



PROPOSAL AND CONTRACT DOCUMENTS

FOR THE CONSTRUCTION OF

14

Construction of Ashland Maintenance Area Headquarters Building, with other Structures, and Site Work, known as State Project Nos. BWO-2214-05(001), BWO-2215-05(001), BWO-2217-05(001), & LWO-2096-05(002) / 502996301, 302, 304, & 305 in Benton County.

Project Completion: 04/26/2019

(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

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12/19/2017 09:29 AM

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, January 23, 2018, from the Bid Express Service and shortly thereafter publicly read on the Sixth Floor for:

Construction of Ashland Maintenance Area Headquarters Building, with other Structures, and Site Work, known as State Project Nos. BWO-2214-05(001), BWO-2215-05(001), BWO-2217-05(001), & LWO-2096-05(002) / 502996301, 302, 304, & 305 in Benton County.

The attention of bidders is directed to the predetermined minimum wage rate set by the U. S. Department of Labor under the Fair Labor Standards Act.

The Mississippi Department of Transportation hereby notifies all bidders that it will affirmatively insure that in any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, sex, age, disability, religion or national origin in consideration for an award.

Plans and specifications are on file in the offices of the Mississippi Department of Transportation.

Contractors may request permission to bid online at <http://shopmdot.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://shopmdot.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://shopmdot.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.

MELINDA L. MCGRATH
EXECUTIVE DIRECTOR

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. 3

CODE: (SP)

DATE: 01/17/2017

SUBJECT: Final Clean-Up

Immediately prior to final inspection for release of maintenance, the Contractor shall pick up, load, transport and properly dispose of all litter from the entire highway right-of-way that is within the termini of the project.

Litter shall include, but not be limited to, solid wastes such a glass, paper products, tires, wood products, metal, synthetic materials and other miscellaneous debris.

Litter removal is considered incidental to other items of work and will not be measured for separate payment.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 5

CODE: (SP)

DATE: 03/16/2017

**SUBJECT: Storm Water Discharge Associated with Construction Activity
(≥ 1 and < 5 Acres)**

Construction Storm Water General NPDES Permit MSR 15 to discharge storm water associated with construction activity is required. This project is granted permission to discharge treated storm water into State waters. Copies of said permit 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 (Form No. 1).

Failure of the bidder to execute and file the completed Prime Contractor Certification (Form No. 1) shall be just cause for the cancellation of the award.

The executed Prime Contractor Certification (Form No. 1) 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 and conditions including, but not limited to, the inspection and reporting requirements of Part IV. For this project, the Contractor shall furnish, set up and read, as needed, an on-site rain gauge.

The Contractor must furnish the Project Engineer a completed copy of the Small Construction Notice of Intent (SCNOI) along with the Contractor's Erosion Control Plan.

The Contractor shall make inspections in accordance with condition No. S-4, Page 19, and shall furnish the Project Engineer with the results of each weekly inspection as soon as possible following the date of inspection. The weekly inspections must be documented monthly on the Inspection and Certification Form, a copy of which is provided. 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.

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. 8

CODE: (SP)

DATE: 07/19/2017

SUBJECT: Errata and Modifications to the 2017 Standard Specifications

<u>Page</u>	<u>Subsection</u>	<u>Change</u>
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.
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 “ <u>AASHTO</u> ” to “ <u>AASHTO’s LRFD</u> ”.
532	642.02.6.6.2	Change the subsection number from “642.02.6.6.2” to “632.02.6.6.2”
532	642.02.6.6.2	Change “Section 661” to “Section 907-661.”
532	632.02.6.6.4	Change “Subsection 663.02.2” to “Subsection 907-663.02.2.”
554	634.05	In the description for 634-A, change “___’ Pole” to “___’ Shaft.”

- | | | |
|-----|---------------|---|
| 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. 9

CODE: (IS)

DATE: 03/01/2017

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

http://www.ops.fhwa.dot.gov/Freight/publications/brdg_frm_wgths/bridge_formula_all_rev.pdf

An on line **BRIDGE FORMULA WEIGHTS CALCULATOR** is available at

http://ops.fhwa.dot.gov/freight/sw/brdgcalc/calc_page.htm

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 11

CODE: (IS)

DATE: 03/01/2017

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 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 shall be in place adjacent to the right-of-way line and at least five (5) feet adjacent to stream banks. 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.

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 will be either permanently or temporarily seeded until additional material is made available to complete these sections. All unclassified excavation on the project will still be required to be moved prior to incorporating any borrow excavation on the project. 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. 12

CODE: (IS)

DATE: 03/01/2017

SUBJECT: MASH Compliant Devices

Bidders are hereby advised that the Standard Specifications may require certain traffic control and permanent safety hardware devices to meet the requirements of the Manual for Assessing Safety Hardware (MASH). However, devices meeting the requirements of NCHRP Report 350 will be allowed until the mandatory effective date for MASH compliance. The following table shows the effective dates for MASH compliant devices.

Device	Effective Date for MASH Compliance
W-beam barriers, cast-in-place concrete barriers	December 31, 2017
W-beam terminals	June 30, 2018
Cable barriers, cable barrier terminals, crash cushions	December 31, 2018
Bridge rails, transitions, all other longitudinal barriers including portable barriers installed permanently, all other terminals, sign supports, all other breakaway hardware	December 31, 2019

Temporary work zone devices, including portable barriers manufactured after December 31, 2019, must have been successfully tested to the 2016 Edition of MASH. Such devices manufactured on or before this date and successfully tested to NCHRP Report 350 or the 2009 Edition of MASH may continue to be used throughout their normal service lives.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

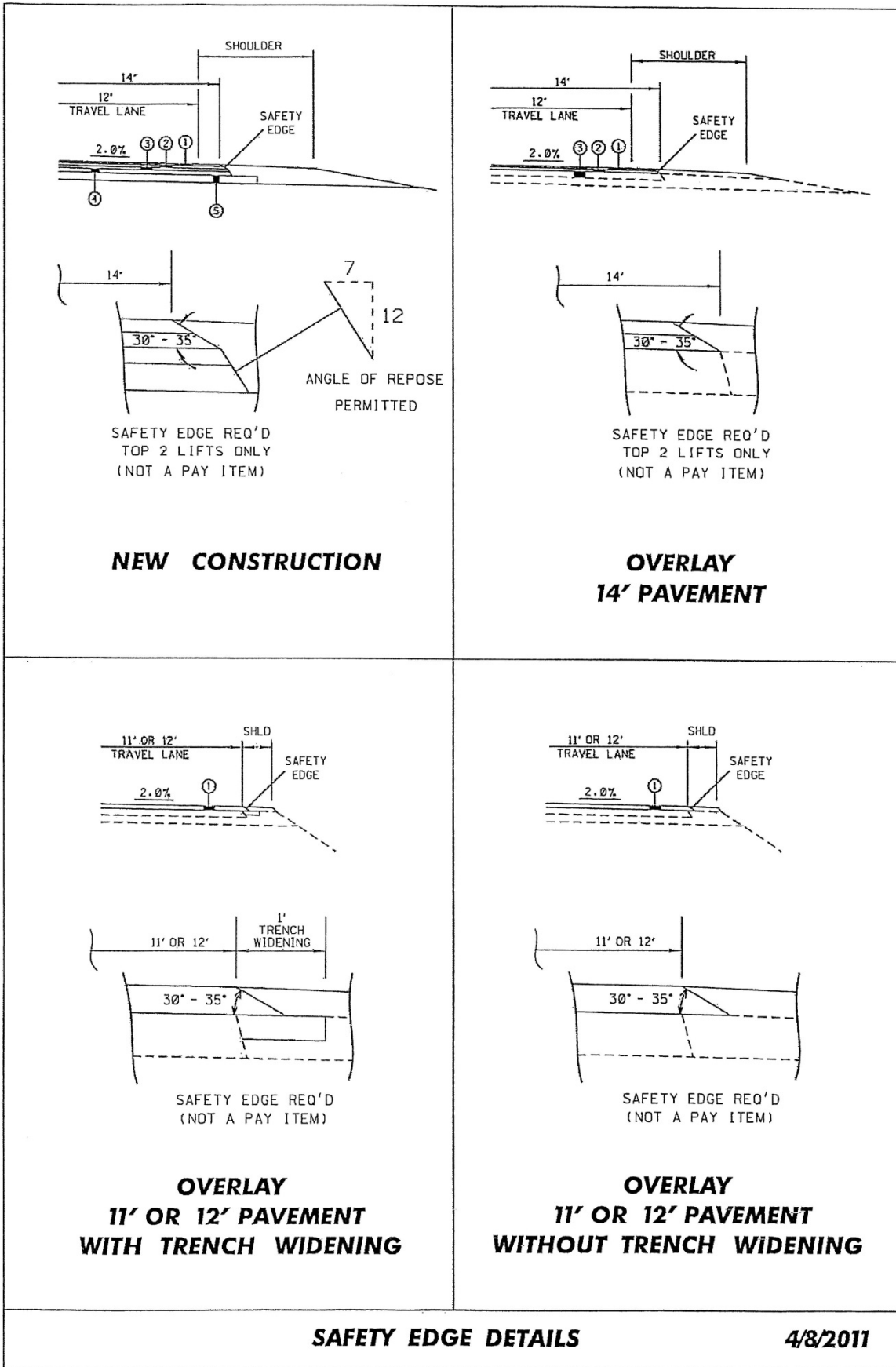
SECTION 904 - NOTICE TO BIDDERS NO. 13

CODE: (IS)

DATE: 03/01/2017

SUBJECT: Safety Edge

Bidders are hereby advised that the Shoulder Wedge (Safety Edge) specified in Section 401, Asphalt Pavements, shall only apply to the top two (2) lifts of asphalt. Open Graded Friction Courses (OGFC) are not to be considered a lift as it pertains to safety edge. Attached is a drawing showing the safety edge. Note that the shoulder dimensions in the bottom two drawings will be less than three feet (3').



MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 30

CODE: (SP)

DATE: 01/17/2017

SUBJECT: Additional Governing Specifications for BWO/LWO Projects

Bidders are advised that if the language of the AIA Document A201 in Special Provision 907-242 is in conflict with the provisions in Section 100 of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction, the language in the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction shall govern.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 113

CODE: (SP)

DATE: 04/18/2017

SUBJECT: Tack Coat

Bidders are advised that in addition to the products listed on the Department's APL as referenced in Subsection 401.03.1.2 on page 256, the Contractor may use one of the following as a tack coat.

- CSS-1
- CSS-1h
- SS-1
- SS-1h

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. 541

CODE: (SP)

DATE: 12/15/2017

SUBJECT: Contract Time

**PROJECT: BWO-2214-05(001) / 502996301 – Benton
BWO-2215-05(001) / 502996302 – Benton
BWO-2217-05(001) / 502996304 – Benton
LWO-2096-05(002) / 502996305 – Benton**

The calendar date for completion of work to be performed by the Contractor for this project shall be **April 26, 2019** 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 **February 13, 2018** and the effective date of the Notice to Proceed / Beginning of Contract Time will be **April 16, 2018**.

Should the Contractor request a Notice to Proceed earlier than **April 16, 2018** and it is agreeable with the Department for an early Notice to Proceed, the requested date will become the new Notice to Proceed date.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-102-2

CODE: (SP)

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. 907-103-2

CODE: (SP)

DATE: 06/22/2017

SUBJECT: Award and Execution of Contract

Section 103, Award and Execution of Contract, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-103.01--Consideration of Proposal. Delete the second and third paragraphs of Subsection 103.01 on page 19, and substitute the following.

907-103.01.1--For Projects Constructed Without Federal Funds. Resident Contractors actually domiciled in Mississippi are to be granted preference over nonresidents in awarding of Contracts financed 100% with State funds.

In consideration of proposals that are equal to or in excess of \$50,000 and financed 100% with State funds, a nonresident bidder domiciled in a state having laws granting preference to local Contractors will be considered for such contracts on the same basis as the nonresident bidder's state awards contracts to Mississippi Contractors bidding under similar circumstances. When a nonresident Contractor submits a bid equal to or in excess of \$50,000 on a contract financed 100% with State funds, a copy of the current laws from the state of domicile and an explanation thereof pertaining to treatment of nonresident Contractors shall be attached. If no preferential treatment is provided for Contractors in the state of domicile and contracts are awarded to the lowest responsible bidder, a statement to this effect shall be attached. Should the attachment not accompany the bid when submitted, the Contractor shall have 10 days following the opening of the bids to furnish the required information to the Contract Administration Director for attachment to the bid. Failure to provide the attachment within 10 days will result in the nonresident Contractor's bid being rejected and not considered for award. As used herein, the term "resident Contractor" includes a nonresident person, firm or corporation that has been qualified to do business in this State and has maintained a permanent full-time office in the State of Mississippi for two years prior to the submission of the bid, and the subsidiaries and affiliates of such a person, firm or corporation.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-107-1

CODE: (SP)

DATE: 06/13/2017

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.

907-107.22.1--Contractor's Erosion Control Plan (ECP). 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. 907-242-2

CODE: (SP)

DATE: 12/19/2017

SUBJECT: Maintenance Area Headquarters and Structures

PROJECT: BWO-2214-05(001), BWO-2215-05(001), BWO-2217-05(001), & LWO-2096-05(002) -- 502996301, 302, 304, & 305 -- Benton County

Section 907-242, Maintenance Area Headquarters and Structures, is hereby added to and made part of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-242--MAINTENANCE AREA HEADQUARTERS AND STRUCTURES

The specification format for this item of work is different than normal. The Contractor shall perform the construction of the Ashland Maintenance Area Headquarters Building, with other Structures, and Site Work in accordance with the requirements set forth as follows. All other items of work shall be performed in accordance with the 2017 Mississippi Standard Specification.

DOCUMENT 00 01 07

SEALS PAGE

Architectural
JH&H Architects/Planners/Interiors, PA
1047 North Flowood Dr.
Flowood, MS 39232
(601) 948-4601



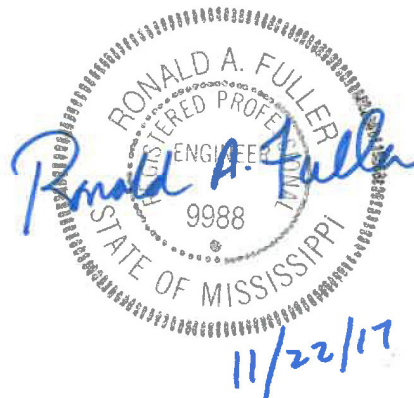
Civil / Structural
Spencer-Engineers, Inc./Consultants
2675 River Ridge Dr./
Jackson, MS 39216-5012
(601) 982-7766



Plumbing / Mechanical
PICKERING FIRM, INC.
6775 Lenox Center Court, Suite 300
Memphis, TN 38115
(901) 729-5502



Electrical
PICKERING FIRM, INC.
6775 Lenox Center Court, Suite 300
Memphis, TN 38115
(901) 729-5502



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 IN ASHLAND, BENTON COUNTY, MISSISSIPPI

PROJECT NUMBER: BWO-2214-05(001) 502996
 BWO-2215-05(001) 502996
 BWO-2217-05(001) 502996
 LWO-2096-05(002) 502996

DATE: 11-22-2017

DESCRIPTION A: This Work shall consist of minor site work and all construction work necessary in constructing a Maintenance Shop Building for Benton County Maintenance Facilities for District Two in Ashland, Benton County, Mississippi, Project No. BWO-2214-05(001) 502996, in accordance with these Specifications and conforming to the Drawings.

DESCRIPTION B: This Work shall consist of minor site work and all construction work necessary in constructing an Equipment Shed with Enclosed Storage Bay for the Benton County Maintenance Facilities for District Two in Ashland, Benton County, Mississippi, Project No BWO-2215-05(001) 502996 in accordance with these Specifications and conforming to the Drawings.

DESCRIPTION C: This Work shall consist of minor site work and all construction work necessary in constructing a Bulk Salt Storage Structure for the Benton County Maintenance Facilities for District Two in Ashland, Benton County, Mississippi, Project No. BWO-2217-05(001) 502996 in accordance with these Specifications and conforming to the Drawings.

The Site Improvements portion of this Work shall consist of site work outside and adjacent to the Work described for construction of the buildings or structures for District Two at Ashland, Benton County, Mississippi, Project No. LWO-2096-05(002) 502996. See Civil Drawings and Special Provisions for extent of this portion of the Work.

It is the intention of these Specifications to provide the necessary items and instruction for complete buildings or structures including all code compliance. Omission of items or instruction necessary or considered standard good practice for the proper installation and construction of the buildings or structures shall not relieve the Contractor of furnishing and installing such items and conforming to the building codes having jurisdiction.

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01 45 29	TESTING LABORATORY SERVICES - MDOT	2
01 50 00	TEMPORARY FACILITIES AND CONTROLS	7
01 60 00	PRODUCT REQUIREMENTS	4
01 73 00	EXECUTION	7
01 74 19	CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL	4
01 77 00	CLOSEOUT PROCEDURES	5
01 78 23	OPERATION AND MAINTENANCE DATA	7
01 78 39	PROJECT RECORD DOCUMENTS	3
01 79 00	DEMONSTRATION AND TRAINING	4
01 91 13	GENERAL COMMISSIONING REQUIREMENTS	2
	DIVISION 02 - EXISTING CONDITIONS (Not Used)	
	DIVISION 03 - CONCRETE	
03 10 00	CONCRETE FORMING AND ACCESSORIES	2
03 20 00	CONCRETE REINFORCING	3
03 21 15	CONCRETE REINFORCING STEEL (Bulk Salt Storage Structure)	2
03 30 00	CAST-IN-PLACE CONCRETE	6
03 31 00	STRUCTURAL CONCRETE (Bulk Salt Storage Structure)	5

	DIVISION 04 - MASONRY	
04 22 00	CONCRETE UNIT MASONRY	8
	DIVISION 05 - METALS	
05 12 00	STRUCTURAL STEEL FRAMING	6
05 50 00	METAL FABRICATIONS	6
	DIVISION 06 – WOOD AND PLASTIC	
06 10 00	ROUGH CARPENTRY	7
06 17 33	WOOD I-JOISTS	3
06 40 00	ARCHITECTURAL WOODWORK	6
	DIVISION 07 - THERMAL AND MOISTURE PROTECTION	
07 11 14	FLUID-APPLIED DAMPPROOFING (Bulk Salt Storage Structure)	2
07 21 28	CELLULOSE THERMAL INSULATION	3
07 26 00	VAPOR RETARDERS	3
07 26 15	VAPOR BARRIER (Bulk Salt Storage Structure)	2
07 62 00	SHEET METAL FLASHING AND TRIM	6
07 84 00	FIRESTOPPING	5
07 92 00	JOINT SEALANTS	7
	DIVISION 08 – OPENINGS	
08 11 13	HOLLOW METAL DOORS AND FRAMES	10
08 14 29	PREFINISHED WOOD DOORS	5
08 31 13	ACCESS DOORS AND FRAMES	5
08 33 23	OVERHEAD COILING DOORS	5
08 41 13	ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS	7
08 45 19	POLYCARBONATE WALL SYSTEM	7
08 51 12	ALUMINUM WINDOWS-SINGLE HUNG	6
08 71 00	DOOR HARDWARE	10
08 80 00	GLAZING	7
08 91 19	FIXED LOUVERS	5
	DIVISION 09 - FINISHES	
09 05 15	COLOR DESIGN	3
09 29 00	GYPSUM BOARD	5
09 31 13	THIN-SET CERAMIC TILING	5

09 51 00	ACOUSTICAL CEILINGS	5
09 65 00	RESILIENT FLOORING	5
09 68 18	TEXTILE COMPOSITE FLOORING	7
09 90 00	PAINTING AND COATING	15
	DIVISION 10 - SPECIALTIES	
10 11 00	VISUAL DISPLAY UNITS	3
10 14 00	SIGNAGE	6
10 21 15	SOLID PLASTIC TOILET COMPARTMENTS	4
10 22 14	CHAIN LINK PARTITIONS AND GATES	4
10 26 13	CORNER GUARDS	2
10 28 13	TOILET ACCESSORIES	3
10 43 15	DEFIBRILLATORS AND CABINETS	2
10 44 16	FIRE EXTINGUISHERS	2
10 51 13	METAL LOCKERS	3
10 56 13	METAL STORAGE SHELVING	2
10 73 16	CANOPIES	3
	DIVISION 11 - EQUIPMENT	
11 31 15	RESIDENTIAL APPLIANCES & EQUIPMENT	3
	DIVISION 12 - FURNISHINGS	
12 21 14	HORIZONTAL LOUVER BLINDS-METAL	4
12 48 43	FLOOR MATS	3
	DIVISION 13 - SPECIAL CONSTRUCTION	
13 34 18	METAL BUILDING-EQUIPMENT SHED	13
13 34 19	METAL BUILDING SYSTEMS-SHOP	15
13 34 26	SELF-SUPPORTING METAL ROOF STRUCTURE (Bulk Salt Storage Structure)	3
	DIVISION 14 - CONVEYING SYSTEMS	
14 45 00	VEHICLE LIFTS	3
	DIVISIONS 15 – 20 (Not Used)	
	DIVISIONS 21 – FIRE SUPPRESSION	
21 10 00	WATER-BASED FIRE SUPPRESSION SYSTEMS	14

DIVISION 22 – PLUMBING		
22 05 00	COMMON WORK RESULTS FOR PLUMBING	7
22 05 53	IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT	2
22 07 00	PLUMBING INSULATION	2
22 07 19	PLUMBING PIPING INSULATION	3
22 10 06	PLUMBING PIPING SPECIALTIES	2
22 11 00	FACILITY WATER DISTRIBUTION	10
22 13 00	FACILITY SANITARY SEWERAGE	7
22 42 00	COMMERCIAL PLUMBING FIXTURES	6
DIVISION 23 HEATING, VENTILATING, AND AIR-CONDITIONING		
23 05 53	IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT	2
23 05 93	TESTING, ADJUSTING AND BALANCING FOR HVAC	6
23 07 19	HVAC PIPING INSULATION	2
23 09 13	INSTRUMENTATION AND CONTROL DEVICES FOR HVAC	3
23 11 13	GAS PIPING	3
23 23 00	REFRIGERANT PIPING	3
23 31 00	HVAC DUCTS AND CASINGS	3
23 33 00	AIR DUCT ACCESSORIES	2
23 34 50	CEILING MOUNTED CIRCULATION FANS	5
23 81 29	VARIABLE REFRIGERANT VOLUME (VRV) HVAC SYSTEM	5
DIVISIONS 24 – 25 (Not Used)		
DIVISION 26 - ELECTRICAL		
26 00 10	GENERAL PROVISIONS, ELECTRICAL	5
26 00 50	BASIC MATERIALS AND METHODS	14
26 06 10	EMERGENCY GENERATOR SYSTEM	10
26 40 02	ELECTRICAL SERVICE	1
26 50 00	LIGHTING	3
DIVISION 27 COMMUNICATIONS		
27 15 00	TELEPHONE AND DATA CABLING SYSTEM	8
DIVISION 28 ELECTRONIC SAFETY AND SECURITY		
28 23 00	SECURITY CCTV VIDEO SURVEILLANCE	13
28 31 00	FIRE- ALARM SECURITY SYSTEM	12
DIVISIONS 29 – 30 (Not Used)		

	DIVISION 31 EARTHWORK	
31 23 11	EXCAVATION, FILL AND GRADING FOR BUILDING	8
31 31 16	TERMITE CONTROL	4
	DIVISIONS 32-49 (Not Used)	
	DIVISIONS 50 MDOT PROCURMENT AND CONTRACTING FORMS	

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

END OF TABLE OF CONTENTS

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:

B.

