,672	Linear Feet	High Performance Cold Plastic Detail Stripe, Yellow
1930	907-628-L003		240	Linear Feet	High Performance Cold Plastic Legend, White
1940	907-628-L004		125	Square Feet	High Performance Cold Plastic Legend, White
1950	907-630-O001		2	Each	Remove and Reset Sign Assembly
				ALTERNATE GROUP AA NUMBER 1	
1960	304-F001	(GT)	18,838	Ton	3/4" and Down Crushed Stone Base
				ALTERNATE GROUP AA NUMBER 2	
1970	304-F002	(GT)	18,838	Ton	Size 610 Crushed Stone Base
				ALTERNATE GROUP AA NUMBER 3	
1980	304-F003	(GT)	18,838	Ton	Size 825B Crushed Stone Base

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CONDITIONS FOR COMBINATION BID

If a bidder elects to submit a combined bid for two or more of the contracts listed for this month's letting, the bidder must complete and execute these sheets of the proposal in each of the individual proposals to constitute a combination bid. In addition to this requirement, each individual contract shall be completed, executed and submitted in the usual specified manner.

Failure to execute this Combination Bid Proposal in each of the contracts combined will be just cause for each proposal to be received and evaluated as a separate bid.

It is understood that the Mississippi Transportation Commission not only reserves the right to reject any and all proposals, but also the right to award contracts upon the basis of lowest separate bids or combination bids most advantageous to the State.

It is further understood and agreed that the Combination Bid Proposal is for comparison of bids only and that each contract shall operate in every respect as a separate contract in accordance with its proposal and contract documents.

I (We) agree to complete each contract on or before its specified completion date.

* * * *

SECTION 905 - COMBINATION BID PROPOSAL (Continued)

Project Number	Pay Item Number	Unit	Unit Price Reduction	Total Item Reduction	Total Contract Reduction
1. _____	_____	_____	_____	_____	
2. _____	_____	_____	_____	_____	
3. _____	_____	_____	_____	_____	
4. _____	_____	_____	_____	_____	
5. _____	_____	_____	_____	_____	
6. _____	_____	_____	_____	_____	
7. _____	_____	_____	_____	_____	
8. _____	_____	_____	_____	_____	

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Project Number	Pay Item Number	Unit	Unit Price Reduction	Total Item Reduction	Total Contract Reduction
9. _____	_____ _____	_____ _____	_____ _____	_____ _____	
10. _____	_____ _____	_____ _____	_____ _____	_____ _____	

(c) If Combination C has been selected, then initial and complete ONE of the following.

_____ I (We) desire to be awarded work not to exceed a total monetary value of $ _____.

_____ I (We) desire to be awarded work not to exceed _____ number of contracts.

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Certification with regard to the Performance of Previous Contracts or Subcontracts subject to the Equal Opportunity Clause and the filing of Required Reports

The Bidder hereby certifies that he has ____, has not ____, participated in a previous contract or subcontract subject to the Equal Opportunity Clause, as required by Executive Orders 10925, 11114, or 11246, and that he has ____, has not ____, filed with the Joint Reporting Committee, the Director of the Office of Federal Contract Compliance, a Federal Government contracting or administering agency, or the former President's Committee on Equal Employment Opportunity, all reports due under the applicable filing requirements.

_____
(COMPANY)

DATE: _____

NOTE: The above certification is required by the Equal Employment Opportunity Regulations of the Secretary of Labor (41 CFR 60-1.7 (b) (1)), and must be submitted by bidders and proposed subcontractors only in connection with contracts and subcontracts which are subject to the Equal Opportunity Clause. Contracts and Subcontracts which are exempt from the Equal Opportunity Clause are set forth in 41 CFR 60-1.5. (Generally only contracts or subcontracts of $10,000 or under are exempt.)

Currently, Standard Form 100 (EEO-1) is the only report required by the Executive Orders or their implementing regulations.

Proposed prime Contractors and Subcontractors who have participated in a previous contract or subcontract subject to the Executive orders and have not filed the required reports should note that 41 CFR 60-1.7 (b) (1) prevents the award of contracts and subcontracts unless such Contractors submit a report covering the delinquent period or such other period specified by the Federal Highway Administration or by the Director, Office of Federal Contract Compliance, U. S. Department of Labor.