WORKING NUMBER	SHEET NUMBER	DESCRIPTION
T101	1	TITLE SHEET
T102	2	INDEX OF DRAWINGS
T103	3	SUMMARY OF QUANTITIES
T104	4	SUMMARY OF QUANTITIES
T105	5	ABBREVIATIONS
T106	6	CODE INFORMATION
C100	7	EXISTING SITE & DEMOLITION PLAN
C200	8	SITE PLAN
C201	9	FENCING PLAN
C300	10	GRADING & DRAINAGE PLAN
C301	11	EROSION CONTROL PLAN
C400	12	SITE DETAILS
C401	13	SITE DETAILS
C402	14	SITE DETAILS
C403	15	EROSION CONTROL DETAILS
C404	16	EROSION CONTROL DETAILS
C405	17	FENCE DETAILS
VS-1	18	VEGETATION SCHEDULE
S100	19	STRUCTURAL GENERAL NOTES
S101	20	FOUNDATION FRAMING PLAN - SHOP
S102	21	2ND FLOOR FRAMING PLAN - SHOP
S103	22	EQUIPMENT SHED FOUNDATION & FLOOR FRAMING PLAN
S104	23	SALT STORAGE FRAMING PLANS
S201	24	FOUNDATION DETAILS
S301	25	WOOD FRAMING DETAILS
A101-A	26	FLOOR PLAN - SHOP
A102-A	27	REFLECTED CEILING PLANS - SHOP
A103-A	28	ROOF PLAN & DETAILS - SHOP
A201-A	29	BUILDING ELEVATIONS - SHOP
A301-A	30	BUILDING SECTIONS
A302-A	31	BUILDING SECTIONS
A303-A	32	WALL SECTIONS
A304-A	33	WALL SECTIONS
A401-A	34	ENLARGED PLANS & INTERIOR ELEVATIONS
A402-A	35	MILLWORK DETAILS
A501	36	MISCELLANEOUS DETAILS & PARTITION TYPES
A601-A	37	OPENING SCHEDULES

A602-A	38	OPENING DETAILS
A603-A	39	OPENING DETAILS
A604-A	40	OPENING DETAILS
A901-A	41	EXTERIOR VIEWS
I101-A	42	FINISH FLOOR PLAN
I601-A	43	INTERIOR FINISH SCHEDULE AND ELEVATIONS
A101-B	44	EQUIPMENT SHED FLOOR PLAN
A102-B	45	EQUIPMENT SHED REFLECTED CEILING PLAN
A103-B	46	EQUIPMENT SHED ROOF PLAN
A201-B	47	EQUIPMENT SHED ELEVATIONS
A202-B	48	EQUIPMENT SHED ELEVATIONS
A301-B	49	EQUIPMENT SHED SECTIONS
A302-B	50	ROOF DETAILS
A101-D	51	BULK SALT STORAGE FLOOR PLAN, REFLECTED CEILING PLAN & ROOF PLAN
A201-D	52	BULK SALT STORAGE ELEVATIONS
A301-D	53	BULK SALT STORAGE BUILDING SECTIONS & DETAILS
A302-D	54	BULK SALT STORAGE WALL SECTIONS & DETAILS
PME001	55	PLUMBING, MECHANICAL & ELECTRICAL SITE PLAN
P001	56	PLUMBING SCHEDULE, NOTES & ABBREVIATIONS
P101-A	57	PLUMBING FLOOR PLAN - SHOP
P101-B	58	PLUMBING FLOOR PLAN - EQUIP SHED
P501	59	PLUMBING DETAILS
FP101-A	60	FIRE SUPPRESSION FLOOR PLAN - SHOP
M001	61	HVAC SCHEDULES, GENERAL NOTES, ABBREVIATIONS & LEGENDS
M101-A	62	MECHANICAL FLOOR PLAN - SHOP
M101-B	63	MECHANICAL FLOOR PLAN - EQUIP SHED
M101-C	64	HVAC DETAILS
E001	65	ELECTRICAL LEGENDS AND ABBREVIATIONS
E101-A	66	LIGHTING - SHOP
E102-A	67	POWER - SHOP
E103-A	68	FIRE ALARM AND SECURITY - SHOP
E104-A	69	TELECOMMUNICATIONS - SHOP
E101-B	70	LIGHTING - EQUIP SHED
E102-B	71	POWER - EQUIP SHED
E101-D	72	LIGHTING AND POWER - BULK SALT STORAGE
E501	73	ELECTRICAL DETAILS
E502	74	ELECTRICAL DETAILS
E503	75	ELECTRICAL DETAILS
E601	76	SINGLE LINE DIAGRAM
E602	77	LIGHTING FIXTURE SCHEDULE

END OF DOCUMENT

DOCUMENT 00 21 13

INSTRUCTIONS TO BIDDERS

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 Thursday prior to the letting. Answers to questions will be posted by 5:00 p.m. on the Thursday 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. There will be no Pre-Bid Meeting, but failure to visit the site prior to submitting a bid will in no way relieve the successful Bidder from furnishing materials or performing work required to complete Work in accordance with Drawings and Project Manual (Proposal).

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.msdoc.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.msdoc.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 the followings
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 in the following manner:
 - 1. Notification on Envelope: A modification may NOT be written on the outside of the sealed envelope containing the bid.
 - 2. Facsimile: A facsimile (fax) will NOT be acceptable.

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.

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 in duplicate.
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.msdoc.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 under \$50,000 and the statement "bid does not exceed \$50,000" is on the outside of the sealed envelope.
 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 there is a separate HVAC/Plumbing Sub-Contractor, so notate as mentioned herein.
* If Mechanical, Plumbing, and/or Electrical Subcontractor is performed by the General Contractor, be sure the General has COR for said discipline.
* If there is no Mechanical, Plumbing, and/or Electrical Sub-Contractor listed, then use of Sub-Contractor to perform such scope will not be permitted.

E. Subcontractors' COR Number

1. Certificate of Responsibility
() List certificate of responsibility Number for all listed Sub-Contractors over \$50,000.
* If under \$50,000 – so notate on the COR line “under \$50,000” (or can still show COR Number)

1.26 BIDDER'S CONTACT LIST

A. Proposal and Contract Documents: If the Bidder has any questions pertaining to the following specific areas of the Documents, please direct them to the following individuals:

1. Additional Proposals: Kerry Harris – Contract Administration (601) 359-7700
3. Bid Forms: Neal Dougherty – Contract Admin. Director (601) 359-7730
4. Specifications: Shane Martin – Assist. Construction Engr. (601) 359-7301
5. Drawings: Shane Martin – Assist. Construction Engr. (601) 359-7301
6. Bidder's List & Specimen Proposals are available online at:
<http://www.gomdot.com/Applications/BidSystem/Home.aspx>

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 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. Masonry Items
 - b. Cellulose Thermal Insulation
 - c. Metal Building System
 - d. Thin-Set Tiling
 - e. Plumbing Items
 - f. Heating, Ventilating and Air Conditioning Items
 - g. Security and Surveillance Items
 - h. Electrical Items
 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 31 32

GEOTECHNICAL DATA

1.01 GEOTECHNICAL DATA

- A. This Document with its referenced attachments, Ashland Maintenance HQ Geotechnical Rept. 17-05-15 502996/101000 PE (34 pages) 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. 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.
- C. 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

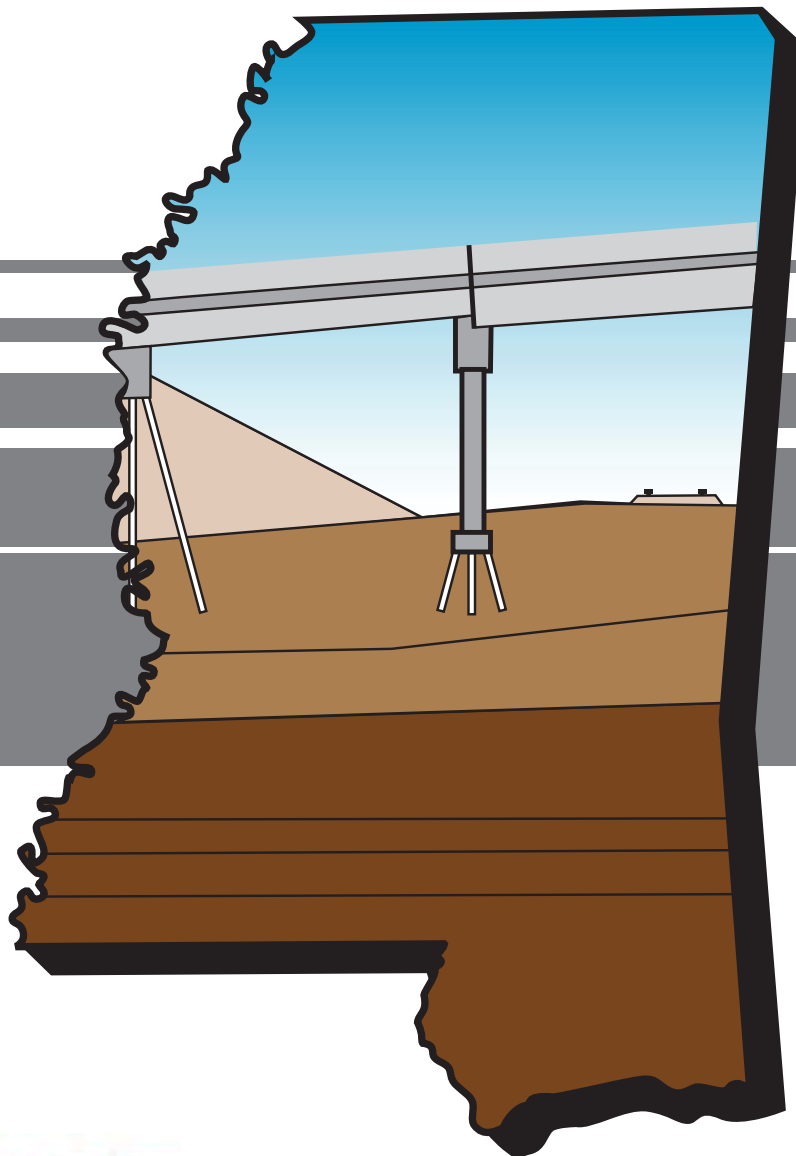
GEO TECHNICAL INVESTIGATION

Federal Aid No.: BWO-2214-05(001)

Report No.: 17-05-15

FMS Construction: 502996/301000

County: BENTON



*Mississippi Department of Transportation
Materials Division
Geotechnical Branch*



MISSISSIPPI DEPARTMENT OF TRANSPORTATION

Inter-Departmental Memorandum

TO: Manager, ASU (75-20)
Mr. Seth Winchester

DATE: April 6, 2017

FROM: Geotechnical Engineer
R. Sean Ferguson 

SUBJECT OR PROJECT NO: Ashland Maintenance HQ
Geotechnical Rept. 17-05-15
502996/101000 PE

INFORMATION COPY TO:

Central File (via Owen)
District Engineer 2nd District
District 2 (Sheffield)
Construction Engineer
Materials Engineer
Project File
Lab File

COUNTY: BENTON

This is the submission of the geotechnical investigation performed by this office on the soil and foundation conditions at the site of proposed buildings and pavements to be constructed at the Ashland Maintenance Headquarters in Benton County.

Please distribute this report to the design architects at your convenience.

If any additional information is needed or if any questions arise which require further review of site conditions or design assumptions either during the design or construction phase of the project or which require clarification of the recommendations provided in this report please advise.

RSF

GENERAL

Seventeen (17) rotary wash soil borings were completed between February 1 and February 15, 2017 at the Ashland Maintenance Area Headquarters in Benton County as part of the geotechnical investigation presented herein. This report covers the subsurface conditions encountered at the location of several building and pavement structures to be constructed. As we understand, the project includes the construction of an administration building and shop separated by a covered walkway, equipment storage building, bulk storage building, and salt storage building. These buildings may be built over the period of several months or years under separate construction contracts.

We have performed borings using information provided by the Departments' Architectural Services Unit.

The soil borings ranged from 17 feet to 62 feet in depth. Undisturbed Shelby tube samples were obtained in cohesive soils. Split-spoon samples were obtained in primarily cohesionless, granular soils.

From the field boring logs and visual inspection of the samples, a laboratory testing program was organized to aid in the classification and zoning of the different soils encountered, as well as to determine the strength characteristics of each zone. The tests conducted were unconfined compression, UU-triaxial compression, moisture content, Atterberg limits, and grain size analyses. The laboratory test results are presented in the reference section of this report and on the appropriate soil boring logs. Boring locations as well as the planned structure locations are indicated on Plates 1 and 2.

The recommendations provided in this report are based on the information supplied to this office at the time of the geotechnical investigation. It should be pointed out that the boring logs contained in this report are reproductions of the original field boring logs. The soil stratification information presented on the boring logs is formulated from laboratory tests and visual examination of the soil samples obtained during the field exploration. Groundwater information that may appear on the boring logs represents the conditions encountered at the time of drilling. Groundwater levels fluctuate regularly with large variations sometimes observed with seasonal changes. The conclusion of what lies between any and all borings is subject to various interpretations and should be evaluated accordingly.

The remainder of this report deals with this subdivision's findings and conclusions. Any questions concerning the contents of this report, or suggestions as to how this material may be more effectively presented, are welcome.

SOIL CONDITIONS

Administration Building and Shop

Soil borings B-4, 5, and 6 were completed for the proposed administration building and adjoining shop. In general, the borings encountered 8 to 10 feet of firm to stiff, Clayey Silt (ML) and Silty Clay (CL) material with low shrink-swell potential overlying medium dense to dense very fine to medium Silty Sand (SM).

Equipment Storage Building

Soil borings B-9, 11, and 14 were completed for the proposed equipment storage building. In general, the borings encountered 3 to 8 feet of firm to stiff, Clayey Silt (ML) and Silty Clay (CL) material with low shrink-swell potential overlying medium dense to dense very fine to medium Silty Sand (SM).

Bulk Storage and Salt Storage Buildings

Soil borings B-16 and B-17 were completed for the proposed bulk storage building and salt storage building. These borings encountered 4 to 5 feet of firm to stiff, Clayey Silt (ML) and Silty Clay (CL) material with low shrink-swell potential overlying medium dense to dense very fine to medium Silty Sand (SM).

Parking Areas and Paved Truck Access

The remaining borings were completed for the parking areas and paved truck and construction equipment access. In general, the borings encountered 4 to 8 feet of firm to stiff, Clayey Silt (ML) and Silty Clay (CL) material with low shrink-swell potential overlying medium dense to dense very fine to medium Silty Sand (SM).

GUIDELINE ENGINEERING RECOMMENDATIONS

The proposed buildings are relatively lightly loaded and will be founded on slabs-on-grade with continuous footings. Maximum spread footing loads are 100 kips per column and maximum wall loads are about 3 kips per linear foot based on dead plus live load. Existing topography of the site is such that maximum cuts of about 3 feet and fills of about 4 feet are anticipated to achieve finished floor elevations.

Site Preparation and Earthwork

Surface water drainage should be maintained and improved as practical to divert surface water away from the construction area. The construction of temporary ditches, berms, or the use of swales or other surface water diversion devices should be considered in order to divert water away from and not across the site during construction. Upon completion of construction, the site should be graded to rapidly remove surface water away from the building structure.

The proposed construction area must be cleared and grubbed per Sub-section 201.03.1.2 of the Mississippi Standard Specifications for Road and Bridge Construction, 2017 Edition. Stripping should be carried to a depth where all organic containing soils have been removed. Soils containing these objectionable materials should not be used for backfill. Any topsoil encountered within the construction limits should be stripped and could be stockpiled for landscaping purposes.

Site preparation for this project should also include the relocation of any existing underground utilities and the removal of all existing curbs, gutters, and asphalt or concrete pavements or other obstructions. Any obstructions encountered from previous construction on the property must be removed from the site.

Effective drainage should be established throughout the site preparation and construction process. This is particularly important if any aspects of construction are attempted during wet periods.

FOUNDATION RECOMMENDATIONS

BUILDINGS

Based on the available information and the results of this geotechnical investigation, the use of a monolithic, steel reinforced slab-on-grade with continuous perimeter and interior footings is suitable provided the loads are relatively light and some differential movements can be tolerated. All slabs supporting the buildings on the site should have a minimum thickness of 5 inches.

Proof Rolling

After achieving finished subgrade elevation in cut areas and prior to placing fill materials in any areas that are currently below finished subgrade elevation, the exposed subgrade should be evaluated to confirm that all soft, yielding and unsuitable materials have been removed.

Proof rolling should be performed with a loaded tandem-axle dump truck or other vehicle with a total weight of at least 25 tons. Proof rolling will aid in determining the presence of unstable materials that were not identified during the field investigation. Any areas, which are soft or pump during proof rolling should be overexcavated and recompacted with suitable select fill materials.

Select Fill Materials, Placement and Compaction

Fill used to bring the site to grade should be either a low plasticity Silty Clay (CL) or Clayey Silt (ML) fine-grained soils meeting the requirements for Class B6-10 borrow material (plasticity index, PI, between 10 and 25) with at least 50% passing the #200 sieve. This material should meet all requirements of Section 703.21 of the Standard Specifications for borrow material. The near-surface on-site soils appear to be generally suitable for use as structural fill provided they are placed at the proper moisture content and meet minimum density requirements.

All materials excavated from the building area which are unsuitable for use as select fill material should be removed and disposed of off- site. Prior to placing fill, the native clayey silt subgrade soils should be lightly scarified and compacted to at least 98% of the standard Proctor maximum dry density at a moisture content between -2% of optimum to +3% of optimum within the upper 8 inches.

After subgrade preparation and observation have been completed, fill placement may begin. The fill should be placed and graded to provide a uniform thickness not exceeding 8-inch loose lifts per Section 203 of the Standard Specifications. The surface of each preceding, compacted lift should be scarified to ensure adequate bonding between lifts. Field density tests should be completed in each lift of the fill material to provide assurance that adequate and uniform densities are being obtained. At least one field density test should be performed by the Department or Department's representative for every 800 square feet of lift surface area (minimum one density test per lift regardless of lift surface area). During compaction, the moisture content of the soil should be maintained within plus 3% or minus 2% of the optimum moisture content as determined by the Standard Effort laboratory compaction test (AASHTO T 99). Each lift should be compacted to achieve a minimum of 98% of the Standard Effort maximum dry density with stability present. Stability is defined as the absence of pumping or rutting under the load of heavy construction equipment or a loaded dump truck.

Continuous Footings

Continuous footings supported on compacted fill may be designed for a maximum allowable bearing pressure of 2,740 pounds per square foot based on dead load plus design live load considerations. For lateral resistance against sliding, a friction coefficient of 0.38 may be used at the soil-foundation interface.

All interior footings should have a minimum width of 12 inches, and should bear entirely in compacted select fill material. Perimeter footings should have a minimum width of at least 14 inches and should bear at least 24 inches below adjacent surface grades. Footings should be formed by placing compacted select fill material to underslab grade elevation and then trenching the beams with a power trencher or similar equipment. This method adds support to the slab and helps it resist deflections by effectively reducing the potential expansion of the underlying soils. If soft or loose soils are encountered at the design bearing level, they should be undercut to stiff or dense soils and the excavation back-filled with concrete.

Foundation Construction

Footing excavations should be observed and approved with concrete placed as quickly as possible after to avoid exposure of the footing bottoms to wetting and drying. Surface run-off water should be drained away from the excavations and not be allowed to pond.

The foundation concrete should be placed during the same day the excavation is made. Slabs-on-grade should be stiffened utilizing interior continuous footings spaced not more than 30 feet on center in each direction. These interior footings should extend at least 18 inches below the bottom of the slab, and together with perimeter footings should be reinforced for both positive and negative bending. As mentioned previously, floor slabs should be steel-reinforced and can be designed based on a modulus of subgrade reaction (k_s) of 225 pci when bearing on properly compacted select fill material.

Uniform compaction of fill materials is critical to reduce total and differential settlement. If the site is prepared as recommended, total movements of the slab should not exceed 1 inch. It is recommended that a 3/8 inch catalytically blown or sprayed asphalt membrane be installed prior to placing slab concrete. The waterproofing should be placed to provide a continuous sheet under the entire slab.

Isolated Spread Footings

Spread footings, if necessary to carry isolated column loads, should be properly dimensioned using a net allowable bearing capacity of 3,040 pounds per square foot for compacted fill materials and should bear at the depth required to adequately satisfy the design compression and uplift loading conditions. The uplift capacity of an individual spread footing should be taken as equal to the weight of the concrete in the footing and pedestal plus the weight of the backfill soils lying directly over the footing.

The weight of the concrete should be taken as 150 pounds per cubic foot and the weight of the backfill soils should be taken as 115 pounds per cubic foot provided that the soils are adequately compacted as per the Specifications.

When the weight of the backfill soils is added to the weight of the concrete footing and pedestal, and then divided by the uplift force, the resulting factor of safety against uplift for the footing should exceed 1.3. The final dimensions of the footing and footing reinforcement should satisfy both the requirements for the compressive and uplift capacities of the spread footing.

Differential Movements

Even when designed with adequate safety factors against bearing capacity failure, foundation and floor slab movements can occur. Settlements can result from immediate deflection upon load application and consolidation over extended periods of time in response to stress increase.

Both uplift and downward foundation movement can occur due to the swelling and shrinkage of plastic soils as the moisture content of the soils increase and decrease, respectively. With properly designed and constructed earthwork and foundations, the total movement of this structure could be on the order of about 1 inch with differential movements estimated to be about 1/2 inch.

PAVEMENTS

Driveway and Parking Areas

Driveway and parking areas will be constructed along the perimeter of the administration building. Concrete paving may be constructed to provide truck access to portions of the lot. Concrete paving should be used for the dumpster pad(s). Soil conditions at the location of these parking areas were investigated. Clayey Silts (ML) were encountered in all of the borings completed within the portions of the lot accessible by vehicle.

The subgrade should be prepared according to the recommendations provided earlier in the report, and select fill material should be used to bring the area to subgrade elevation. However, prior to placement of pavement, the subgrades to be paved should be lime treated and compacted to at least 95% of maximum standard Proctor dry density. The top 6 inches of the pavement subgrade should be lime treated with 5 percent hydrated lime by dry weight of soil. The lime stabilized subgrade layer should be constructed according to Section 307 of the Standard Specifications. If the subgrade soils are prepared and select fill materials are placed according to Section 203 of the Standard Specifications, a design subgrade CBR value of 8 is appropriate for flexible pavement design.

For portions of the lot accessible to moderate to heavy trucks we recommend a minimum of 8 inches of full depth flexible asphalt pavement. The top 2 inches should be asphalt wearing course with 6 inches of asphalt base. For the parking areas which should support mainly automobile and light truck traffic, we recommend 6 1/2 inches of full depth asphalt including a 1 1/2 inch wearing course. Asphalt base materials should be angular crushed aggregate meeting MDOT Red Book specifications. These materials should be placed in 8-inch loose lifts, moisture-conditioned as necessary, and compacted to a minimum 95 percent of maximum standard Proctor dry density.

Concrete Pavement Slab for Heavy Truck Access and Dumpster Pad(s)

Concrete slabs instead of asphalt paving may be used in areas which must accommodate heavy truck loading. A typical design for the anticipated loads applied to these slabs would consist of a minimum 9-inch thick concrete slab with a mat of reinforcing steel. Reinforcement should consist of No. 4 bars spaced at 12 inches on center in both directions having a minimum cover of 2 inches. Tooled contraction joints should be provided at intervals that will provide a slab size that does not exceed 20 feet by 20 feet. Expansion joints should not be placed in these pads unless they are required where the slabs directly abut the building or other fixed structure.

Secondary Design Considerations

The following recommendations should be incorporated into the plans and specifications and should improve the performance of the structures constructed on the site:

1. Prior to construction, the area to be covered by buildings should be prepared so that water will not pond beneath or around the buildings after periods of rainfall. In addition, water should not be allowed to pond on or around pavements. Paved areas and the general ground surface should be sloped away from buildings on all sides so that water will always drain away from the structures.
2. Water should not be allowed to pond near buildings after the floor slabs and foundations have been constructed. Sidewalks should not be structurally connected to buildings.
3. They should be graded away from buildings so that water will drain away from structures. Irrigation systems should not be located where water will be sprayed onto building walls and subsequently drain downward and flow into the soils beneath foundations. Roof drainage should be collected and transmitted by pipe to a storm drainage system or to an area where the water can drain down-slope away from buildings and pavements.
4. Backfill for utility lines that are located in pavement, sidewalk and building areas should consist of on-site fill. The backfill should be placed and compacted as described in the **Site Preparation and Select Fill Materials** section of this report in accordance with the Red Book.
5. Lesser lift thicknesses may be required to obtain adequate compaction. Care should be exercised to make sure that ditches for utility lines do not serve as conduits that transmit water beneath structures or pavements. The top of the ditch should be sealed to inhibit the inflow of surface water during periods of rainfall.
6. Utilities that project through slab-on-grade floors should be designed with some degree of flexibility and/or with a sleeve to reduce the potential for damage to the utilities should movement occur.
7. Flower beds and planting areas should not be constructed along building perimeters. Constructing sidewalks or pavements adjacent to buildings are preferable. If required, flower beds and planting areas could be constructed beyond the sidewalks away from the buildings. If it is desired to have flower beds and planting areas adjacent to a building, the use of above grade concrete box planters, or other methods to reduce variations in moisture content of soils adjacent to or below structures should be considered.
8. Trees and large shrubs in general should not be planted closer to a structure than the mature height of the tree to prevent roots beneath the structure. This can cause detrimental changes in subgrade moisture and/or structural distress.

STATE	PROJECT NO.
MISS.	
MISS.	

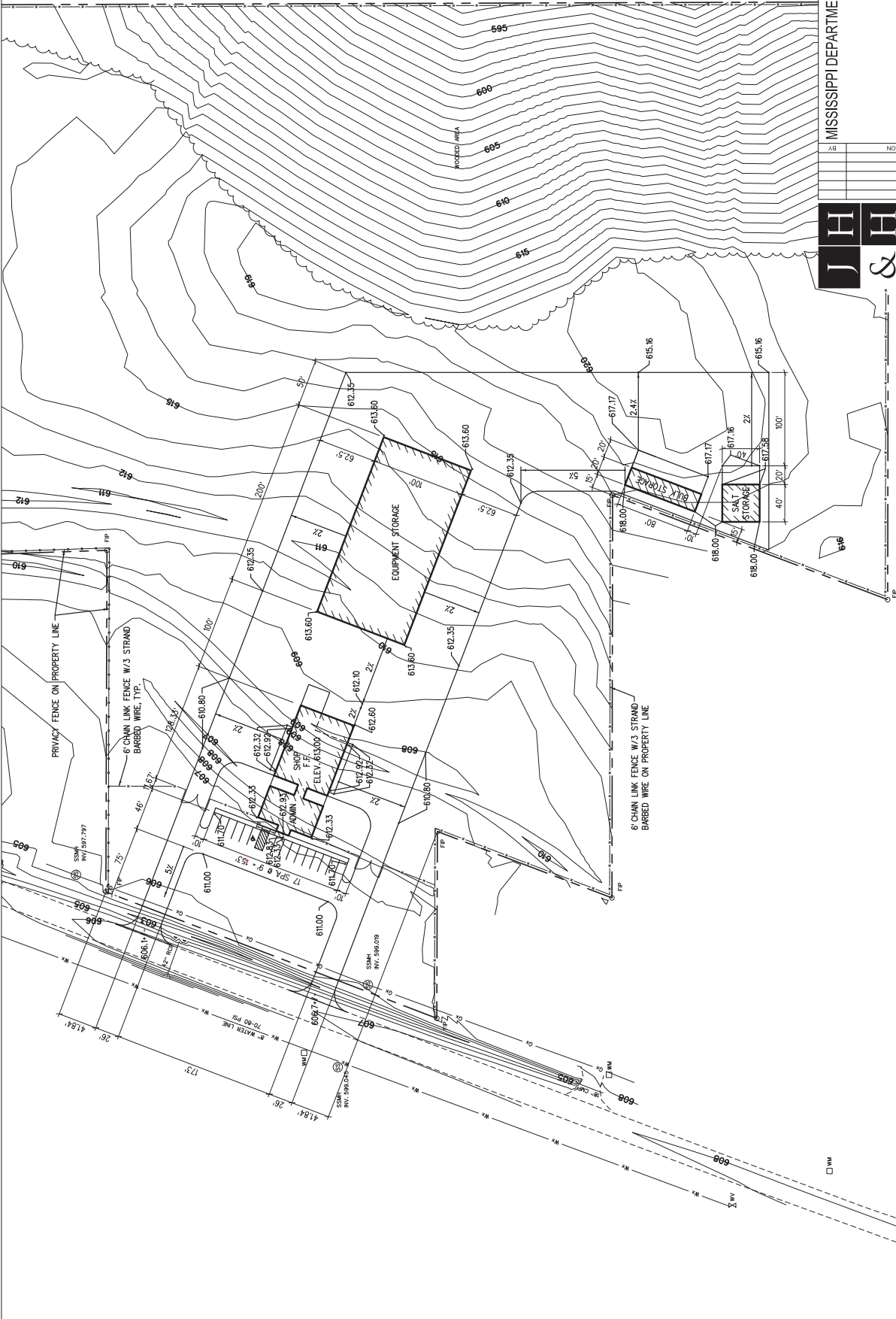


PLATE 1

MISSISSIPPI DEPARTMENT OF TRANSPORTATION



a professional corporation
 Franco Baglieri, Lewis Wood
 © 2016
JH&H Architects
 Planners, Interiors P.A.
 1000 Highway 90
 Frenock, MS 39232-9533
 P: 601.748.4611 F: 601.355.6000

PROJ. NO.
 COUNTY:

DATE	DESIGN TEAM	ISSN	CHECKED	ISSN	DATE	3/25/16
REVISION						
BY						

WORKING NUMBER
 SHEET NUMBER

STATE PROJECT NO.
MISS.

FOR PRINT SCALE VERIFICATION, THIS LINE IS 4" LONG

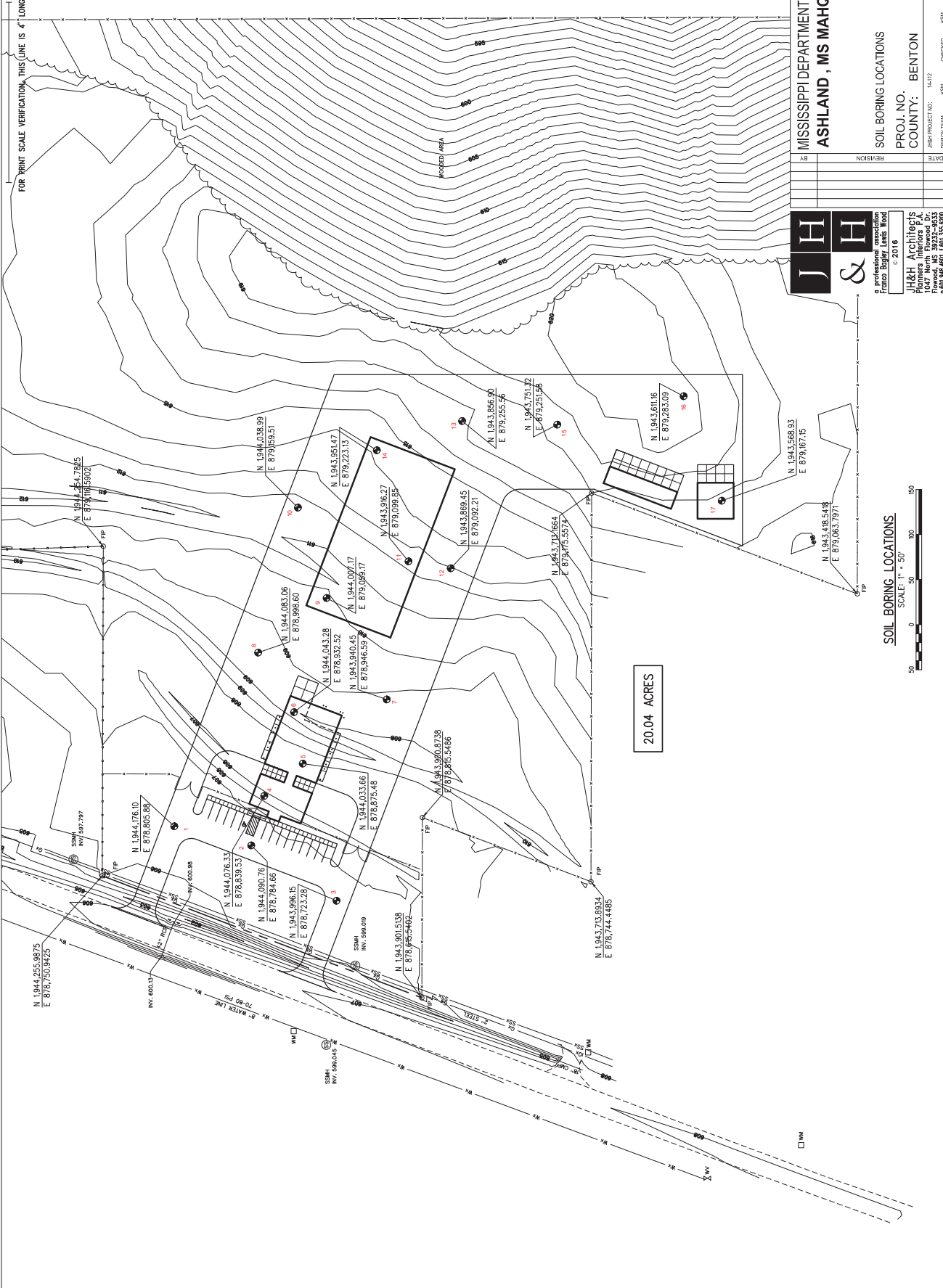


PLATE 2

MISSISSIPPI DEPARTMENT OF TRANSPORTATION
ASHLAND, MS MAHQ

SOIL BORING LOCATIONS
PROJ. NO.
COUNTY: BENTON



a professional association
Francis B. Jagger, Lewis Wood
© 2016
JH&H Architects
Planners, Interiors P.A.
Firmwood, MS 39232-9533
P.601.948.4681 F.601.356.6000

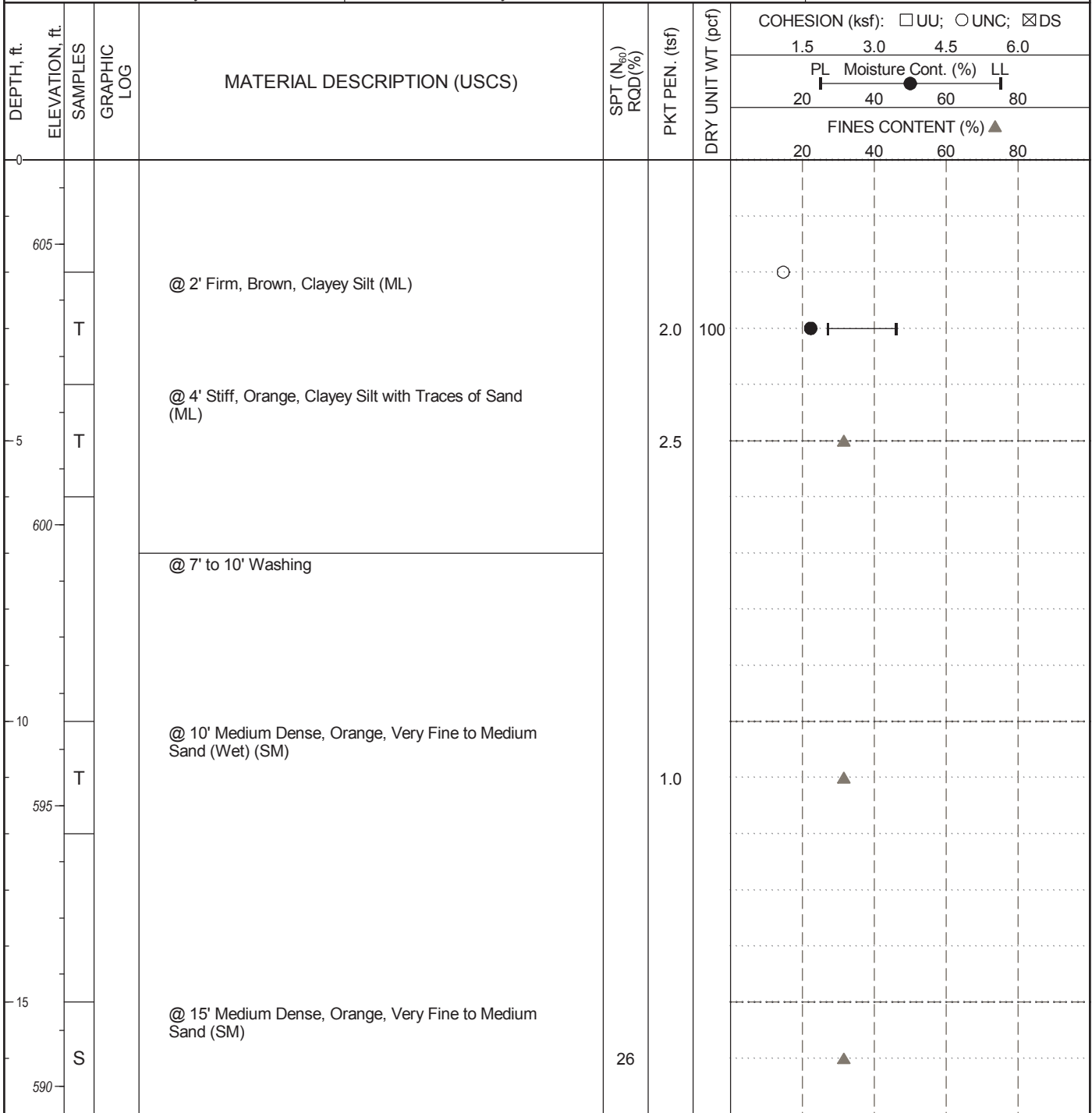
SOIL BORING LOCATIONS
SCALE: 1" = 50'



20.04 ACRES

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SITE NO.: 17-5-2001	HOLE NO.: 1	FMS P.E. No.: 502966/101000	REPORT NO.:
COUNTY: Benton	LATITUDE: N31.8786045°	LONGITUDE: W85.7415385°	COMPLETION DATE: 2/1/2017
LOCATION: Proposed MDOT Facility on SR 5 in Ashland, MS			WATER TABLE ELEV: N/A
STATION:	OFFSET:	COMPLETION DEPTH: 17'	
BORING TYPE: Rotary Wash		LOGGED BY: Cory Clark	SURFACE ELEVATION: 606.5'

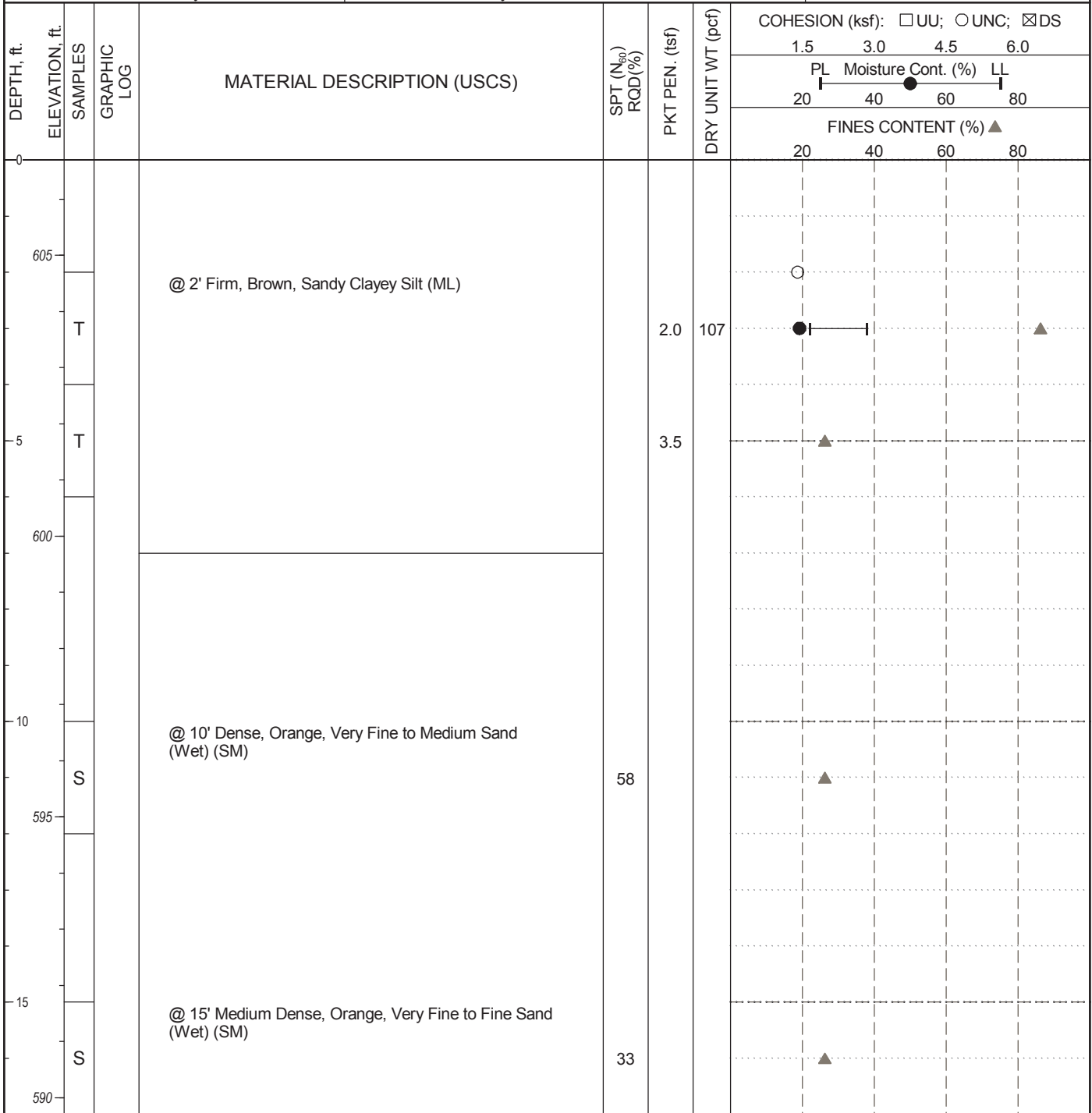


TOTAL DEPTH OF BORING - 17.0'

NOTE: A HYDRAULIC AUTOMATIC TRIP HAMMER WAS USED TO DETERMINE SPT N-VALUES. THE N-VALUES SHOWN REPRESENT N₆₀ VALUES.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SITE NO.: 17-5-2001	HOLE NO.: 2	FMS P.E. No.: 502966/101000	REPORT NO.:
COUNTY: Benton	LATITUDE: N31.8786112°	LONGITUDE: W85.7418156°	COMPLETION DATE: 2/1/2017
LOCATION: Proposed MDOT Facility on SR 5 in Ashland, MS			WATER TABLE ELEV: N/A
STATION:	OFFSET:	COMPLETION DEPTH: 17'	
BORING TYPE: Rotary Wash		LOGGED BY: Cory Clark	SURFACE ELEVATION: 606.7'

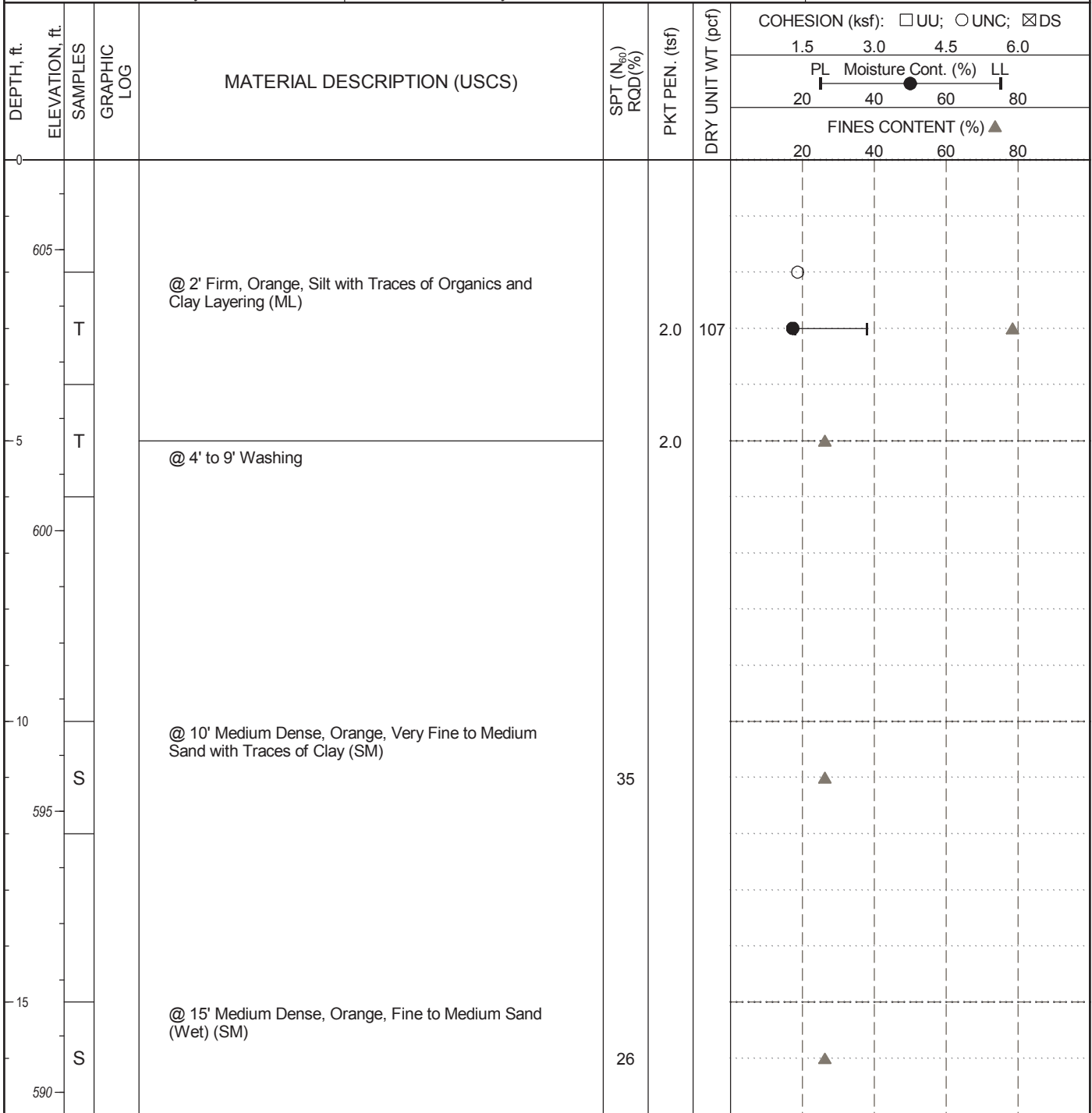


TOTAL DEPTH OF BORING - 17.0'

NOTE: A HYDRAULIC AUTOMATIC TRIP HAMMER WAS USED TO DETERMINE SPT N-VALUES. THE N-VALUES SHOWN REPRESENT N₆₀ VALUES.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SITE NO.: 17-5-2001	HOLE NO.: 3	FMS P.E. No.: 502966/101000	REPORT NO.:
COUNTY: Benton	LATITUDE: N31.8783919°	LONGITUDE: W85.7421275°	COMPLETION DATE: 2/1/2017
LOCATION: Proposed MDOT Facility on SR 5 in Ashland, MS			WATER TABLE ELEV: N/A
STATION:	OFFSET:	COMPLETION DEPTH: 17'	
BORING TYPE: Rotary Wash		LOGGED BY: Cory Clark	SURFACE ELEVATION: 606.6'