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MISSISSIPPI DEPARTMENT OF TRANSPORTATION

CERTIFICATION

I,_____,
(Name of person signing bid)

individually, and in my capacity as_____ of
(Title of person signing bid)

_____do hereby certify under
(Name of Firm, partnership, or Corporation)

penalty of perjury under the laws of the United States and the State of Mississippi that_____

_____, Bidder
(Name of Firm, Partnership, or Corporation)

on Project No. **STBG-0010-01(180)/ 109171301000**

in **Jackson** _____County(ies), Mississippi, has not either

directly or indirectly entered into any agreement, participated in any collusion; or otherwise taken any action in restraint of free competitive bidding in connection with this contract; nor have any of its corporate officers or principal owners.

Except as noted hereafter, it is further certified that said legal entity and its corporate officers, principal owners, managers, auditors and others in a position of administering federal funds:

a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in (b) above; and

d) Have not within a three-year period preceding this application/ proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

Do exceptions exist and are made a part thereof? Yes / No

Any exceptions shall address to whom it applies, initiating agency and dates of such action.

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Note: Exceptions will not necessarily result in denial of award but will be considered in determining bidder responsibility. Providing false information may result in criminal prosecution or administrative sanctions.

The bidder further certifies that the certification requirements contained in Section XI of Form FHWA 1273, will be or have been included in all subcontracts, material supply agreements, purchase orders, etc. except those procurement contracts for goods or services that are expected to be less than the Federal procurement small purchase threshold fixed at 10 U.S.C. 2304(g) and 41 U.S.C. 253(g) (currently $25,000) which are excluded from the certification requirements.

The bidder further certifies, to the best of his or her knowledge and belief, that:

1) No Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this contract, Standard Form-LLL, Disclosure Form to Report Lobbying, in accordance with its instructions will be completed and submitted.

The certification contained in (1) and (2) above is a material representation of fact upon which reliance is placed and a prerequisite imposed by Section 1352, Title 31, U.S. Code prior to entering into this contract. Failure to comply shall be subject to a civil penalty of not less than $10,000 and not more than $100,000. The bidder shall include the language of the certification in all subcontracts exceeding $100,000 and all subcontractors shall certify and disclose accordingly.

All of the foregoing is true and correct.

Executed on _____ _____

Signature

(01/2016 F)

For Information Purposes Only

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SAM.GOV Registration and Unique Entity ID

Bidders are advised that the Prime Contractor must register and maintain a current registration in the **System for Award Management** (http://sam.gov) at all times during the project. Upon registration, the Contractor will be assigned a SAM Unique Entity ID.

Bidders are advised that prior to the award of this contract, they MUST be registered in the System for Award Management.

I (We) acknowledge that this contract cannot be awarded if I (We) are not registered in the System for Award Management prior to the award of this contract. _____ (Yes / No)

I (We) have a SAM Unique Entity ID. _____ (Yes / No)

SAM Unique Entity ID: _____

Company Name: _____

Company e-mail address: _____

For Informational Purposes Only

SECTION 902

CONTRACT FOR _____
LOCATED IN THE COUNTY(IES) OF _____

STATE OF MISSISSIPPI
COUNTY OF HINDS

This Contract is entered into by and between the Mississippi Transportation Commission (the "Commission") and the undersigned contractor (the "Contractor"), as follows:

As consideration for this Contract, the Commission agrees to pay the Contractor the amount(s) set out in the Proposal attached hereto. Said payment will be made in the manner and at the time(s) specified in the Specifications and/or Special Provisions, if any. In exchange for said consideration, the Contractor hereby agrees to accept the prices stated in the Proposal as full compensation for the furnishing of all labor, materials and equipment, and the execution of the scope of work identified for this referenced Project as contemplated in this Contract, and as more fully outlined in the Contract Documents (the "Work"). The Contract Documents consist of the Advertisement, the Notice to Bidders, the Proposal, the Specifications, the Special Provisions, and the approved Plans, all of which are hereby made a part of this Contract and incorporated herein by reference.

The Contractor shall be responsible for all loss or damage arising out of, or in any way in connection with the Work, or from any unforeseen obstructions or difficulties that may be encountered in the prosecution of the Work, and for all risks of every description connected with the Work, with the exception of any items specifically excluded in the Contract Documents. The Contractor shall fully and faithfully complete the Work in a good and workmanlike manner, according to the Contract Documents and any Supplemental Agreements thereto.

The Contractor further agrees that the Work shall be done under the direct supervision of, and to the complete satisfaction of, the Executive Director of the Mississippi Department of Transportation, or his authorized representative(s), and, when federal funds are involved, subject to the inspection and approval of the Federal Highway Administration, or its agents, and/or the agents of any other state or federal agency whose funds are involved. Further, the Work shall be done in accordance with any applicable state and federal laws, and any such rules and regulations issued by the Commission and/or any relevant Federal Agency.

The Contractor agrees that all labor as outlined in the Contract Documents may be secured from a list furnished by the Manager of the Win Job Center nearest the project location, or any successor thereto.

It is agreed and understood that each and every provision of law and clause required by law to be inserted into this Contract shall be deemed to be inserted herein, and this Contract shall be read and enforced as though it were included herein. If through mere mistake or otherwise, any such provision is not inserted, then upon the application of either party hereto, the Contract shall be physically amended to make such insertion.

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The Contractor agrees that he has read each and every clause of the Contract Documents, and fully understands the meaning of same, and hereby acknowledges that he will comply with all terms, covenants and agreements therein.

Witness our signatures, this the _____ day of _____, 20___.

_____
Contractor

By: _____
Title: _____

_____
Signed and sealed in the presence of: (name and address of witness)

_____
_____

MISSISSIPPI TRANSPORTATION COMMISSION

_____
Executive Director

_____
Secretary to the Commission

Award authorized by the Mississippi Transportation Commission in session on the ____ day of _____, _____, Minute Book No._____, Page No. _____.

For Informational Purposes Only

SECTION 903
PERFORMANCE BOND

PERFORMANCE BOND FOR THE FOLLOWING CONTRACT:
Project No.: _____

For the construction of: _____

Contract date: _____ Contract Price: _____

FOR OWNER: MISSISSIPPI TRANSPORTATION COMMISSION, 401 N. WEST STREET, JACKSON, MISSISSIPPI 39201.

CONTRACTOR (full legal name, contact person, phone number and address):
_____
_____
_____
_____

SURETY (legal name, phone number, principal place of business and address ***for notice purposes***):
_____
_____
_____

Second Surety (if applicable):
_____
_____
_____

The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns, to the Owner for the performance of the Contract, which is incorporated herein by reference, and subject to the following terms:

1. If the Contractor fully and faithfully performs the Contract, the Surety and the Contractor shall have no obligation under this Bond.

2. The Surety's obligation under this Bond shall arise after:
   (a) the Owner first provides notice to the Contractor and the Surety that termination is imminent, pursuant to the current edition of the Mississippi Standard Specifications for Road and Bridge Construction, which is a part of the Contract; and
   (b) the Owner declares a Contractor Default, terminates the Contract, and notifies the Surety.

3. Within 20 calendar days as set forth in Section 108.08 of the current edition of the Mississippi Standard Specifications for Road and Bridge Construction, the Surety shall, after discussions with and consent from the Owner, and at the Surety's expense, elect to take one of the following actions:
   (a) Arrange for the Contractor, with the consent of the Owner, to perform and complete the Contract;
   (b) Undertake to perform and complete the Contract itself, through its agents or independent contractors;
   (c) Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and after investigation, determine the amount for which it may be liable to the Owner (subject to the consent of the Owner) and as soon as practicable after the amount is determined, make payment to the Owner.

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4. If the Surety does not proceed, within a reasonable time frame, to enact and carry out the election made in Paragraph 3, then the Surety shall be deemed to be in default on this Bond, and the Owner shall be entitled to enforce any remedy available to it under the Contract and applicable law.

5. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for
   (a) the responsibilities of the Contractor for correction of defective work and completion of the Contract;
   (b) additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 3; and
   (c) liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of the Contractor.

6. The Surety hereby waives notice of any change, including changes of time, to the Contract or to related subcontracts, purchase orders and other obligations.

7. The penal sum of the Bond shall be equal to the Contract Price; however, the penal sum may be increased or decreased as the result of any subsequent Supplemental Agreements and/or final contract quantities.

8. Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address listed for notice purposes on the first page of this Bond.