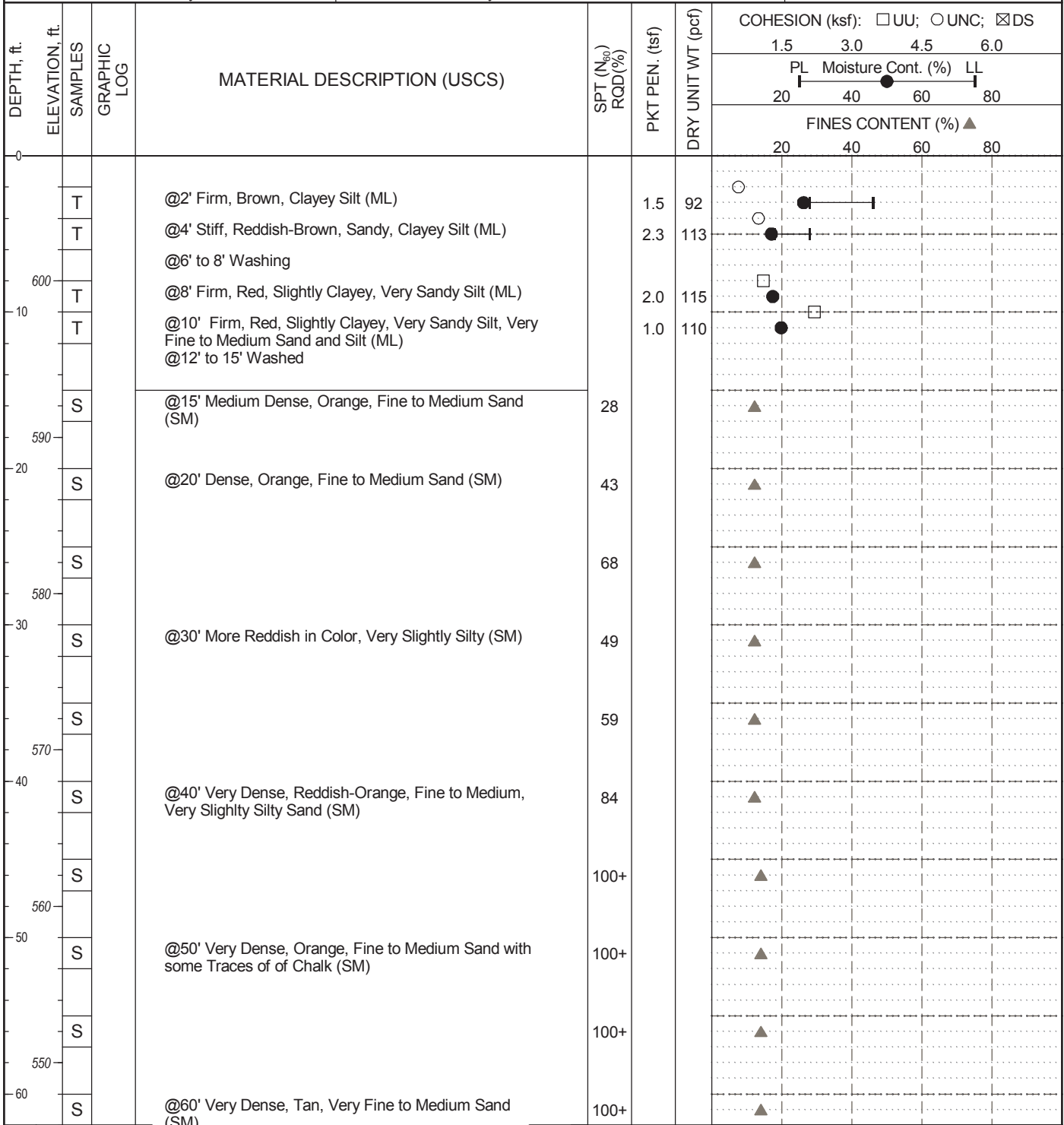


TOTAL DEPTH OF BORING - 17.0'

NOTE: A HYDRAULIC AUTOMATIC TRIP HAMMER WAS USED TO DETERMINE SPT N-VALUES. THE N-VALUES SHOWN REPRESENT N₆₀ VALUES.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SITE NO.: 17-5-2001	HOLE NO.: 4	FMS P.E. No.: 502966/101000	REPORT NO.:
COUNTY: Benton	LATITUDE: N31.8787047°	LONGITUDE: W85.748589°	COMPLETION DATE: 2/7/2017
LOCATION: Proposed MDOT Facility on SR 5 in Ashland, MS			WATER TABLE ELEV: N/A
STATION:	OFFSET:	COMPLETION DEPTH: 62'	
BORING TYPE: Rotary Wash		LOGGED BY: Cory Clark	SURFACE ELEVATION: 608'

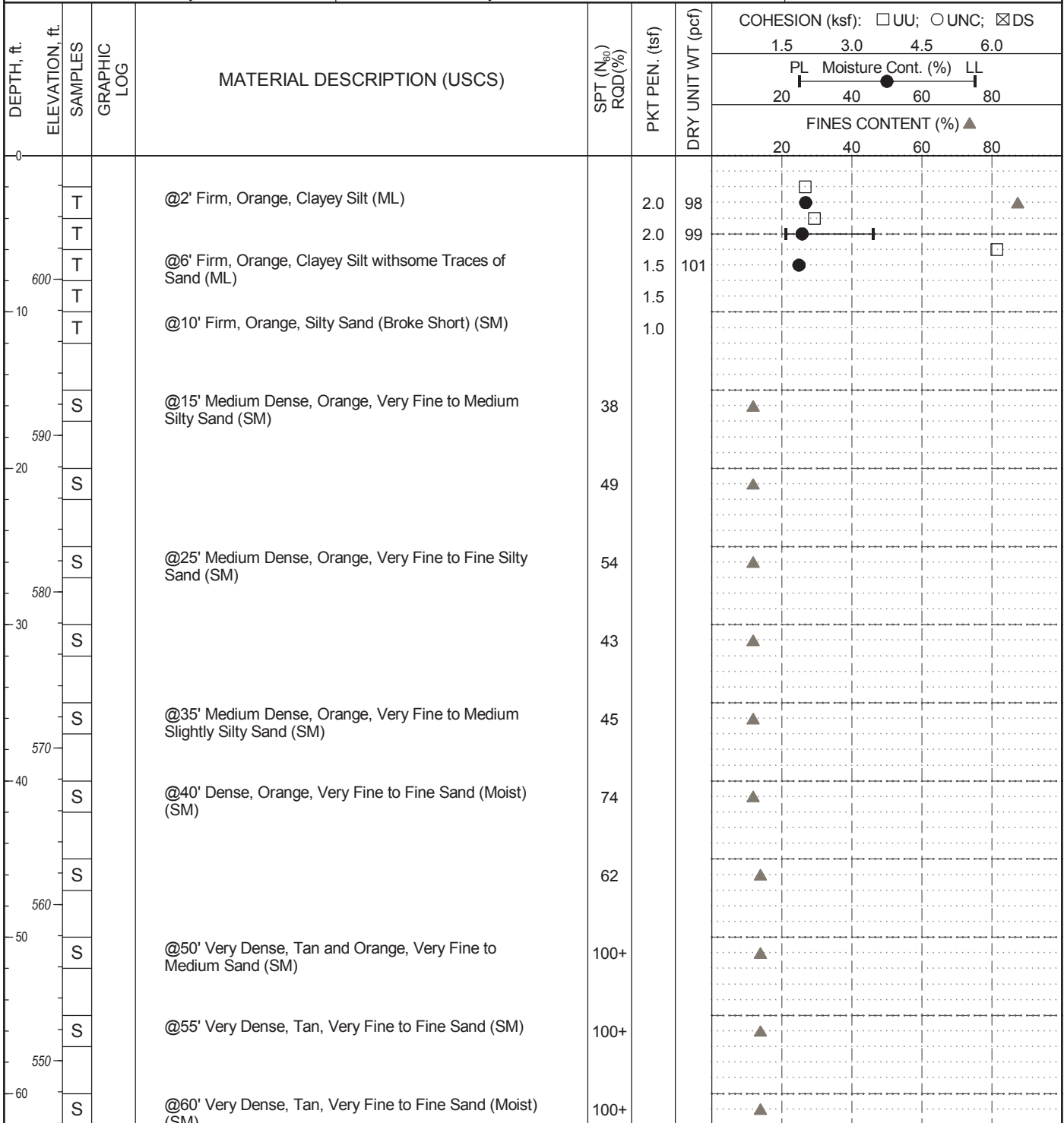


TOTAL DEPTH OF BORING - 62.0'

NOTE: A HYDRAULIC AUTOMATIC TRIP HAMMER WAS USED TO DETERMINE SPT N-VALUES. THE N-VALUES SHOWN REPRESENT N₆₀ VALUES.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SITE NO.: 17-5-2001	HOLE NO.: 5	FMS P.E. No.: 502966/101000	REPORT NO.:
COUNTY: Benton	LATITUDE: N31.8788067°	LONGITUDE: W85.7419929°	COMPLETION DATE: 2/8/2017
LOCATION: Proposed MDOT Facility on SR 5 in Ashland, MS			WATER TABLE ELEV: N/A
STATION:	OFFSET:	COMPLETION DEPTH: 62'	
BORING TYPE: Rotary Wash		LOGGED BY: Cory Clark	SURFACE ELEVATION: 607.9'



TOTAL DEPTH OF BORING - 62.0'

NOTE: A HYDRAULIC AUTOMATIC TRIP HAMMER WAS USED TO DETERMINE SPT N-VALUES. THE N-VALUES SHOWN REPRESENT N₆₀ VALUES.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SITE NO.: 17-5-2001	HOLE NO.: 6	FMS P.E. No.: 502966/101000	REPORT NO.:
COUNTY: Benton	LATITUDE: N31.8789625°	LONGITUDE: W85.7419567°	COMPLETION DATE: 2/8/2017
LOCATION: Proposed MDOT Facility on SR 5 in Ashland, MS			WATER TABLE ELEV: N/A
STATION:	OFFSET:	COMPLETION DEPTH: 62'	
BORING TYPE: Rotary Wash		LOGGED BY: Cory Clark	SURFACE ELEVATION: 608.5'

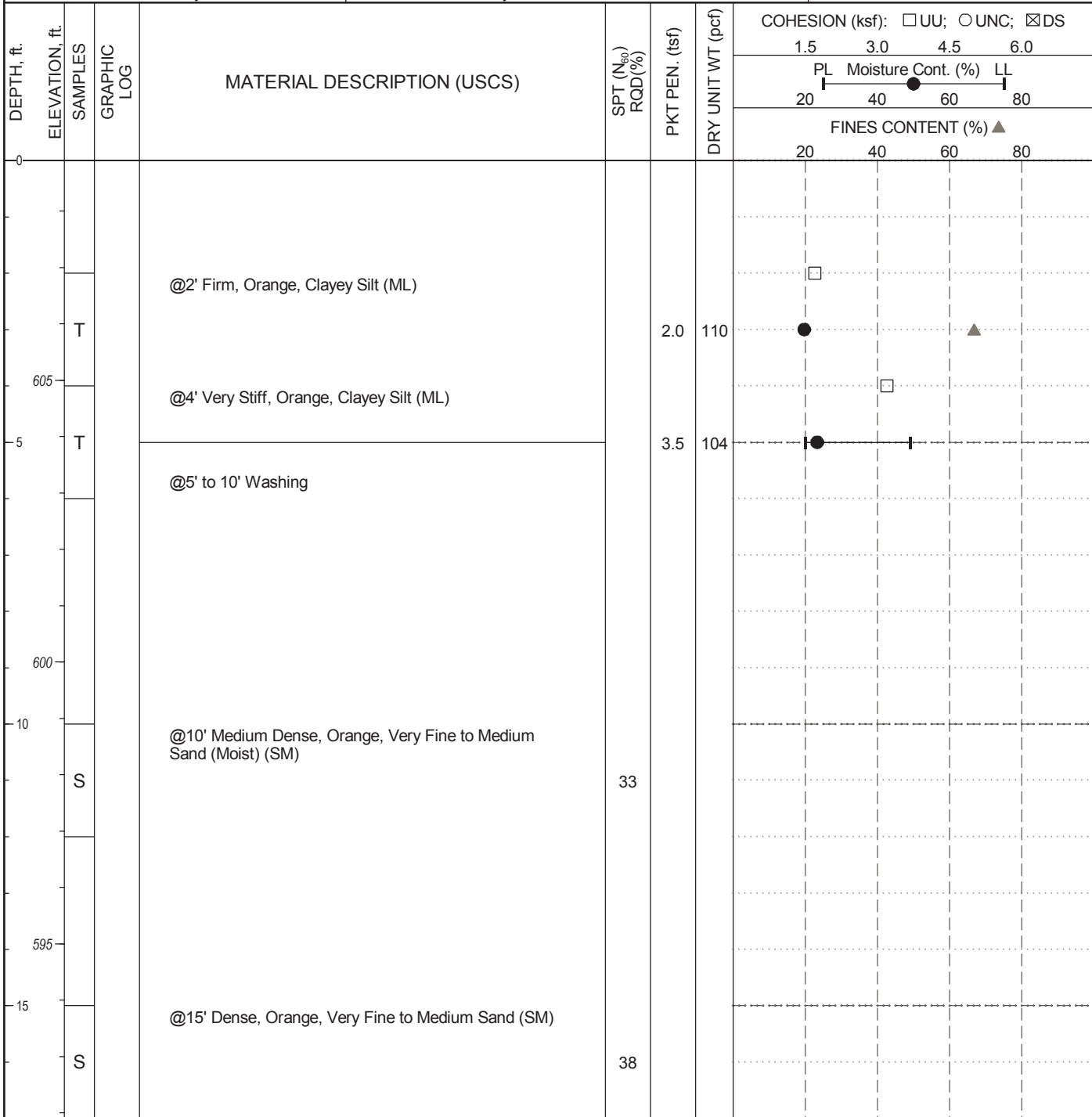
DEPTH, ft.	ELEVATION, ft.	SAMPLES GRAPHIC LOG	MATERIAL DESCRIPTION (USCS)	SPT (N ₆₀) RQD(%)	PKT PEN. (tsf)	DRY UNIT WT (pcf)	COHESION (ksf): <input type="checkbox"/> UU; <input type="checkbox"/> UNC; <input checked="" type="checkbox"/> DS						
							1.5	3.0	4.5	6.0			
							PL Moisture Cont. (%) LL						
							20	40	60	80			
							FINES CONTENT (%) ▲						
							20	40	60	80			
0		T	@2' Firm, Brown, Silty Clay (ML)		2.0								
		T			2.0								
		T	@6' Stiff, Orange, Silty Clay (ML)		3.0								
600		T	@8' Stiff, Orange, Clayey Sandy Silt (Broke Short) (ML)		2.5								
10		S	@10' Very Loose, Orange, Fine to Medium Clayey Sand (SM)	WOH									
		S			41								
590		S											
20		S	@20' Dense, Orange, Very Fine to Medium Sand (SM)		56								
		S			83								
580		S											
30		S	@30' Medium Dense, Orange, Very Fine to Medium Silty Sand (SM)		29								
		S			35								
570		S	@35' Medium Dense, Reddish-Orange, Fine to Medium Sand (SM)										
40		S			68								
		S			88								
560		S											
50		S	@50' Medium Dense, Tan and Orange, Very Fine to Fine Silty Sand with some Clay Layering (SM)		39								
		S			90								
550		S	@55' Dense, Tan, Very Fine to Fine Sand (SM)										
60		S	@60' Medium Dense, Very Fine to Medium Sand (SM)		47								

TOTAL DEPTH OF BORING - 62.0'

NOTE: A HYDRAULIC AUTOMATIC TRIP HAMMER WAS USED TO DETERMINE SPT N-VALUES. THE N-VALUES SHOWN REPRESENT N₆₀ VALUES.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SITE NO.: 17-5-2001	HOLE NO.: 7	FMS P.E. No.: 502966/101000	REPORT NO.:
COUNTY: Benton	LATITUDE: N31.8790092°	LONGITUDE: W85.7422862°	COMPLETION DATE: 2/8/2017
LOCATION: Proposed MDOT Facility on SR 5 in Ashland, MS			WATER TABLE ELEV: N/A
STATION:	OFFSET:	COMPLETION DEPTH: 17'	
BORING TYPE: Rotary Wash		LOGGED BY: Cory Clark	SURFACE ELEVATION: 608.9'

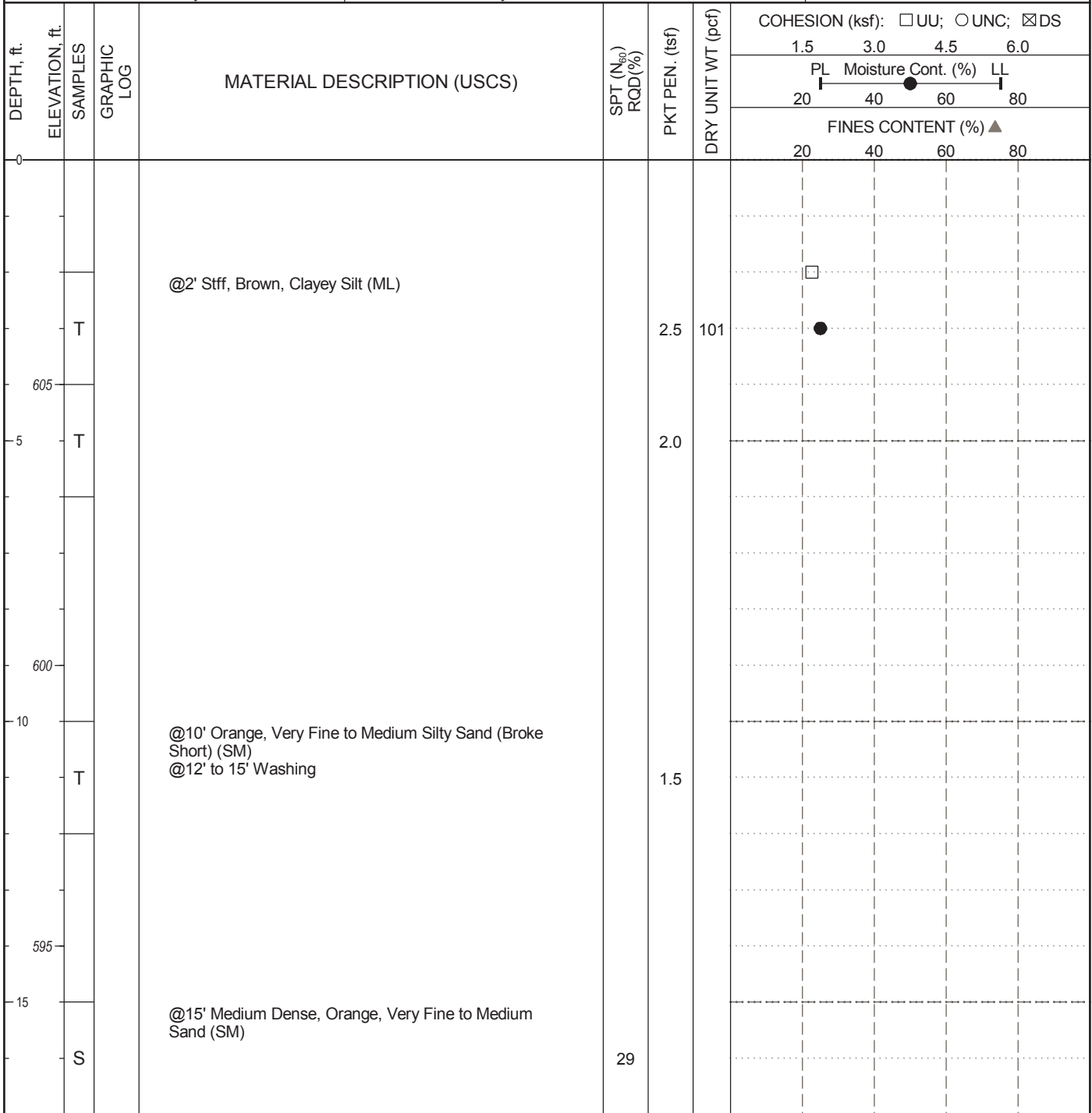


TOTAL DEPTH OF BORING - 17.0'

NOTE: A HYDRAULIC AUTOMATIC TRIP HAMMER WAS USED TO DETERMINE SPT N-VALUES. THE N-VALUES SHOWN REPRESENT N₆₀ VALUES.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SITE NO.: 17-5-2001	HOLE NO.: 8	FMS P.E. No.: 502966/101000	REPORT NO.:
COUNTY: Benton	LATITUDE: N31.8791408°	LONGITUDE: W85.7418227°	COMPLETION DATE: 2/8/2017
LOCATION: Proposed MDOT Facility on SR 5 in Ashland, MS			WATER TABLE ELEV: N/A
STATION:	OFFSET:	COMPLETION DEPTH: 17'	
BORING TYPE: Rotary Wash		LOGGED BY: Cory Clark	SURFACE ELEVATION: 609'

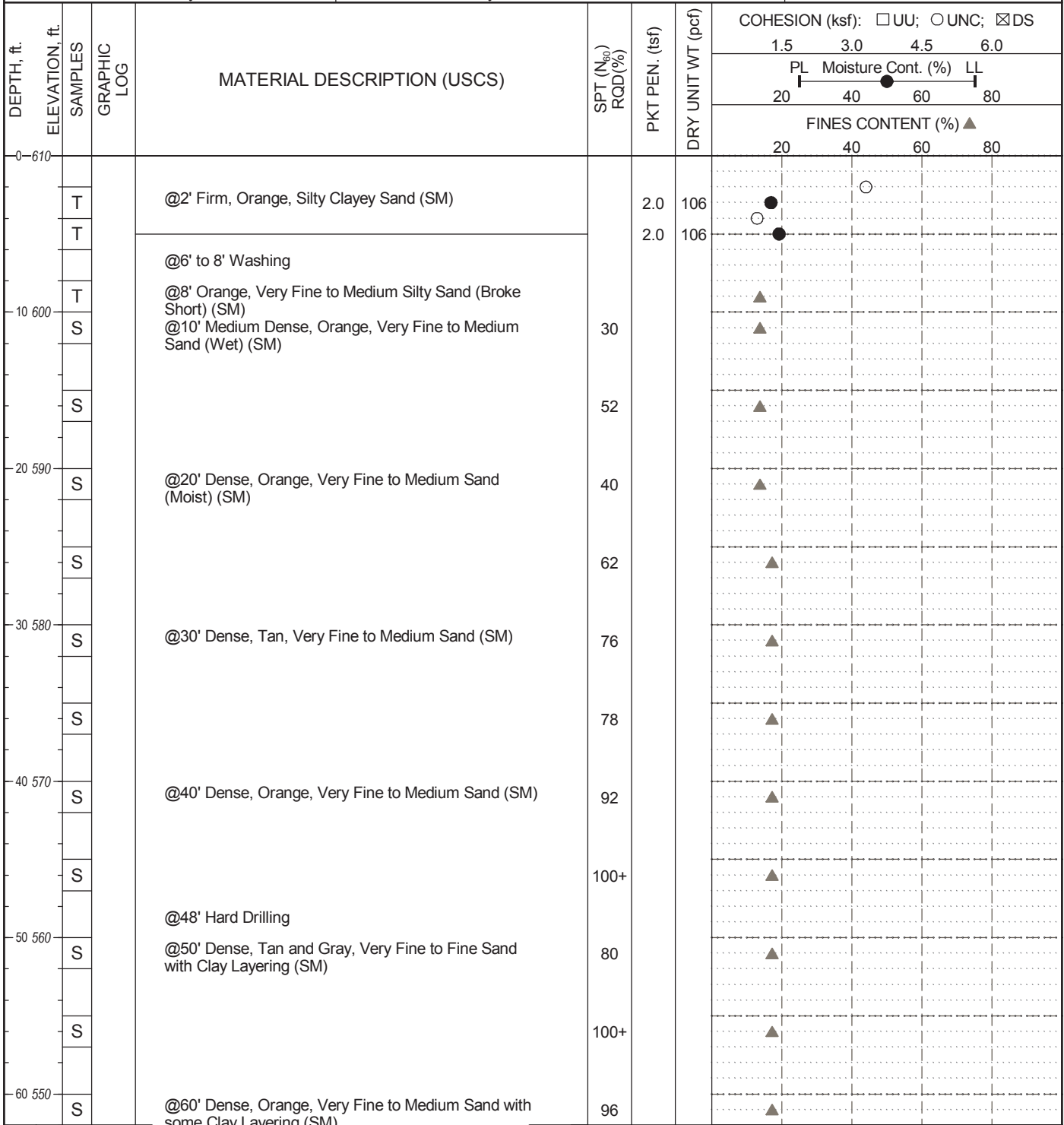


TOTAL DEPTH OF BORING - 17.0'

NOTE: A HYDRAULIC AUTOMATIC TRIP HAMMER WAS USED TO DETERMINE SPT N-VALUES. THE N-VALUES SHOWN REPRESENT N₆₀ VALUES.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SITE NO.: 17-5-2001	HOLE NO.: 9	FMS P.E. No.: 502966/101000	REPORT NO.:
COUNTY: Benton	LATITUDE: N31.879313°	LONGITUDE: W85.7420613°	COMPLETION DATE: 2/14/2017
LOCATION: Proposed MDOT Facility on SR 5 in Ashland, MS			WATER TABLE ELEV: N/A
STATION:	OFFSET:	COMPLETION DEPTH: 62'	
BORING TYPE: Rotary Wash		LOGGED BY: Cory Clark	SURFACE ELEVATION: 610'

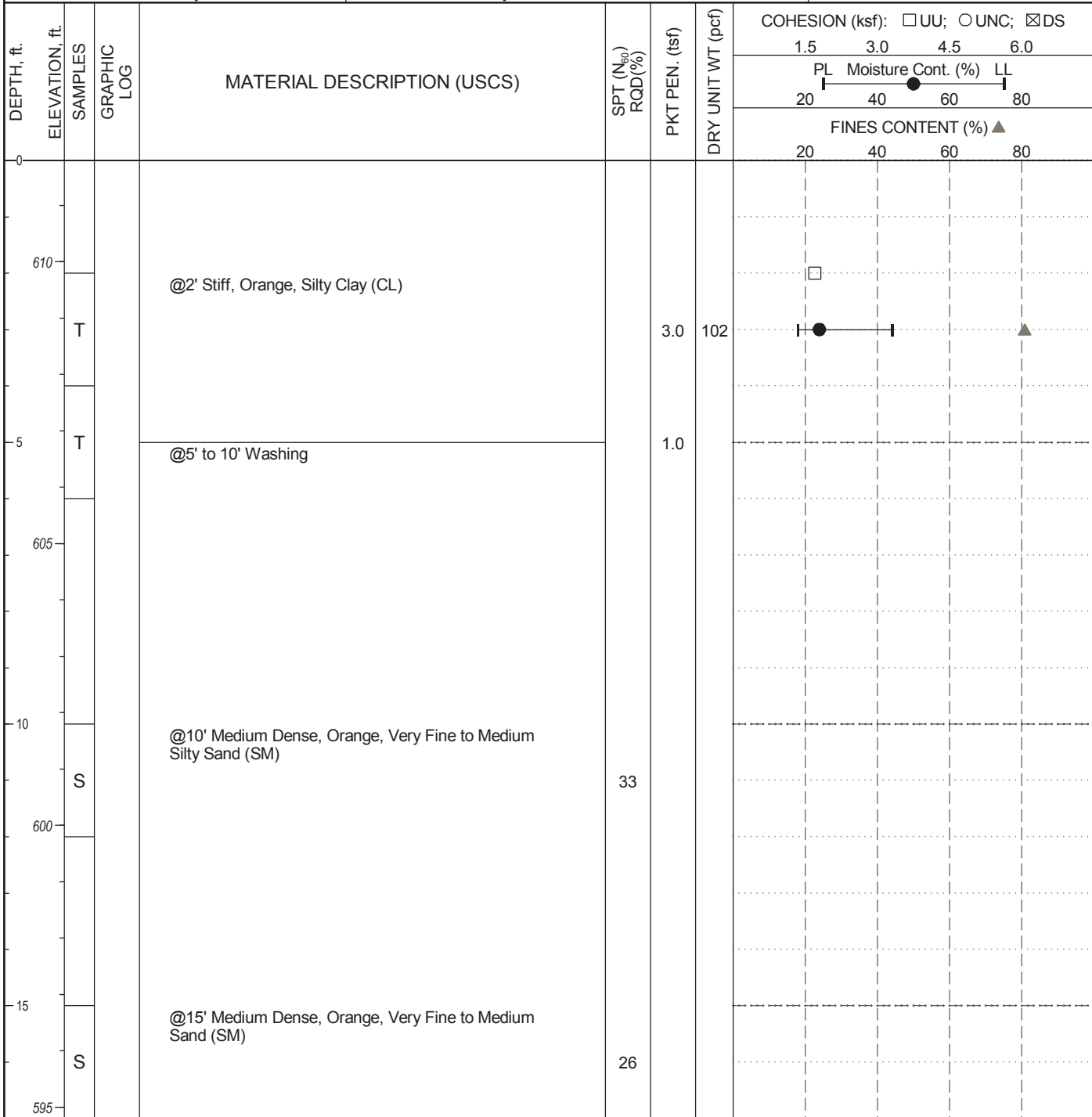


TOTAL DEPTH OF BORING - 62.0'

NOTE: A HYDRAULIC AUTOMATIC TRIP HAMMER WAS USED TO DETERMINE SPT N-VALUES. THE N-VALUES SHOWN REPRESENT N₆₀ VALUES.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SITE NO.: 17-5-2001	HOLE NO.: 10	FMS P.E. No.: 502966/101000	REPORT NO.:
COUNTY: Benton	LATITUDE: N31.8795863°	LONGITUDE: W85.7419661°	COMPLETION DATE: 2/14/2017
LOCATION: Proposed MDOT Facility on SR 5 in Ashland, MS			WATER TABLE ELEV: N/A
STATION:	OFFSET:	COMPLETION DEPTH: 17'	
BORING TYPE: Rotary Wash		LOGGED BY: Cory Clark	SURFACE ELEVATION: 611.8'

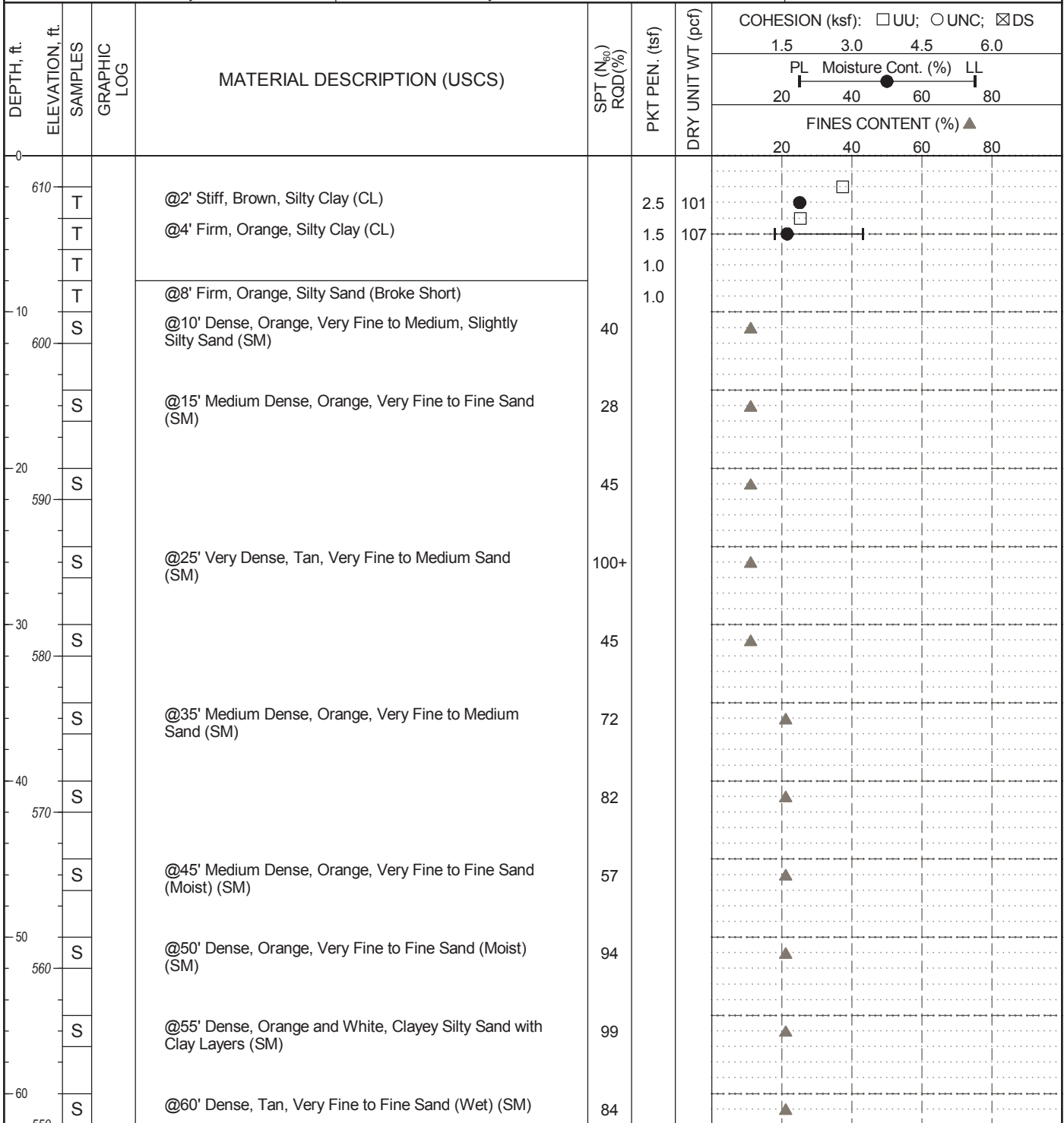


TOTAL DEPTH OF BORING - 17.0'

NOTE: A HYDRAULIC AUTOMATIC TRIP HAMMER WAS USED TO DETERMINE SPT N-VALUES. THE N-VALUES SHOWN REPRESENT N₆₀ VALUES.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SITE NO.: 17-5-2001	HOLE NO.: 11	FMS P.E. No.: 502966/101000	REPORT NO.:
COUNTY: Benton	LATITUDE: N31.8794318°	LONGITUDE: W85.7423499°	COMPLETION DATE: 2/14/2017
LOCATION: Proposed MDOT Facility on SR 5 in Ashland, MS			WATER TABLE ELEV: N/A
STATION:	OFFSET:	COMPLETION DEPTH: 62'	
BORING TYPE: Rotary Wash		LOGGED BY: Cory Clark	SURFACE ELEVATION: 612'



TOTAL DEPTH OF BORING - 62.0'

NOTE: A HYDRAULIC AUTOMATIC TRIP HAMMER WAS USED TO DETERMINE SPT N-VALUES. THE N-VALUES SHOWN REPRESENT N₆₀ VALUES.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SITE NO.: 17-5-2001	HOLE NO.: 12	FMS P.E. No.: 502966/101000	REPORT NO.:
COUNTY: Benton	LATITUDE: N31.8794145°	LONGITUDE: W85.7425013°	COMPLETION DATE: 2/15/2017
LOCATION: Proposed MDOT Facility on SR 5 in Ashland, MS			WATER TABLE ELEV: N/A
STATION:	OFFSET:	COMPLETION DEPTH: 17'	
BORING TYPE: Rotary Wash		LOGGED BY: Cory Clark	SURFACE ELEVATION: 613'

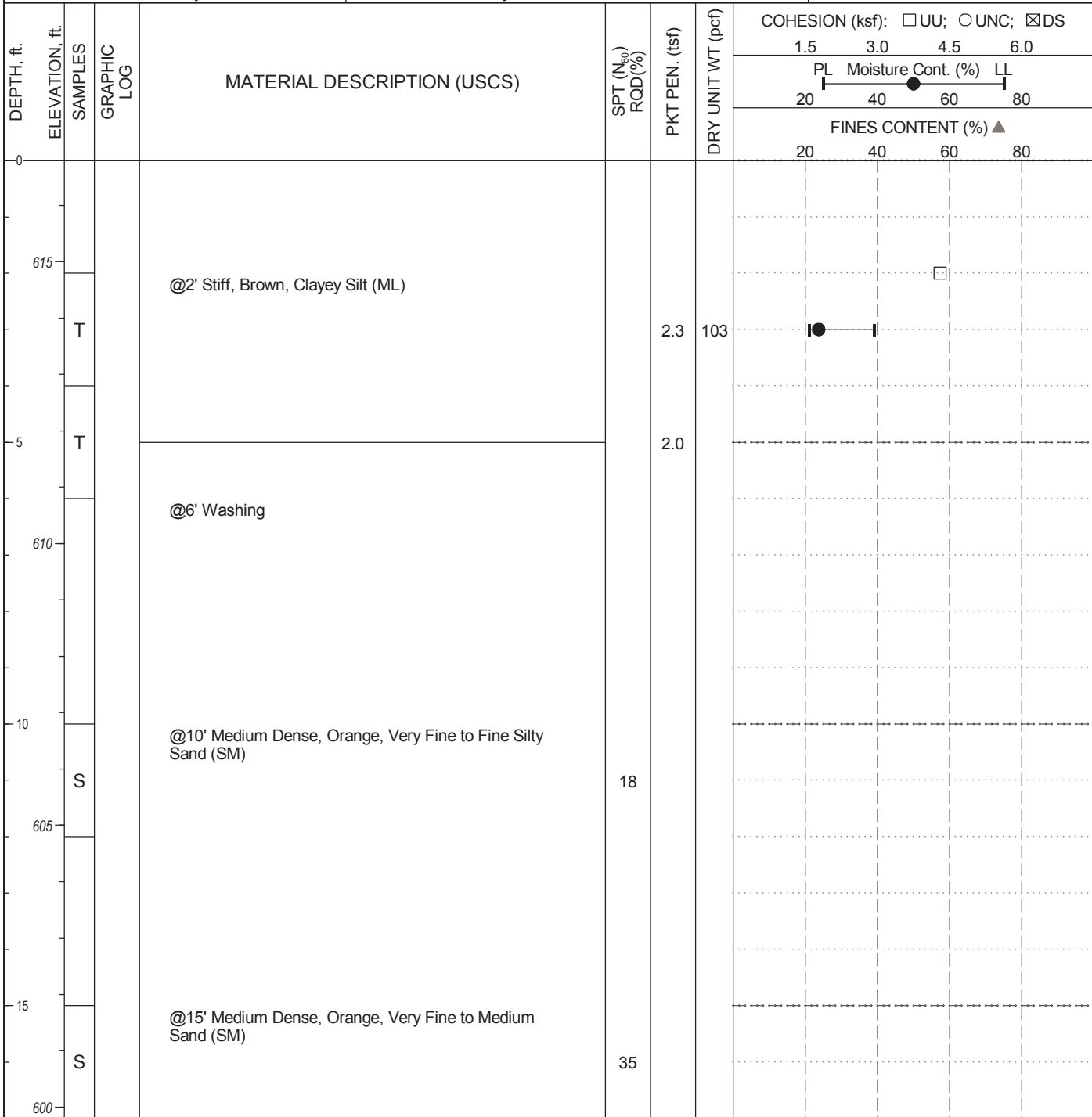
DEPTH, ft.	ELEVATION, ft.	SAMPLES	GRAPHIC LOG	MATERIAL DESCRIPTION (USCS)	SPT (N ₆₀)	RQD (%)	PKT PEN. (tsf)	DRY UNIT WT (pcf)	COHESION (ksf): <input type="checkbox"/> UU; <input type="checkbox"/> UNC; <input checked="" type="checkbox"/> DS					
									1.5	3.0	4.5	6.0		
									PL Moisture Cont. (%) LL					
									20	40	60	80		
									FINES CONTENT (%) ▲					
									20	40	60	80		
0														
610		T		@2' Stiff, Brown, Clayey Silt (ML)			2.5	102						
5		T		@6' Washing			3.0							
605														
10		S		@10' Dense, Orange, Very Fine to Medium Silty Sand (SM)			41							
600														
15		S		@15' Medium Dense, Orange, Very Fine to Fine Sand (SM)			28							
595														

TOTAL DEPTH OF BORING - 17.0'

NOTE: A HYDRAULIC AUTOMATIC TRIP HAMMER WAS USED TO DETERMINE SPT N-VALUES. THE N-VALUES SHOWN REPRESENT N₆₀ VALUES.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SITE NO.: 17-5-2001	HOLE NO.: 13	FMS P.E. No.: 502966/101000	REPORT NO.:
COUNTY: Benton	LATITUDE: N31.8798639°	LONGITUDE: W85.7425266°	COMPLETION DATE: 2/15/2017
LOCATION: Proposed MDOT Facility on SR 5 in Ashland, MS			WATER TABLE ELEV: N/A
STATION:	OFFSET:	COMPLETION DEPTH: 17'	
BORING TYPE: Rotary Wash		LOGGED BY: Cory Clark	SURFACE ELEVATION: 616.8'

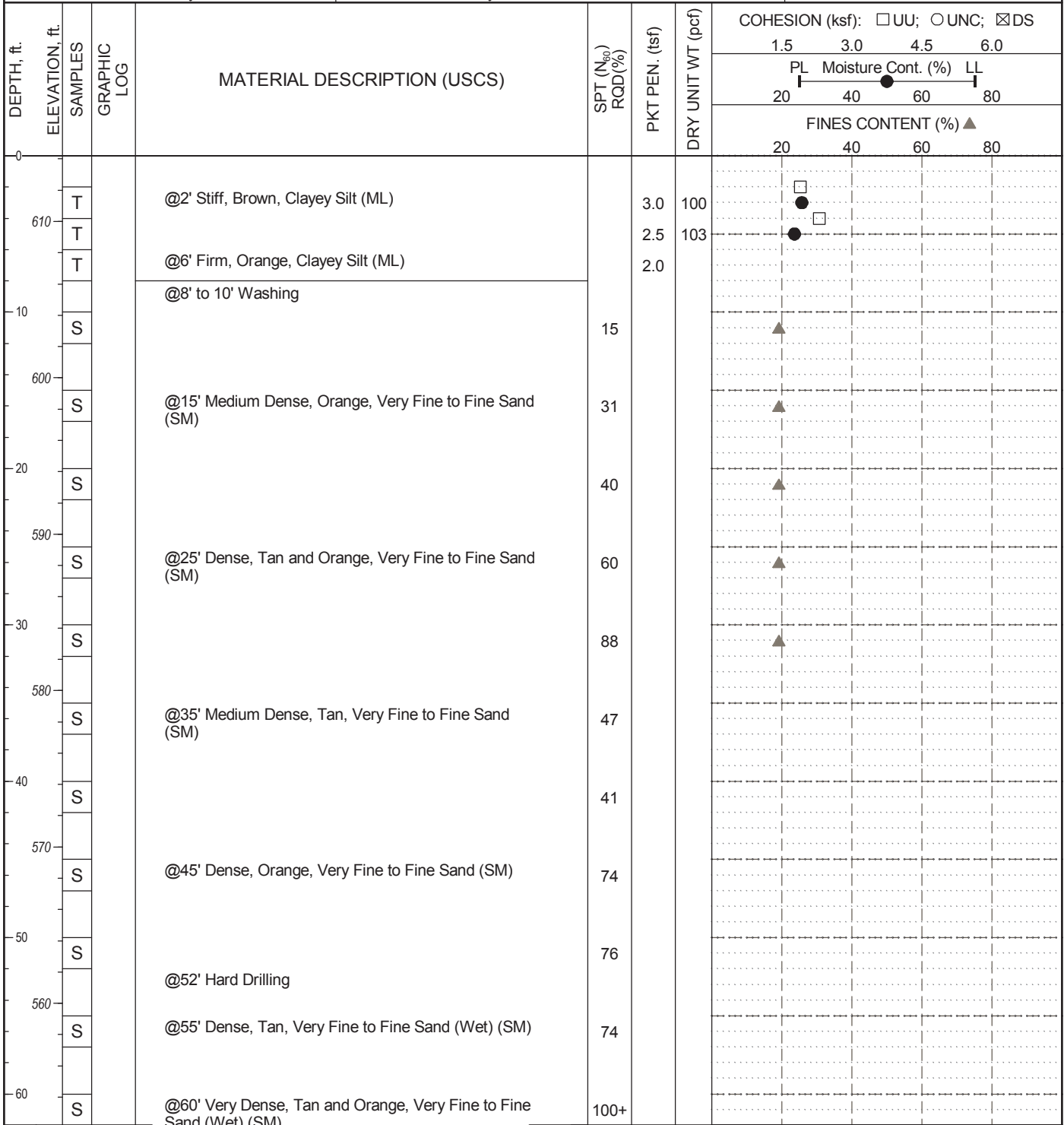


TOTAL DEPTH OF BORING - 17.0'

NOTE: A HYDRAULIC AUTOMATIC TRIP HAMMER WAS USED TO DETERMINE SPT N-VALUES. THE N-VALUES SHOWN REPRESENT N₆₀ VALUES.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SITE NO.: 17-5-2001	HOLE NO.: 14	FMS P.E. No.: 502966/101000	REPORT NO.:
COUNTY: Benton	LATITUDE: N31.8797696°	LONGITUDE: W85.7422253°	COMPLETION DATE: 2/15/2017
LOCATION: Proposed MDOT Facility on SR 5 in Ashland, MS			WATER TABLE ELEV: N/A
STATION:	OFFSET:	COMPLETION DEPTH: 62'	
BORING TYPE: Rotary Wash		LOGGED BY: Cory Clark	SURFACE ELEVATION: 614.2'

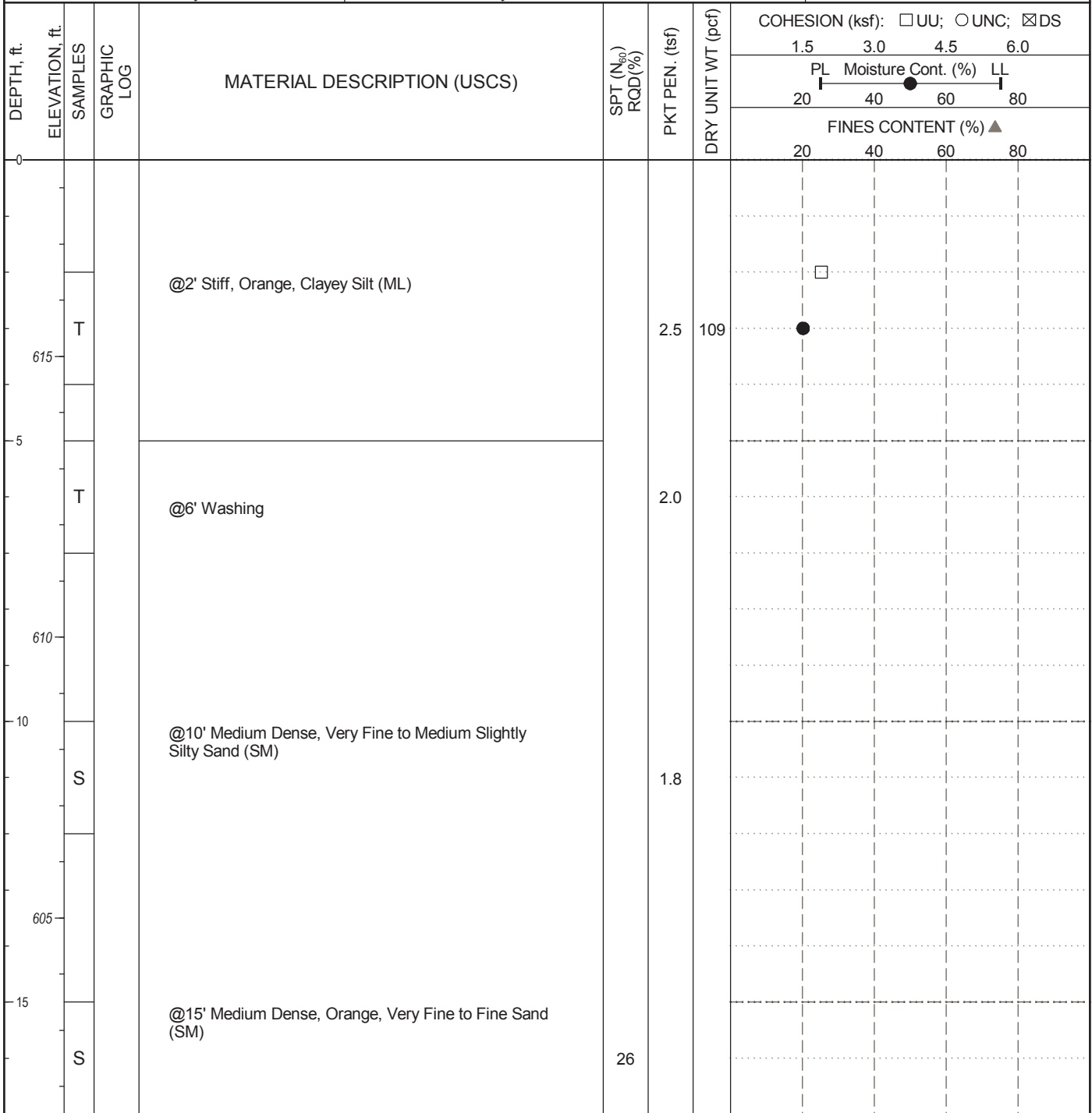


TOTAL DEPTH OF BORING - 62.0'