CONTRACTOR AS PRINCIPAL
Company: _____

Signature: _____
Name: _____
Title: _____
Address: _____
_____

SURETY
Company: _____

Signature: _____ MS Insurance ID # _____
Name: _____
Title: _____
Address: _____
_____

SURETY (if applicable)
Company: _____

Signature: _____ MS Insurance ID # _____
Name: _____
Title: _____
Address: _____
_____

For Informational Purposes Only

SECTION 903
PAYMENT BOND

PAYMENT BOND FOR THE FOLLOWING CONTRACT:
Project No.: _____

For the construction of: _____

Contract date: _____ Contract Price: _____

FOR OWNER: MISSISSIPPI TRANSPORTATION COMMISSION, 401 N. WEST STREET, JACKSON, MISSISSIPPI 39201.

CONTRACTOR (full legal name, contact person, phone number and address):
_____
_____
_____

SURETY (legal name, phone number, principal place of business and address ***for notice purposes***):
_____
_____
_____
Second Surety (if applicable):
_____
_____
_____

The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns, to the Owner for payment of labor, materials and equipment furnished for use in the performance of the Contract, which is incorporated herein by reference, subject to the following terms:

1. If the Contractor promptly makes payment of all sums due to any and all subcontractors, sub-subcontractors, suppliers to the Contractor, suppliers to subcontractors and/or laborers who have performed work on the project site, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Contract, then the Surety and the Contractor shall have no obligation under this Bond.

2. The Owner shall provide notice to the Surety of any claims, demands, liens or suits against the Owner or the Owner's property that it receives from any person or entity ("Claimants") seeking payment for labor, materials or equipment furnished for use in the performance of the Contract.

3. Upon notice of any claims, demands, liens or suits provided by the Owner or Contractor or given to the Surety by a Claimant, the Surety shall promptly and at the Surety's expense, defend, indemnify and hold harmless the Owner against said claim, demand, lien or suit and shall take the following additional actions:
    (a) Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
    (b) Pay or arrange for payment of any undisputed amounts.

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4. The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond and shall have no obligation under this Bond to make payments to, or give notice on behalf of, Claimants, or otherwise have any obligations to Claimants under this Bond.

5. The Surety hereby waives notice of any change, including changes of time, to the Contract or to related subcontracts, purchase orders and other obligations.

6. The penal sum of the Bond shall be equal to the Contract Price; however, the penal sum may be increased or decreased as the result of any subsequent Supplemental Agreements and/or final contract quantities.

CONTRACTOR AS PRINCIPAL
Company: _____

Signature: _____
Name: _____
Title: _____
Address: _____
_____

SURETY
Company: _____

Signature: _____ MS Insurance ID # _____
Name: _____
Title: _____
Address: _____
_____

SURETY (if applicable)
Company: _____

Signature: _____ MS Insurance ID # _____
Name: _____
Title: _____
Address: _____
_____

For Informational Purposes Only

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we_____
Contractor

_____
Address

_____
City, State ZIP

As principal, hereinafter called the Principal, and _____
Surety

a corporation duly organized under the laws of the state of _____

as Surety, hereinafter called the Surety, are held and firmly bound unto **State of Mississippi, Jackson, Mississippi**

As Obligee, hereinafter called Obligee, in the sum of **Five Per Cent (5%) of Amount Bid**

Dollars($_____)

for the payment of which sum will and truly to be made, the said Principal and said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for **I-10 Jackson County Welcome Center, known as Federal Aid Project No. STBG-0010-01(180) / 109171301 in Jackson County.**

NOW THEREFORE, the condition of this obligation is such that if the aforesaid Principal shall be awarded the contract, the said Principal will, within the time required, enter into a formal contract and give a good and sufficient bond to secure the performance of the terms and conditions of the contract, then this obligation to be void; otherwise the Principal and Surety will pay unto the Obligee the difference in money between the amount of the bid of the said Principal and the amount for which the Obligee legally contracts with another party to perform the work if the latter amount be in excess of the former, but in no event shall liability hereunder exceed the penal sum hereof.

Signed and sealed this _____day of _____, 20___

_____
(Principal) (Seal)

_____ By:_____
(Witness) (Name) (Title)

_____
(Surety) (Seal)

_____ By:_____
(Witness) (Attorney-in-Fact)

_____
(MS Agent)

_____
Mississippi Insurance ID Number