NOTE: A HYDRAULIC AUTOMATIC TRIP HAMMER WAS USED TO DETERMINE SPT N-VALUES. THE N-VALUES SHOWN REPRESENT N₆₀ VALUES.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SITE NO.: 17-5-2001	HOLE NO.: 15	FMS P.E. No.: 502966/101000	REPORT NO.:
COUNTY: Benton	LATITUDE: N31.8798612°	LONGITUDE: W85.7428666°	COMPLETION DATE: 2/15/2017
LOCATION: Proposed MDOT Facility on SR 5 in Ashland, MS			WATER TABLE ELEV: N/A
STATION:	OFFSET:	COMPLETION DEPTH: 17'	
BORING TYPE: Rotary Wash		LOGGED BY: Cory Clark	SURFACE ELEVATION: 618.5'



TOTAL DEPTH OF BORING - 17.0'

NOTE: A HYDRAULIC AUTOMATIC TRIP HAMMER WAS USED TO DETERMINE SPT N-VALUES. THE N-VALUES SHOWN REPRESENT N₆₀ VALUES.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SITE NO.: 17-5-2001	HOLE NO.: 16	FMS P.E. No.: 502966/101000	REPORT NO.:
COUNTY: Benton	LATITUDE: N31.8799587°	LONGITUDE: W85.7433146°	COMPLETION DATE: 2/15/2017
LOCATION: Proposed MDOT Facility on SR 5 in Ashland, MS			WATER TABLE ELEV: N/A
STATION:	OFFSET:	COMPLETION DEPTH: 17'	
BORING TYPE: Rotary Wash		LOGGED BY: Cory Clark	SURFACE ELEVATION: 620'

DEPTH, ft.	ELEVATION, ft.	SAMPLES	GRAPHIC LOG	MATERIAL DESCRIPTION (USCS)	SPT (N ₆₀)	RQD (%)	PKT PEN. (tsf)	DRY UNIT WT (pcf)	COHESION (ksf): <input type="checkbox"/> UU; <input type="checkbox"/> UNC; <input checked="" type="checkbox"/> DS					
									1.5	3.0	4.5	6.0		
									PL	Moisture Cont. (%)		LL		
									20	40	60	80		
									FINES CONTENT (%) ▲					
									20	40	60	80		
0-620														
		T		@2' Stiff, Orange, Slightly Sandy, Slightly Clayey Silt (Broke Short) (ML)			2.3							
5-615		T		@5' to 10' Washing			2.5							
10-610		S		@10' Medium Dense, Orange, Very Fine to Fine Slightly Silty Sand (SM)	33									
15-605		S		@15' Medium Dense, Orange, Very Fine to Fine Sand (SM)	26									

TOTAL DEPTH OF BORING - 17.0'

NOTE: A HYDRAULIC AUTOMATIC TRIP HAMMER WAS USED TO DETERMINE SPT N-VALUES. THE N-VALUES SHOWN REPRESENT N₆₀ VALUES.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

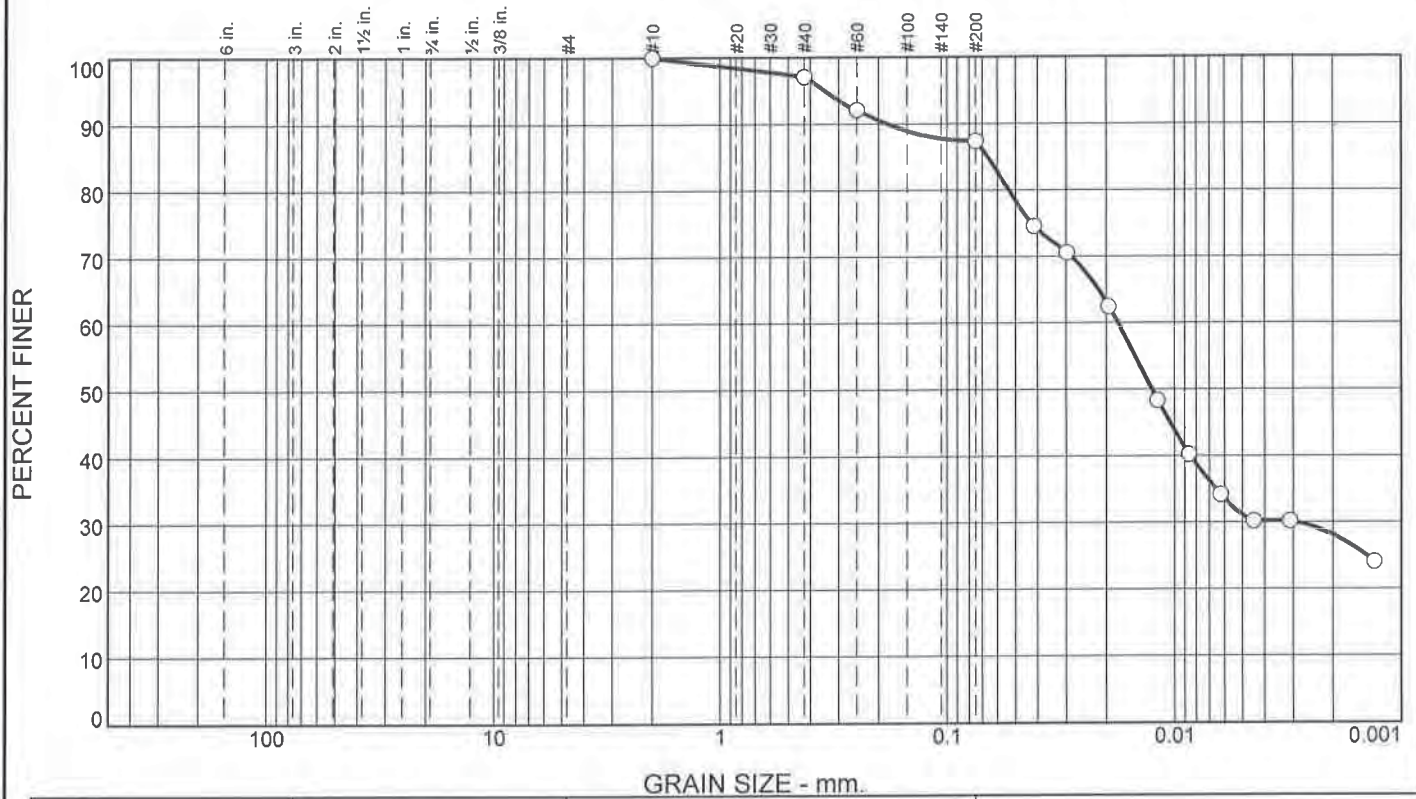
SITE NO.: 17-5-2001	HOLE NO.: 17	FMS P.E. No.: 502966/101000	REPORT NO.:
COUNTY: Benton	LATITUDE: N31.8796437°	LONGITUDE: W85.7434611°	COMPLETION DATE: 2/15/2017
LOCATION: Proposed MDOT Facility on SR 5 in Ashland, MS			WATER TABLE ELEV: N/A
STATION:	OFFSET:	COMPLETION DEPTH: 62'	
BORING TYPE: Rotary Wash		LOGGED BY: Cory Clark	SURFACE ELEVATION: 618'

DEPTH, ft.	ELEVATION, ft.	SAMPLES GRAPHIC LOG	MATERIAL DESCRIPTION (USCS)	SPT (N ₆₀) RQD(%)	PKT PEN. (tsf)	DRY UNIT WT (pcf)	COHESION (ksf): <input type="checkbox"/> UU; <input type="checkbox"/> UNC; <input checked="" type="checkbox"/> DS						
							1.5	3.0	4.5	6.0			
							PL Moisture Cont. (%) LL						
							20	40	60	80			
							FINES CONTENT (%) ▲						
							20	40	60	80			
0		T	@2' Very Stiff, Orange, Clayey Silt (ML)		3.5	118	●	□					
		T	@5' to 10' Washing		3.0								
610													
10		S	@10' Dense, Orange, Very Fine to Fine Slightly Silty Sand (SM)	40			▲						
		S		29			▲						
600													
20		S	@20' Dense, Orange, Very Fine to Medium Sand (SM)	43			▲						
		S		43			▲						
590													
30		S	@30' Medium Dense, Orange, Very Fine to Medium Sand (SM)	57			▲						
		S		55			▲						
580													
40		S	@40' Dense, Tan, Very Fine to Medium Sand (Wet) (SM)	74			▲						
		S		80			▲						
570													
50		S	@50' Dense, Orange, Very Fine to Medium Sand (Wet) (SM)	80			▲						
		S		100+			▲						
560													
60		S	@60' Very Dense, Tan, Very Fine to Medium Sand (Wet) (SM)	100+			▲						

TOTAL DEPTH OF BORING - 62.0'

NOTE: A HYDRAULIC AUTOMATIC TRIP HAMMER WAS USED TO DETERMINE SPT N-VALUES. THE N-VALUES SHOWN REPRESENT N₆₀ VALUES.

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines			
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay		
○	0.0	0.0	0.0	0.0	2.8	9.8	56.3	31.1		
×	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
○			0.0663	0.0177	0.0126	0.0029				

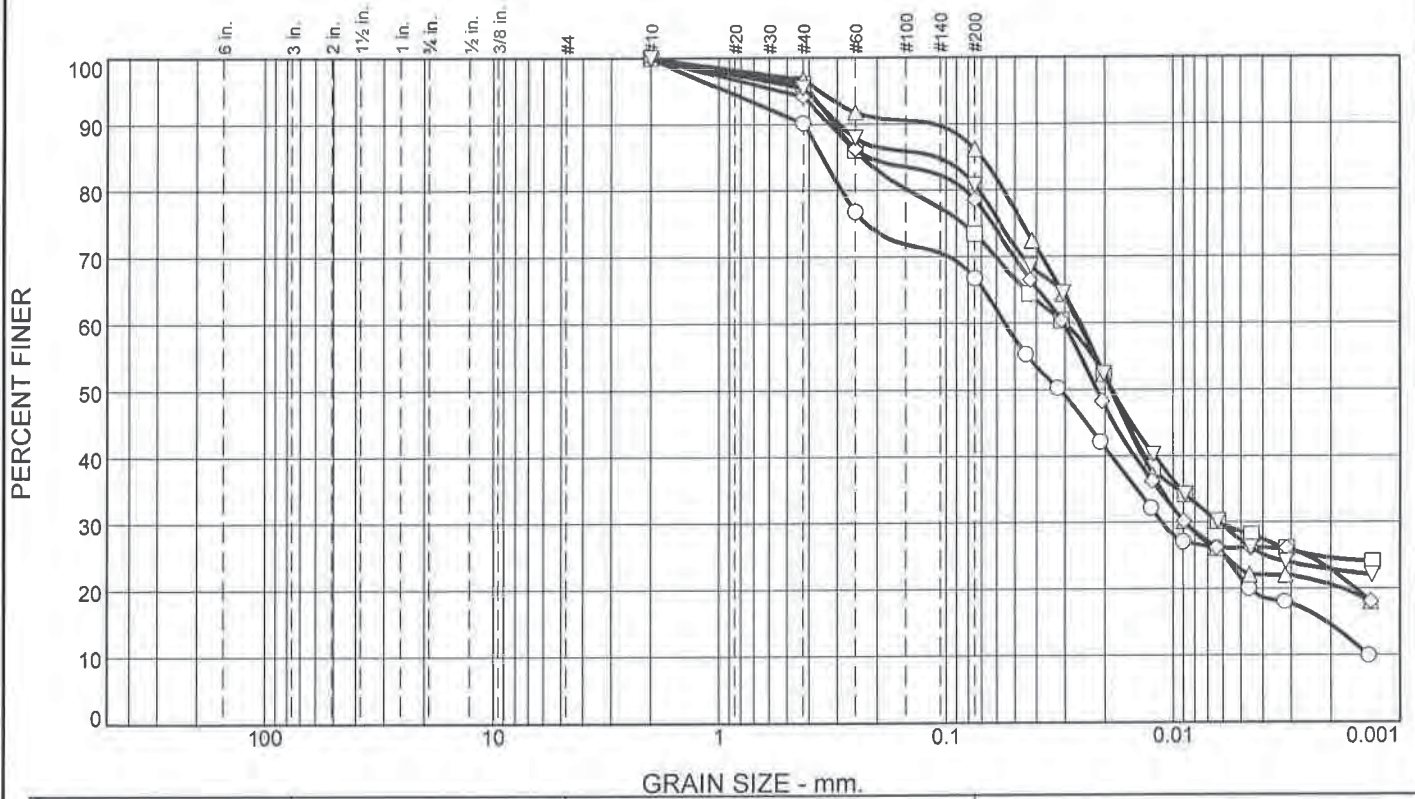
Material Description	USCS	AASHTO
○		

Project No. 502966/ Client: MDOT Project: 17-05-2001 ; BENTON CO. ; RSF ○ Source of Sample: Gradation Depth: 4'-6' Sample Number: H5 S2	Remarks:
---	-------------------------

Mississippi Department of Transportation
Jackson, Mississippi 69

Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines			
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay		
○	0.0	0.0	0.0	0.0	9.8	23.4	45.3	21.5		
□	0.0	0.0	0.0	0.0	3.9	22.7	44.8	28.6		
△	0.0	0.0	0.0	0.0	3.2	10.6	63.3	22.9		
◇	0.0	0.0	0.0	0.0	5.8	15.7	52.4	26.1		
▽	0.0	0.0	0.0	0.0	4.5	14.7	53.5	27.3		
×	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
○			0.3481	0.0553	0.0317	0.0112	0.0021	0.0014	1.66	40.38
□			0.2320	0.0302	0.0187	0.0062				
△			0.0702	0.0261	0.0188	0.0088				
◇			0.2156	0.0306	0.0218	0.0088				
▽			0.1094	0.0257	0.0187	0.0062				

	USCS	AASHTO
○		
□		
△		
◇		
▽		

Project No. 502966/ **Client:** MDOT
Project: 17-05-2001 ; BENTON CO. ; RSF
 ○ **Source of Sample:** Gradation **Depth:** 2'-4' **Sample Number:** H7 S1
 □ **Source of Sample:** Gradation **Depth:** 2'-4' **Sample Number:** H16 S1
 △ **Source of Sample:** Gradation **Depth:** 2'-4' **Sample Number:** H2 S1
 ◇ **Source of Sample:** Gradation **Depth:** 2'-4' **Sample Number:** H3 S1
 ▽ **Source of Sample:** Gradation **Depth:** 2'-4' **Sample Number:** H10 S1

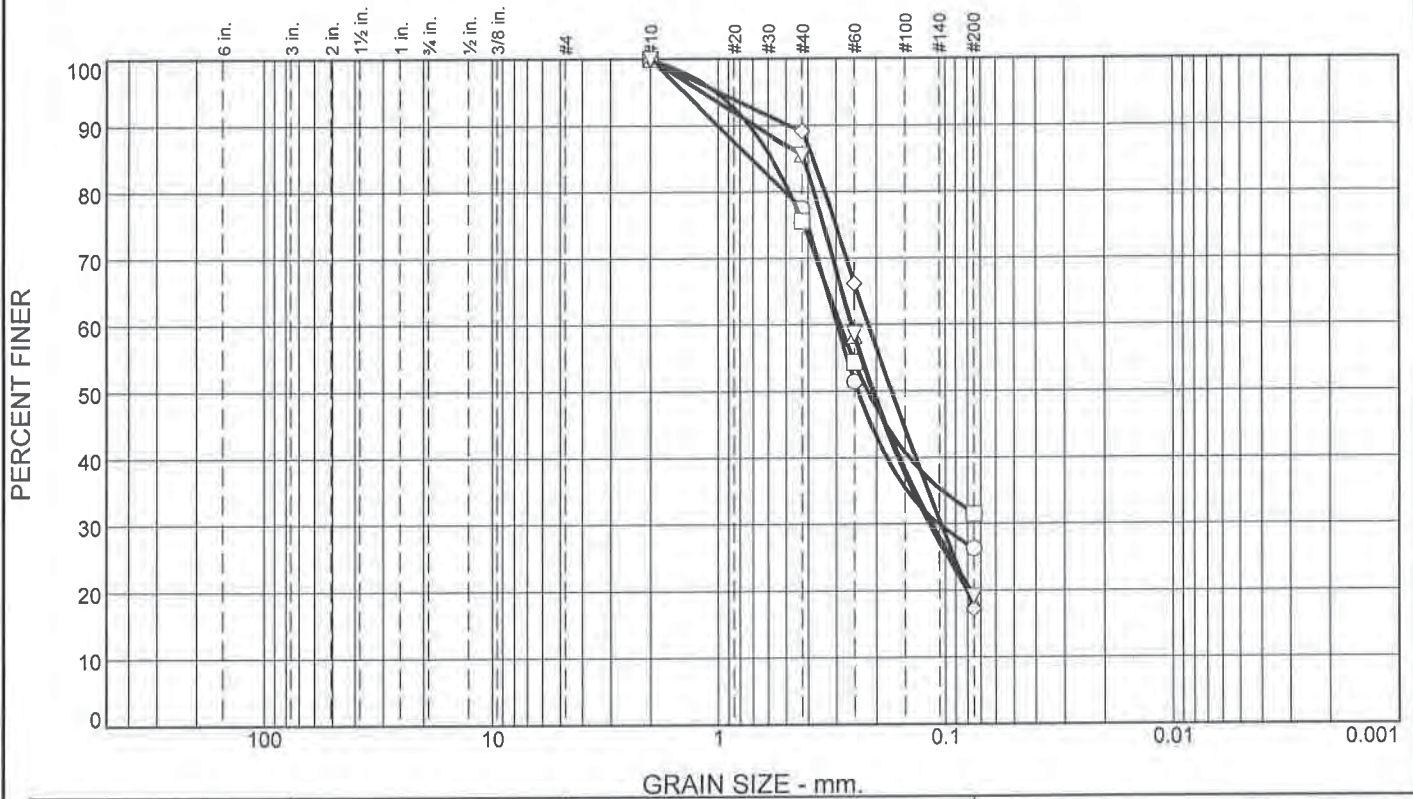
Remarks:
 ○ High organic properties

Mississippi Department of Transportation

Jackson, Mississippi 70

Figure

Particle Size Distribution Report

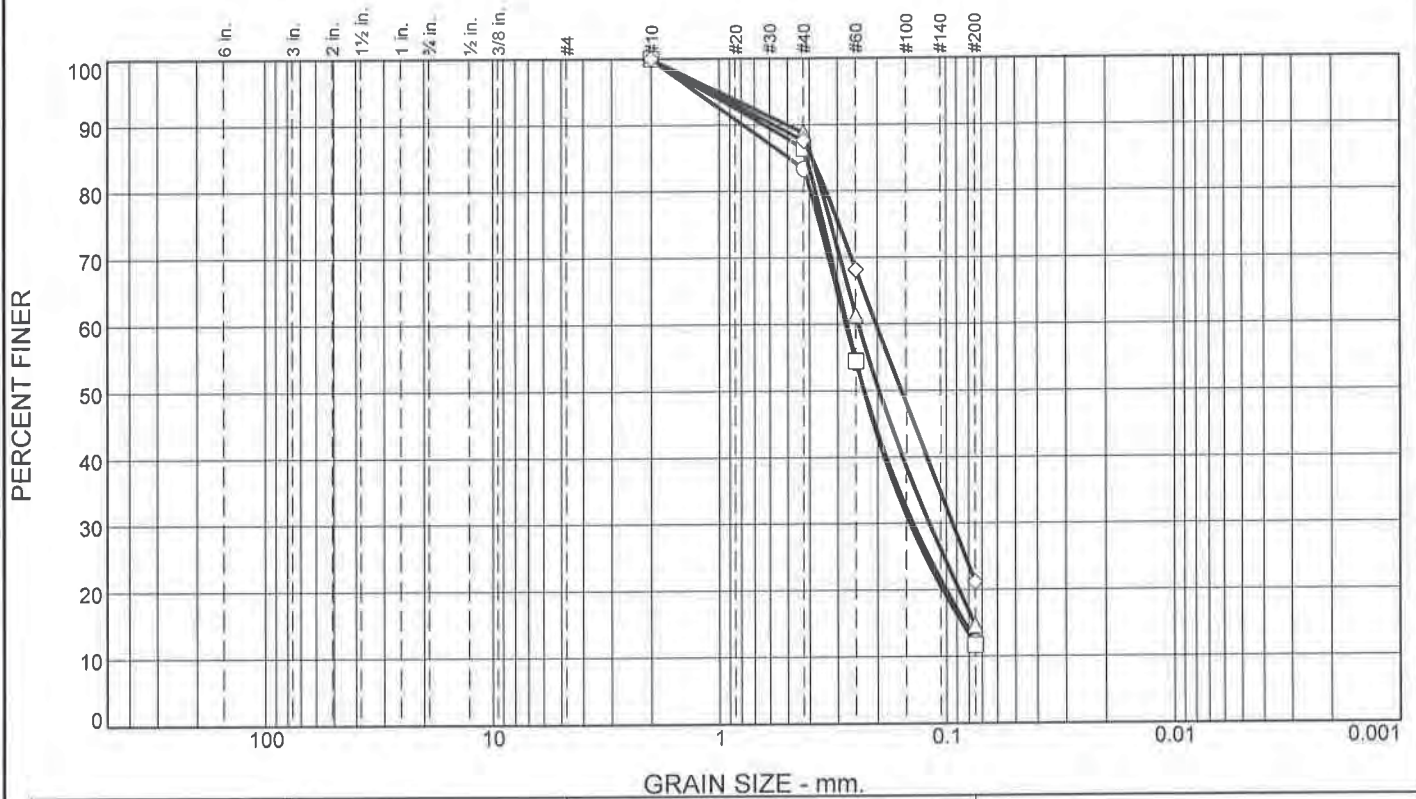


	% +3"	% Gravel		% Sand			% Fines		C _c	C _u
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay		
○	0.0	0.0	0.0	0.0	22.5	51.2	26.3			
□	0.0	0.0	0.0	0.0	24.5	44.0	31.5			
△	0.0	0.0	0.0	0.0	14.4	67.4	18.2			
◇	0.0	0.0	0.0	0.0	10.9	71.9	17.2			
▽	0.0	0.0	0.0	0.0	14.5	66.4	19.1			
	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀		
○			0.7115	0.2985	0.2414	0.1069				
□			0.5785	0.2891	0.2189					
△			0.4190	0.2581	0.2086	0.1175				
◇			0.3808	0.2174	0.1722	0.1046				
▽			0.4199	0.2568	0.2067	0.1145				

	Material Description	USCS	AASHTO
○			
□			
△			
◇			
▽			

<p>Project No. 502966/ Client: MDOT</p> <p>Project: 17-05-2001 ; BENTON CO. ; RSF</p> <p>○ Source of Sample: WASH Depth: 2'-17' Sample Number: H2,3 S2-4</p> <p>□ Source of Sample: WASH Depth: 4'-17' Sample Number: H1 S2,3,4</p> <p>△ Source of Sample: WASH Depth: 15'-42' Sample Number: H6 S6-11</p> <p>◇ Source of Sample: WASH Depth: 25'-62' Sample Number: H9 S7-14</p> <p>▽ Source of Sample: WASH Depth: 10'-32' Sample Number: H14 S4-8</p> <p style="text-align: center;">Mississippi Department of Transportation</p> <p style="text-align: center;">Jackson, Mississippi 71</p>	<p>Remarks:</p> <p style="text-align: right;">Figure</p>
--	--

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines			
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay		
○	0.0	0.0	0.0	0.0	16.5	71.3	12.2			
□	0.0	0.0	0.0	0.0	13.5	74.8	11.7			
△	0.0	0.0	0.0	0.0	11.2	74.1	14.7			
◇	0.0	0.0	0.0	0.0	12.4	66.5	21.1			
×	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
○			0.4909	0.2773	0.2300	0.1406	0.0836			
□			0.4127	0.2740	0.2306	0.1449	0.0857			
△			0.3905	0.2436	0.1978	0.1192	0.0758			
◇			0.3910	0.2037	0.1579	0.0944				

Material Description	USCS	AASHTO
○		
□		
△		
◇		

Project No. 502966/ **Client:** MDOT
Project: 17-05-2001 ; BENTON CO. ; RSF
 ○ **Source of Sample:** WASH **Depth:** 15'-42' **Sample Number:** H4 S5-10
 □ **Source:** WASH **Depth:** 10'-37' **Sample No.:** H4 S16,17
 △ **Source:** WASH **Depth:** 40'-62' **Sample No.:** H17 S9-13
 ◇ **Source:** WASH **Depth:** 35'-62' **Sample No.:** H11 S10-15

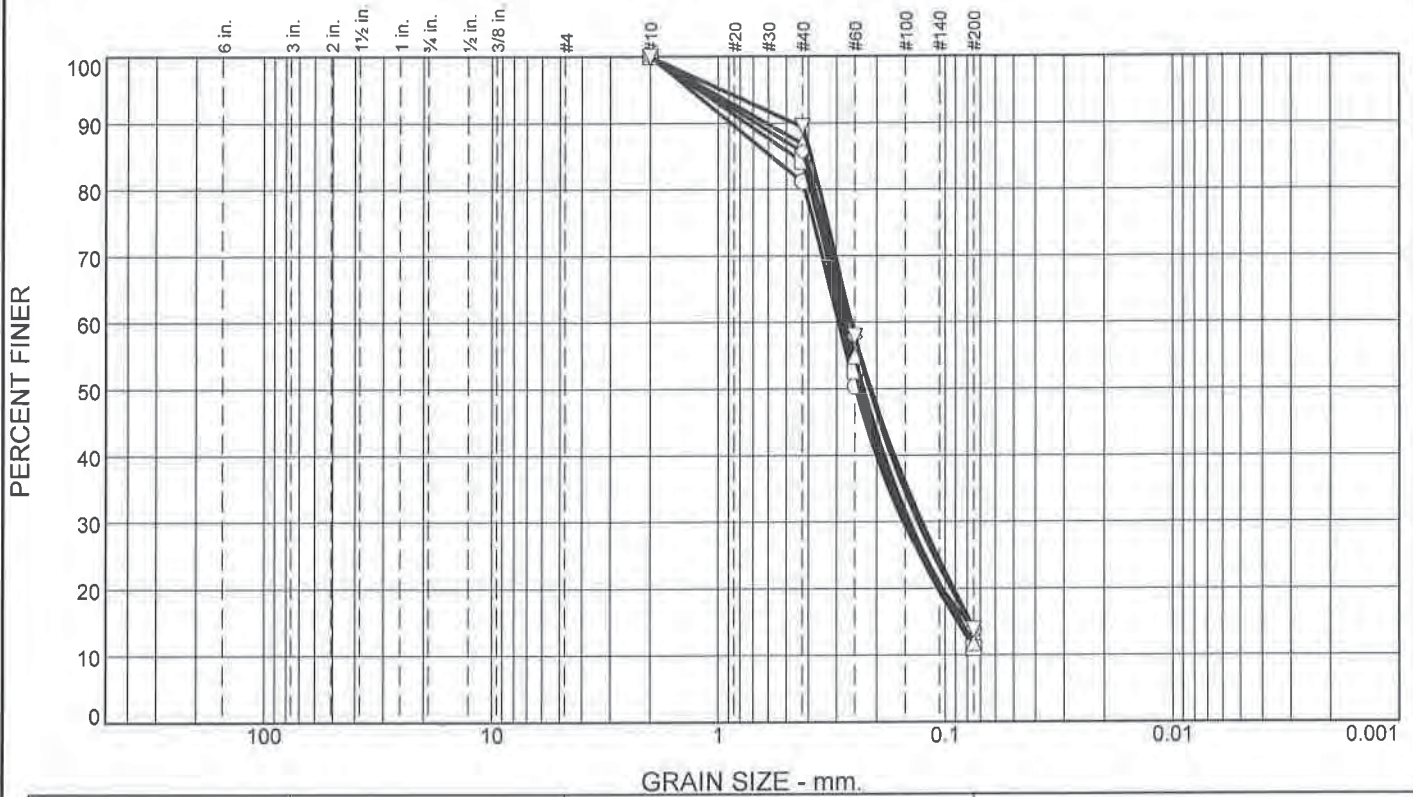
Remarks:

Mississippi Department of Transportation

Jackson, Mississippi 72

Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	18.8	67.4	13.8	
□	0.0	0.0	0.0	0.0	15.8	73.1	11.1	
△	0.0	0.0	0.0	0.0	13.1	75.1	11.8	
◇	0.0	0.0	0.0	0.0	14.3	71.7	14.0	
▽	0.0	0.0	0.0	0.0	10.5	75.6	13.9	

	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
○			0.5820	0.2951	0.2482	0.1531	0.0801			
□			0.4588	0.2830	0.2385	0.1506	0.0885			
△			0.4095	0.2723	0.2290	0.1439	0.0854			
◇			0.4184	0.2603	0.2127	0.1272	0.0777			
▽			0.3903	0.2589	0.2156	0.1321	0.0783			

	Material Description	USCS	AASHTO
○			
□			
△			
◇			
▽			

Project No. 502966/ **Client:** MDOT
Project: 17-05-2001 ; BENTON CO. ; RSF
 ○ **Source of Sample:** WASH **Depth:** 8'-22' **Sample Number:** H9 S3-6
 □ **Source of Sample:** WASH **Depth:** 10'-32' **Sample Number:** H11 S5-9
 △ **Source of Sample:** WASH **Depth:** 15'-42' **Sample Number:** H5 S6-11
 ◇ **Source of Sample:** WASH **Depth:** 45'-62' **Sample Number:** H4 S11-14
 ▽ **Source of Sample:** WASH **Depth:** 45'-62' **Sample Number:** H5 S12-15

Mississippi Department of Transportation
Jackson, Mississippi 73

Remarks:

Figure

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, Sixteenth 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:

(Name and location or address)

BENTON COUNTY MAINTENANCE FACILITIES IN ASHLAND, BENTON COUNTY, MISSISSIPPI

BWO-2214-05(001) 502996

BWO-2215-05(001) 502996

BWO-2217-05(001) 502996

LWO-2096-05(002) 502996

THE OWNER:

(Name, legal status and address)

MISSISSIPPI TRANSPORTATION COMMISSION
P O BOX 1850
JACKSON, MISSISSIPPI 39215-1850

THE ARCHITECT:

(Name, legal status and address)

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

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.

14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES

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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.

§ 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.

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.

§ 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.

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§ 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).

§ 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;

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- .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).

§ 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.

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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 extension 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 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.

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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.

§ 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.

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§ 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.

§ 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

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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.

§ 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.

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§ 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.

§ 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.

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§ 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 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

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- .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 Day
\$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.

§ 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

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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:

- .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;

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- .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 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

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:	250,000.00	Per Person
Bodily Injury		
Bodily Injury	500,000.00	Per Accident
Property Damage	100,000.00	Per Occurrence

.4 EXCESS LIABILITY:

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(Umbrella on projects over \$500,000) Bodily Injury & Property Damage (Combined Single Limit)	\$1,000,000.00	Aggregate
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.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 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 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

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§ 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 OF COMPLETION

§ 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 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.

§ 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

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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;
- 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.

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§ 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.

§ 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

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- 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.

.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

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§ 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 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.

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§ 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.

§ 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.

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§ 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 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 to construct the Benton County Maintenance Facilities for District Two in Ashland, Benton County, Mississippi. Separate Lump Sums as described in these Specifications and Drawings are to be given for each of the following separate descriptions:
- | | | |
|----|-----------------------------|---|
| 1. | Pay Item 907-242-A006 | Construction of Maintenance Shop Building. |
| 2. | Pay Item 907-242-A006 | Construction of Equipment Shed with Enclosed Bay. |
| 3. | Pay Item 907-242-A006 | Construction of Bulk Salt Storage Structure |
| 4. | Other Pay Items on Drawings | Site Improvements. |
- 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. Pay legally required sales, consumer, use, payroll, privilege and other taxes.
 3. Secure and pay for, as necessary for proper execution and completion of Work, and as applicable at time of receipt of bids:
 - a. Permits.
 - b. Government Fees.
 - c. Licenses.
 4. Give required notices
 5. Comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities that bear on performance of Work.
 6. 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.
 7. Enforce strict discipline and good order among employees. Do not employ on Work, unfit persons or persons not skilled in assigned task.
 8. Schedule of Values: Submit 8 copies to the MDOT Architectural Services Unit a Schedule of Values as described in Section 01 29 73 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.

9. 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 Form CAD-720 – REQUEST FOR PERMISSION TO SUBCONTRACT for each subcontractor before they are allowed to perform any Work. Contract Administration Division will provide copies of approved subcontractors to Project Engineer and Architectural Services.
10. 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.

1.02 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.

1.03 CONSTRUCTION SEQUENCE

- A. Submit an updated copy of Contractor's construction schedule (01 32 00) showing the sequence, commencement and completion dates, and move-in dates of Owner's personnel for all phases of the Work.

1.04 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

1.05 COORDINATION WITH OCCUPANTS

- B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Final Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
 1. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
 2. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.06 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 in the existing building to normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated.
- E. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.

1.07 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 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- D. 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 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.

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. The MDOT Architect and his Consultants WILL NOT consider requests for substitutions during bidding. ONLY ONE REQUEST per product will be allowed.
- B. Substitution Requests: Within 30 days after Notice to proceed, submit four copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use facsimile of form provided in Project Manual.
 - 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.
 - 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. 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 15 days of receipt of request, or ten 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 if received within 30 days after the Notice to Proceed. 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 its 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 Supplementary Conditions 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 and Mechanical / Electrical 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.
4. Group line items to show subtotal of Description A and then Description B, C and D with the same amounts indicated on the Bid Forms and a total equal to the Contract amount indicated on the Bid Form.

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 / MDOT Architect's review, if requested, revise and resubmit schedule in same manner

1.03 METHOD FOR PAYMENT

- 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.

C. Submittal Procedures:

1. Submit electronic pdf copy of each Application for Payment to the Project Engineer and one copy to the MDOT 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 submission by the Contractor of the actual weekly payrolls showing all employees, hours worked, hourly rates, overtime hours, etc., or copies thereof, is not required to be turned in. However, each Contractor and Subcontractor shall preserve weekly payroll records for a period of three years from the date of Contract completion. All Contractor personnel working at the project site will be paid unconditionally and not less often than once a week without subsequent deduction or rebate on any account, except such payroll deductions as are permitted by regulations, the full amounts of wages and bona fide fringe benefits due at time of payment.
- B. The payroll records shall contain the name, with an individually identifying number for each employee, classification, rate of pay, daily and weekly number of hours worked, itemized deductions and actual wages paid to each employee.
- C. Upon request, the Contractor will make payroll records available at the project site for inspection by the Department Compliance Officer or authorized representative and will permit such officer or representative to interview employees on the job during working hours.
- D. The Contractor and Subcontractors shall submit Form CAD-880, "Weekly Summary of Wage Rates", 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.
- E. 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 BASIS OF PAYMENT

A. This Work will be paid for by Contract Sum for the construction in District Two. The Work includes Benton County Maintenance Facilities in Ashland, Benton 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. BWO-2214-05(001) 502996
Maintenance Shop Building
In Ashland, Benton County lump sum
- 2. Description B
MDOT Project No. BWO-2215-05(001) 502996
Equipment Shed with Enclosed Bay
in Ashland, Benton County Lump Sum
- 3. Description C
MDOT Project No. BWO-2217-05(001) 502996
Bulk Salt Storage Structure
in Ashland, Benton County 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. Scope: Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
1. Project Management.
 2. Requests for Information (RFIs).
 3. Project 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.

1.02 DEFINITIONS

- A. RFI: Request from Project Engineer, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.03 INFORMATIONAL SUBMITTALS

- A. 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
- B. 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 DUTIES OF PROJECT COORDINATOR (SUPERINTENDENT)

A. General: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

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 diary to Project 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 Coordinator (Superintendent) must be present on the job site at all times while work is in progress. Superintendent shall advise Project 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: Stop all Work not in accordance with the requirements of the Contract Documents.

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.
- 1.05 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.
- 1.06 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.
- 1.07 REQUESTS FOR INFORMATION (RFIs)
- 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.
 - 1. MDOT Architect will return RFIs submitted to MDOT Architect by other entities controlled by Contractor with no response.

2. 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:
1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Architect
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 14. 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.
1. 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.
 2. 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.
 3. 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."
 - a. 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. On receipt of MDOT Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

- E. 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:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number including RFIs that were dropped and not submitted.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date MDOT Architect's response was received.
- F. 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.
1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.08 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:
1. Establish an understanding of what is expected from everyone involved.
 2. Enable an orderly Project review during the progress of the Work.
 3. Provide for systematic discussion of problems and effect remedies and clarifications.
 4. Coordination of the Work.
 5. 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:
1. Review, modify / approve minutes of the previous meeting.
 2. Discuss items that have been done the previous month and anticipated work to be done within the next month.
 3. 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. Duties include the following:
1. Preparation of agenda for meetings.
 2. Distribution of agenda and written notice 7 days in advance of date for each regularly scheduled meeting.
 3. Make physical arrangements for meetings.
 4. 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.

5. Distribute copies of minutes within 7 calendar days to all parties affected by decisions made at the meeting.
 6. 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.
1. Schedule: Schedule Pre-Construction Meeting within 10 days after Notice to Proceed.
 2. Location: A central site, convenient for all parties, designated by the Project Engineer and the MDOT Architect.
 3. 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.
 4. 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.
1. 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 of scheduled meeting dates.
 2. 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.
 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 5. 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:
1. Schedule: Progress Meetings will be scheduled monthly. The Project Engineer will cancel the meeting with at least 48 hours notice if a meeting is not necessary for any particular month.
 2. Place of Progress Meetings: Contractor's Field Office except as otherwise agreed.

3. 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.
4. 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.
5. Minutes: Record and distribute the meeting minutes to each party present and to parties requiring information.
 - a. 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

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: Take photographs for each day that any substantial construction activity occurs at the job site. The number of photographs to be taken shall vary, depending on the construction activity that day. The purpose of the photographs is to document the installation of the work and verify that the work is being installed properly.
- 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 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. 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.
- J. 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.

- K. 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 8 1/2 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

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, 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 Contractor shall provide and pay for all other required inspection, sampling and testing.

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. 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.

- B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

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. Such materials shall not be delivered to the site until the building is roofed, and exterior walls are sheathed and protected with building paper as a minimum, the doors and windows are installed and glazed, and there is ample interior storage space for such materials and products. Delivery shall not occur during periods of rain, heavy dew, or fog.
 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. Excepted materials: installed exterior wood siding, exterior wood trim, exterior wood doors, and exterior wood windows, after specified treatments, such as exterior wood stain or paint, have been applied.
- 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 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 indicated, 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 SPECIAL TESTS AND INSPECTIONS
- A. Special Tests and Inspections: Engage a qualified testing agency / special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner and as follows:
- B. Special Tests and Inspections: Conducted by a qualified testing agency / special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections and 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, and MDOT Architect'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 in the following list.

AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute (Formerly: ACI International)
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies, Inc. (The)
AGA	American Gas Association
AHAM	Association of Home Appliance Manufacturers
AHRI	Air-Conditioning, Heating, and Refrigeration Institute (The)
AI	Asphalt Institute
AIA	American Institute of Architects (The)
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AMCA	Air Movement and Control Association International, Inc.
ANSI	American National Standards Institute
AOSA	Association of Official Seed Analysts, Inc.
APA	APA - The Engineered Wood Association
APA	Architectural Precast Association
API	American Petroleum Institute
ARI	Air-Conditioning & Refrigeration Institute (See AHRI)
ARI	American Refrigeration Institute (See AHRI)
ASCE	American Society of Civil Engineers
ASCE/SEI	American Society of Civil Engineers / Structural Engineering Institute (See ASCE)
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	ASME International (American Society of Mechanical Engineers)
ASSE	American Society of Sanitary Engineering
ASTM	ASTM International (American Society for Testing and Materials International)
AWI	Architectural Woodwork Institute
AWPA	American Wood Protection Association (Formerly: American Wood-Preservers' Association)
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association (The)
CFSEI	Cold-Formed Steel Engineers Institute
CGA	Compressed Gas Association
CIMA	Cellulose Insulation Manufacturers Association
CISCA	Ceilings & Interior Systems Construction Association
CLFMI	Chain Link Fence Manufacturers Institute
CRI	Carpet and Rug Institute (The)
CRRC	Cool Roof Rating Council
CRSI	Concrete Reinforcing Steel Institute
CSA	CSA International (Formerly: IAS - International Approval Services)
CSI	Construction Specifications Institute (The)
DASMA	Door and Access Systems Manufacturers Association
DHI	Door and Hardware Institute
ECA	Electronic Components Association
FM Approvals	FM Approvals LLC

FM Global	FM Global (Formerly: FMG - FM Global)
GA	Gypsum Association
GANA	Glass Association of North America
HMMA	Hollow Metal Manufacturers Association (See NAAMM)
HPVA	Hardwood Plywood & Veneer Association
ICBO	International Conference of Building Officials (See ICC)
ICC	International Code Council
ICRI	International Concrete Repair Institute, Inc.
IES	Illuminating Engineering Society (Formerly: Illuminating Engineering Society of North America)
IGMA	Insulating Glass Manufacturers Alliance
IGSHPA	International Ground Source Heat Pump Association
ISO	International Organization for Standardization
LPI	Lightning Protection Institute
MBMA	Metal Building Manufacturers Association
MCA	Metal Construction Association
MFMA	Metal Framing Manufacturers Association, Inc.
MIA	Marble Institute of America
MMPA	Moulding & Millwork Producers Association (Formerly: Wood Moulding & Millwork Producers Association)
MPI	Master Painters Institute
NAAMM	National Association of Architectural Metal Manufacturers
NAIMA	North American Insulation Manufacturers Association
NCMA	National Concrete Masonry Association
NEBB	National Environmental Balancing Bureau
NECA	National Electrical Contractors Association
NEMA	National Electrical Manufacturers Association
NETA	InterNational Electrical Testing Association
NFHS	National Federation of State High School Associations
NFPA	NFPA (National Fire Protection Association)
NFRC	National Fenestration Rating Council
NHLA	National Hardwood Lumber Association
NLGA	National Lumber Grades Authority
NSPE	National Society of Professional Engineers
NSSGA	National Stone, Sand & Gravel Association
NTMA	National Terrazzo & Mosaic Association, Inc. (The)
PDI	Plumbing & Drainage Institute
RFCI	Resilient Floor Covering Institute
SDI	Steel Door Institute
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SPIB	Southern Pine Inspection Bureau
SRCC	Solar Rating and Certification Corporation
SSINA	Specialty Steel Industry of North America
SSPC	SSPC: The Society for Protective Coatings
SWPA	Submersible Wastewater Pump Association
TCNA	Tile Council of North America, Inc.
TIA	Telecommunications Industry Association (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance)
TMS	The Masonry Society
TPI	Truss Plate Institute
TPI	Turfgrass Producers International
UL	Underwriters Laboratories Inc.
WCMA	Window Covering Manufacturers Association

WDMA Window & Door Manufacturers Association
 WWPA Western Wood Products Association

B. 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.

DIN Deutsches Institut fur Normung e.V.
 IAPMO International Association of Plumbing and Mechanical Officials
 ICC International Code Council
 ICC-ES ICC Evaluation Service, LLC

C. 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.

COE Army Corps of Engineers
 CPSC Consumer Product Safety Commission
 DOC Department of Commerce
 National Institute of Standards and Technology
 DOE Department of Energy
 EPA Environmental Protection Agency
 FG Federal Government Publications
 GSA General Services Administration
 HUD Department of Housing and Urban Development
 LBL Lawrence Berkeley National Laboratory
 Environmental Energy Technologies Division
 OSHA Occupational Safety & Health Administration
 TRB Transportation Research Board
 National Cooperative Highway Research Program
 USDA Department of Agriculture
 Agriculture Research Service
 U.S. Salinity Laboratory
 USDA Department of Agriculture
 Rural Utilities Service
 USDJ Department of Justice
 Office of Justice Programs
 National Institute of Justice
 USPS United States Postal Service

- D. 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.

CFR	Code of Federal Regulations Available from Government Printing Office
DOD	Department of Defense Military Specifications and Standards Available from Department of Defense Single Stock Point
FED-STD	Federal Standard (See FS)
FS	Federal Specification Available from Department of Defense Single Stock Point Available from Defense Standardization Program Available from General Services Administration Available from National Institute of Building Sciences/Whole Building Design Guide
MILSPEC	Military Specification and Standards (See DOD)
USAB	United States Access Board
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 45 23

TESTING AND INSPECTION SERVICES - CONTRACTOR

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Laboratory selection and payment.
2. Laboratory duties.
3. Contractor's responsibilities.

B. Related Requirements:

1. Individual specifications sections contain specific tests and inspections to be preformed.
2. Section 01 45 29 – Testing Laboratory Services – MDOT.

1.02 REFERENCES

A. ASTM International (ASTM):

1. D3666 - Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials.
2. E329 - Standard Specification for Agencies Engaged in Construction Inspection and / or Testing.
3. E543 - Standard Specification for Agencies Performing Nondestructive Testing.

1.03 QUALITY ASSURANCE

A. Employment of Testing Laboratory shall in no way relieve Contractor of his obligations to perform work in accordance with Contract Documents.

B. Contractor shall employ and pay for services of an independent testing laboratory to perform specified testing and inspection.

C. Refer to the Conditions of the Contract for provisions related to special inspections and testing.

D. Qualifications of Laboratory:

1. Meet requirements of ASTM D3666, E329, and E543.
2. Authorized to operate in State of Mississippi

1.04 LABORATORY DUTIES

A. Cooperate with Project Engineer, Architect and Contractor; provide qualified personnel after due notice.

- B. Perform specified inspections, sampling, and testing of materials and methods of construction.
 - 1. Comply with specified standards.
 - 2. Ascertain compliance or noncompliance of materials with requirements of Contract Documents.
 - C. Promptly notify Project Engineer, MDOT Architect, Architect and Contractor of observed irregularities or deficiencies of Work or products.
 - D. Promptly submit written report of each test and inspection; submit electronically in Adobe PDF format to Project Engineer, Architect, MDOT Architect and Contractor.
 - E. Each report to include:
 - 1. Date issued.
 - 2. Project title and number.
 - 3. Testing Laboratory name, address, and telephone number.
 - 4. Name of Inspector and signature of individual in charge.
 - 5. Date and time of sampling or inspection.
 - 6. Record of temperature and weather conditions.
 - 7. Date of test.
 - 8. Identification of product and specification section.
 - 9. Location of sample or test in project.
 - 10. Type of inspection or test.
 - 11. Results of tests and compliance or noncompliance with Contract Documents.
 - 12. Interpretation of test results when requested by Project Engineer, MDOT Architect, Architect or Contractor.
 - F. Perform additional tests when required by Project Engineer, MDOT Architect, Architect or Contractor.
 - G. Laboratory is not authorized to:
 - 1. Release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Approve or accept any portion of work.
 - 3. Perform duties of Contractor.
- 1.05 CONTRACTOR'S RESPONSIBILITIES
- A. Cooperate with Laboratory personnel, provide access to Work, and to manufacturer's operations.
 - B. When materials require testing prior to being incorporated into Work, secure and deliver to Laboratory adequate quantities of representative samples of materials proposed to be used.
 - C. Furnish copies of product test reports as required.

- D. Furnish incidental labor and facilities:
 - 1. To provide access to work to be tested.
 - 2. To obtain and handle samples at site or at source of product to be tested.
 - 3. To facilitate inspections and tests.
 - 4. For safe storage and curing of test samples.
- E. Notify Laboratory sufficiently in advance of operations to allow for Laboratory assignment of personnel and scheduling of tests.
- F. Make arrangements with Laboratory and pay for additional samples and tests required for Contractor's convenience.
- G. When tests or inspections cannot be performed after such notice, reimburse Owner for Laboratory personnel and travel expenses incurred due to Contractor's negligence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 45 29

TESTING AND INSPECTION SERVICES - MDOT

PART 1 - GENERAL

1.01 SUMMARY

- A. Scope: The Contractor shall use testing laboratory services of the Mississippi Department of Transportation for all testing required in this Section. These services will be provided to the Contractor by the MDOT at no charge. Use of said services shall in no way relieve the Contractor of his obligation to perform Work in accordance with the Contract. Refer to Section 01 45 23 Testing and Inspection Services – Contractor for additional testing and inspection services required to be provided by the Contractor
- B. Inspection, Sampling and Testing are required for:
 - 1. Section 31 23 12, Excavation, Fill and Grading.
 - 2. Section 03 20 00, Concrete Reinforcing.
 - 3. Section 03 30 00, Cast-In-Place Concrete.

1.02 LABORATORY'S DUTIES

- A. Materials will be inspected and sampled in accordance with current Mississippi Department of Transportation SOP pertaining to inspecting and sampling.
- B. Prepare reports of inspections and tests including:
 - 1. Date issued.
 - 2. Project title and number.
 - 3. Testing laboratory, name and address.
 - 4. Name and signature of inspector.
 - 5. Date of inspection or sampling.
 - 6. Record of temperature and weather.
 - 7. Date of test.
 - 8. Identification of product and Specification Section.
 - 9. Location of project.
 - 10. Type inspection or test.
 - 11. Observations regarding compliance with Contract Documents requirements.
- C. Distribute copies of reports of inspections and tests to Project Engineer and one copy to the MDOT Architect.

1.03 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with laboratory personnel to provide to laboratory in required quantities preliminary representative samples of materials to be tested.
- B. 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.
- C. Provide facilities for laboratory's exclusive use for storage and curing of test samples.
- D. Notify laboratory in advance of operations to allow for assignment of personnel and scheduling of tests.

1.04 MATERIAL CERTIFICATIONS AND CERTIFIED TEST REPORTS

- A. All certifications shall meet the following requirements:
 - 1. Have letterhead of the manufacturer, producer, supplier, or fabricator.
 - 2. Include the project number.
 - 3. Itemized list of materials covered by the certification.
 - 4. Contain a material conformance statement, which certifies that the materials conform to the specific specification requirements.
 - 5. Certification for all steel and steel wire products must also include a certified statement by the manufacturer that all of the manufacturing processes are of domestic origin.
 - 6. Signature of a responsible company official.
- B. All certified test reports shall meet the following requirements:
 - 1. Have letterhead of the manufacturer, producer, supplier, or fabricator
 - 2. Include name and description of material, lot, batch, or heat number, etc., as applicable.
 - 3. Show results of each required test, and state that the test was run according to the test method specified.
 - 4. Test method specified statement by the manufacturer that all of the manufacturing processes are of domestic origin.
 - 5. Signature of a responsible laboratory official.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 01 10 00 "Summary" for work restrictions and limitations on utility interruptions.

1.02 USE CHARGES

- A. General: Installation and removal of temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Project Engineer, MDOT Architect, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service: Provide water and sewer service with account placed in Owner's Name. . Water is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- C. Electric Power Service: Provide electric power service with account placed in Owner's Name. Electric power is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.03 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
- C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire prevention program.

1.04 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.

1.05 PROJECT CONDITIONS

- A. 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 Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Portable 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, with 1-5/8-inch-OD top and bottom rails. Provide concrete bases for supporting posts.

2.02 TEMPORARY FACILITIES

- A. Field Offices: The Contractor is not required to furnish a field office, but shall provide at the job site duplicates of all correspondence, shop drawings, plans, specifications, samples, etc. required to administer the Project. These duplicates will be permanently kept as reference and shall not be used in the field. Contractor shall provide the Project Engineer and the MDOT Architect with job site and emergency telephone numbers.
- B. Storage and Fabrication Sheds: It shall be the Contractor's option to provide watertight storage facilities for storage of cement, lime, and / or other materials subject to water damage. If storage facilities are used, it shall be of sufficient size to hold all materials required for logically grouped activities on the site at one time, and shall have floors raised at least 6 inches above the ground on heavy joists or sleepers. Fully enclosed trailer is allowed, but location must be coordinated with Project Engineer.

2.03 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
3. Permanent HVAC System: If Owner 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".

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 1. Locate facilities to limit site disturbance as specified in Section 01 10 00 "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service.
 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. 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.

- F. 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.
- G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - 1. Install electric power service overhead unless otherwise indicated.
- H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- I. Telephone Service: Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.03 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 - 1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
 - 2. 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 Owner.
- B. 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.
- C. Project Signs: Unauthorized signs are not permitted.
- D. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01 73 00 "Execution."
- 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.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. 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.
- B. 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.
- C. 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.
 - 1. 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.
- D. 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.
- E. 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 Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- F. 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.
- G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- H. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- I. 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.

- J. 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.

3.05 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.

3.06 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 Owner'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 Owner's requirements, become objectionable, shall be removed at the Owner's request. Inform all workmen of Owner'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 Substantial 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. Owner reserves right to take possession of Project identification signs.
 - 2. At Substantial 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 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. 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.

- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 33 00 "Submittal Procedures." Show compliance with requirements.

1.04 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.

1.05 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 weathertight 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.

1.06 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."

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. 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, an equivalent product will always be accepted if it is equal in all respects (size, shape, texture, color, etc.). The Contractor must submit a request for substitution as set forth in this section.
 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: 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, that it 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.
 - 3. Section 07 84 00 "Firestopping" for patching penetrations in fire-rated construction.

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.

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 in Section 01 31 00 "Project Management and Coordination."

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 Substantial 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 Substantial 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 Substantial 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 nonhazardous construction waste.
 - 2. Disposing of nonhazardous construction waste.
- B. Related Requirements:
 - 1. Section 04 20 00 "Unit Masonry" for disposal requirements for masonry waste.
 - 2. Section 31 23 11 "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. 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.

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. Include manifests, weight tickets, receipts, and invoices.

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, and 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.
 - 1. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 - 2. 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 salvage, 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 CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.

- B. 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.
 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
- C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.
1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

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.
 4. Section 01 79 00 "Demonstration and Training" for requirements for instructing Owner's personnel.

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 already show evidence of repair or restoration.
 - 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 will return one copy with comments.
1. Correct or revise each manual to comply with MDOT Architect's comments. Submit two copies of each corrected manual within 15 days of receipt of MDOT Architect'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. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 8. 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.
- 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 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 79 00

DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
 - 3. Demonstration and training video recordings.

1.02 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
 - 1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

1.03 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
 - 1. At completion of training, submit complete training manual(s) for Owner's use prepared and bound in format matching operation and maintenance manuals.

1.04 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 40 00 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to demonstration and training.

1.05 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.01 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project record documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
 - 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
 - 4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.

- c. Routine and normal operating instructions.
- d. Regulation and control procedures.
- e. Control sequences.
- f. Safety procedures.
- g. Instructions on stopping.
- h. Normal shutdown instructions.
- i. Operating procedures for emergencies.
- j. Operating procedures for system, subsystem, or equipment failure.
- k. Seasonal and weekend operating instructions.
- l. Required sequences for electric or electronic systems.
- m. Special operating instructions and procedures.
- 5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
- 6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
- 7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
- 8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 78 23 "Operation and Maintenance Data."

3.02 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

- 1. Owner will furnish Contractor with names and positions of participants.

- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with Owner, through Project Engineer, with at least seven days' advance notice.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

3.03 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Video Recording Format: Provide high-quality color video recordings with menu navigation in format acceptable to Project Engineer and MDOT Architect.
- C. Narration: Describe scenes on video recording by dubbing audio narration off-site after video recording is recorded. Include description of items being viewed.
- D. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION

SECTION 01 91 13

GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. OPR and BoD documentation are included by reference for information only.

1.02 SUMMARY

- A. Section includes general requirements that apply to implementation of commissioning without regard to specific systems, assemblies, or components.

1.03 DEFINITIONS

- A. BoD: Basis of Design. A document that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.
- B. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- C. OPR: Owner's Project Requirements. A document that details the functional requirements of a project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.
- D. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.04 COMMISSIONING TEAM

- A. Members Appointed by Contractor(s): Individuals, each having the authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated action. The commissioning team shall consist of, but not be limited to, representatives of Contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the Project Engineer and MDOT Architect.
- B. Members Appointed by Owner:
 - 1. Representatives of the facility user and operation and maintenance personnel.
 - 2. Architect and engineering design professionals.

1.05 OWNER'S RESPONSIBILITIES

- A. Provide the OPR documentation to the Contractor for information and use.
- B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities.
- C. Provide the BoD documentation, prepared by MDOT Architect and approved by Owner, to the Contractor for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.

1.06 CONTRACTOR'S RESPONSIBILITIES

- A. Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following:
 - 1. Provide commissioning plan.
 - 2. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
 - 3. Attend commissioning team meetings held on a monthly basis.
 - 4. Integrate and coordinate commissioning process activities with construction schedule.
 - 5. Review and accept construction checklists provided by the MDOT Architect.
 - 6. Complete paper or electronic (preferred) construction checklists as Work is completed and provide to the Project Engineer and MDOT Architect on a weekly basis.
 - 7. Complete commissioning process test procedures.

1.07 PROJECT ENGINEER'S RESPONSIBILITIES

- A. Organize and lead the commissioning team.
- B. Convene commissioning team meetings.
- C. Verify the execution of commissioning process activities. Verification will include, but is not limited to, equipment submittals, construction checklists, training, operating and maintenance data, tests, and test reports to verify compliance with the OPR.
- D. Witness systems, assemblies, equipment, and component startup.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 03 10 00 CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes all concrete formwork and other related items necessary to complete project indicated by Contract Documents unless specifically excluded.
- B. Related Sections:
 - 1. Section 03 20 00 – Concrete Reinforcing.
 - 2. Section 03 30 00 – Cast-in-Place Concrete.

1.02 PROJECT CONDITIONS

- A. Examine the substrate over which concrete forms are installed and advise the Project Engineer of conditions detrimental to the installation of concrete formwork. Do not proceed until unsatisfactory conditions have been corrected.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Wood Forms: 3/4 inch thick exterior grade plywood on studs and joists.
- B. Form Ties: Standard snap ties, 1-1/2 inch break-back.
- C. Form Oil: Oil must not affect bonding of finishes on exposed concrete. Approved non-staining type as follows:
 - 1. Nox-Crete Products Group Nox-Crete Form Coating EB.
 - 2. SEI Form Release Gcc-100.
 - 3. Dayton Superior Bio-Release EF.

PART 3 - EXECUTION

3.01 FORMWORK

- A. Forms shall be properly aligned, adequately braced and mortar tight to produce concrete shapes required by Drawings.
 - 1. Align forms so that the actual surface does not vary from true surface more than 1/8 inch.
 - 2. The surface shall be clean, undamaged, and free of offsets and irregularities at joints.
 - 3. Adequately brace and frame to retain true shapes under vibration and placing strains without leaks, bowing, or deflection.

- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
 - C. Studs, girts, and walls shall not be less than 2 by 4's, S4S, construction of standard grade Douglas fir, or equal, selected for straightness.
 - 1. Walls shall consist of at least two 2 by 4's.
 - 2. Studs shall not be spaced more than 16 inches, girts not more than 24 inches and ties not more than 27 inches, on center.
 - D. Lightly oil wood forms prior to placing reinforcing, and with oil not permitted on the reinforcing. Where oil form is used, remove excess before pouring concrete.
 - E. Unless indicated otherwise, chamfer exterior corners and edges of permanently exposed concrete.
 - F. Comply with recommendations of "Recommended Practice for Concrete Form work" ACI 347 unless indicated otherwise.
- 3.02 INSERTS AND FASTENING DEVICES FOR OTHER WORK
- A. Provide for installation of inserts, hangers, metal ties, anchors, bolts, dowels, nailing strips, grounds and other fastening devices required for attachment of other Work
 - B. Locate partitions for other trades prior to pouring concrete in order that conduits, sleeves and inserts required by others will be installed in the proper locations.
 - C. Do not install sleeves in any concrete beams or piers except upon approval of the Project Engineer.
 - D. Do not install aluminum conduits in concrete.
- 3.03 VAPOR RETARDERS
- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended tape. Refer to Section 07 26 00 – Vapor Retarders.
 - 2. Refer to Section 07 26 15 – Vapor Barrier (Bulk Salt Storage Structure).
- 3.04 FORM REMOVAL
- A. Grade beam and column forms may be removed 24 hours after a pour is completed.
 - B. Floor slab wood forms may be removed 10 days after pour, providing compressive strength has reached a minimum of 2500 psi based on job cast cylinders.

END OF SECTION

SECTION 03 20 00 CONCRETE REINFORCING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes all concrete reinforcing and the related items necessary to complete the Project indicated by the Contract Documents unless specifically excluded.
- B. Related Sections:
 - 1. Section 03 10 00 – Concrete Forming and Accessories.
 - 2. Section 03 30 00 – Cast-in-Place Concrete.

1.02 SUBMITTALS

- A. Submit reinforcing steel shop drawings and materials list prior to placement for MDOT Architect's approval.
 - 1. Shop drawings shall include complete DIMENSIONED placing plans including control joint locations, order lists, bend diagrams, and DETAILS SHOWING DIMENSIONS WITH CLEARANCES.
 - 2. Submittals not including this requirement will be considered as an incomplete submittal and will be returned to Contractor for re-submittal.
- B. Furnish mill certificates for steel bar reinforcement, to the Project Engineer certifying that each shipment meets specifications. The fabricator will furnish certificates with bar lists to designate location of shipment and the time steel is delivered to the project.

1.03 QUALITY ASSURANCE

- A. Reinforcing bars shall conform to ASTM A 615 "Deformed Billet-Steel Bars for Concrete".
- B. Mesh reinforcement shall conform to ASTM A 185 "Welded Steel Wire Fabric for Concrete Reinforcement".
- C. Accessories shall conform to American Concrete Institute ACI 301 "Specifications for Structural Concrete for Buildings".
- D. Placement shall be in accordance with approved shop drawings and ACI 318 "Standard Building Code Requirements for Reinforced Concrete".
- E. Comply with ACI 315 "Manual of Standard Practice of Detailing Reinforced Concrete Structures".

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Reinforcing bar steel and mesh shall be handled, shipped and stored in a manner that will prevent distortion or other damage.
- B. Materials shall be stored in a manner to prevent excessive rusting and fouling with dirt, grease, or other bond-breaking coatings.

1.05 PROJECT CONDITIONS

- A. Examine the substrate over which concrete forms are installed and advise the Project Engineer of conditions detrimental to the installation of concrete formwork. Do not proceed until unsatisfactory conditions have been corrected.
- B. Coordinate placement of concrete reinforcing with installation of concrete formwork, vapor barriers, concrete inserts, conduit and all other items occurring in the area.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Steel Bar Reinforcement: Bar reinforcement shall conform to ASTM A 615, grade 60, of domestic manufacture. Bars shall be new; free from rust, scale, oil, or other coatings that will prevent bond.
- B. Welded Steel Wire Fabric: Fabric shall conform to ASTM A 185, new, free from rust and other coatings that will prevent bond.
- C. Accessories: Metal accessories as required shall support reinforcing bars and comply with ACI 315. Chairs and bolsters for use in exposed concrete shall have plastic coated or stainless steel legs or shall be plastic.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Fabricate and place reinforcement in accordance with the latest requirements of the American Concrete Institute and the approved shop drawings. Fabrication shall not proceed until MDOT Architect's approval is obtained.
- B. Reinforcing for one day's pour shall be completely placed and an inspection made by the Project Engineer / MDOT Architect prior to starting the pour.
- C. Concrete Protection for Reinforcement: Minimum coverage shall be as follows unless shown otherwise on drawings:
 - 1. Footings (bottom of steel) 3 inches clear
 - 2. Slabs 1-1/2 inches clear top and 3/4 inch clear bottom
 - 3. Beams 1-1/2 inch clear to stirrups
 - 4. Walls 2-1/2 inches clear
 - 5. Columns 2 inches clear to verticals
- D. Steel Dowels for successive work shall be wired in correct position before placing concrete. The "sticking" of dowels after placing concrete will not be permitted.
- E. Lap all bars 24 bar diameters at corners, splices and intersections.
- F. Interrupt Reinforcing steel at control joints in floor slabs.
- G. Do not weld reinforcing steel unless specifically approved by the Project Engineer.

END OF SECTION

SECTION 03 21 15

CONCRETE REINFORCING STEEL

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes: Concrete reinforcing and the related items necessary to complete the Bulk Salt Storage Structure indicated by the Contract Documents unless specifically excluded.
- B. Related Sections:
 - 1. Section 03 10 00 – Concrete Forming and Accessories.
 - 2. Section 03 31 00 – Structural Concrete.

1.02 SUBMITTALS

- A. Submit reinforcing steel shop drawings and materials list prior to placement for MDOT Architect's approval.
 - 1. Shop drawings shall include complete DIMENSIONED placing plans including control joint locations, order lists, bend diagrams, and DETAILS SHOWING DIMENSIONS WITH CLEARANCES.
 - 2. Submittals not including this requirement will be considered as an incomplete submittal and will be returned to Contractor for re-submittal.
- B. Furnish mill certificates for steel bar reinforcement, to the Project Engineer certifying that each shipment meets specifications. The fabricator will furnish certificates with bar lists to designate location of shipment and the time steel is delivered to the project.
- C. Contractor shall check shop drawings for dimensions and consistency with pours before forwarding to Project Architect for approval, and shall stamp drawings to confirm his checking.

1.03 QUALITY ASSURANCE

- A. Reinforcing shall be placed by installers regularly engaged in this type of work.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Reinforcing bar steel and mesh shall be handled, shipped and stored in a manner that will prevent distortion or other damage.
- B. Materials shall be stored in a manner to prevent fouling with dirt, grease, or other bond-breaking coatings.

1.05 PROJECT CONDITIONS

- A. Examine the substrate over which concrete forms are installed and advise the Project Engineer of conditions detrimental to the installation of concrete formwork. Do not proceed until unsatisfactory conditions have been corrected.

- B. Coordinate placement of concrete reinforcing with installation of concrete formwork, vapor barriers, concrete inserts, conduit and all other items occurring in the area.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Steel Bar Reinforcement: Bar reinforcement shall conform to ASTM A 615, grade 60, epoxy coated. Furnish mill certificates to the Project Architect certifying that each shipment meets specifications. The fabricator will furnish certificates with bar lists to designate location of shipment and the time steel is delivered to the job.
- B. Accessories: Metal accessories as required shall support reinforcing bars and comply with ACI 315. Chairs and bolsters for use in concrete shall have plastic coated or stainless steel legs or shall be plastic.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Fabricate and place reinforcement in accordance with the latest requirements of the American Concrete Institute and the approved shop drawings. Fabrication shall not proceed until MDOT Architect's approval is obtained.
- B. Reinforcing for one day's pour shall be completely placed and an inspection made by the Project Engineer / MDOT Architect prior to starting the pour.
- C. Concrete Protection for Reinforcement: Minimum coverage shall be as follows unless shown otherwise on drawings:
 - 1. Footings (bottom of steel) 3 inches clear
 - 2. Walls 2 inches clear to verticals
- D. Steel Dowels for successive work shall be wired in correct position before placing concrete. The "sticking" of dowels after placing concrete will not be permitted.
- E. Lap all bars 24 bar diameters at corners, splices and intersections.
- F. Do not weld reinforcing steel unless specifically approved by the Project Engineer.

END OF SECTION

SECTION 03 30 00 CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, finishes, and other related items necessary to complete Project indicated by Contract Documents unless specifically excluded
- B. Related Sections:
 - 1. Section 03 10 00 - Concrete Forming and Accessories.
 - 2. Section 03 20 00 - Concrete Reinforcing.
 - 3. Section 07 26 00 - Vapor Retarders.
 - 4. Section 09 90 00 – Painting and Coating.

1.02 SUBMITTALS

- A. Submit concrete mix design, concrete compression test reports and product data and manufacturer's installation instructions for concrete curing compound.

1.03 TESTING LABORATORY SERVICES

- A. The Owner will provide testing as specified in Section 01 45 29.

1.04 QUALITY ASSURANCE

- A. Concrete work shall conform to all requirements of ACI 301, Specifications for Structural Concrete for Buildings and ACI 318 Building Code Requirements for Reinforced Concrete, latest editions, except as modified by supplemental requirements herein.
- B. Mix Design: Concrete mix design proportioning shall be by a certified MDOT Class III technician and submitted to the Project Engineer prior to placing concrete. Mix proportions shall meet the requirements of the 804.02.10 Section of the MDOT's Standard Specifications, 2017 Edition, except concrete requiring a trowel finish shall not be air entrained and shall meet the compressive strength requirements for Class B concrete. Concrete shall be sampled according to ASTM C 172 and compression test cylinders made and cured according to ASTM C 31. Control of mixes is to be maintained at the Ready-Mix Plant and on the job site. Adjustments of the mix proportions shall meet the requirements of Section 804.02.10.4 of MDOT's Standard Specifications, 2017 Edition.

- C. The Owner will mold and cure compression test cylinders (two cylinders per set) from concrete at the job site from the first placement of each mix design placed each day and additionally for each 75 cubic yards, or fraction thereof, of each mix design placed in a single day. In addition to sampling concrete in accordance with ASTM C 172, the Owner will follow the sampling requirements Paragraph 6.1.2 in the latest edition of the Department's *Concrete Field Manual*.
1. Cylinders will be tested in accordance with ASTM C 39. The Owner will mold one set of cylinders for ensuring the concrete meets the minimum 28-day acceptance requirements.
 2. The Owner will mold three sets of cylinders for form removal in accordance with Subsection 907-804.03.15. Forms may be removed when the compressive strength of the field cured cylinders reaches 2000 psi.
 3. In addition to determining the slump, temperature, and total air content of the concrete used for molding the test cylinders, the Owner will determine the yield of each mix design during the first placement of each mix design.
 4. Copies of all test reports shall be furnished to the ready mixed concrete producer and as directed by the Project Engineer.

1.05 COORDINATION

- A. Verify that all pipes under grade have been installed and tested before being covered. Check and verify materials and locations of inserts, anchors, and items required by other trades before pouring concrete. Concerned subcontractors shall be notified of date of pour in sufficient time to allow for completion of their work.
- B. The Contractor shall notify the Project Engineer upon completing formwork and all reinforcing steel for the next intended pour, and shall not commence pouring operation until all forms and reinforcing steel are approved by the Project Engineer.
- C. Project Engineer shall have free access to all materials used, and the required samples are to be furnished by the Contractor, as directed.
- D. Inspection and written approval from the floor-covering subcontractor is required for slab finish receiving floor covering.

PART 2 - PRODUCTS

2.01 CONCRETE, GENERAL

- A. All concrete, unless otherwise specifically approved in writing by the Project Engineer, shall be transit-mixed in accordance with ASTM C94. Control of concrete shall be under supervision of testing laboratory as described in Section 01 45 29.
- B. All concrete, unless noted otherwise, shall be Class B.
- C. Maximum slump for normal weight concrete shall be 4 inches. Slump may be increased to 8 inches with an approved water reducer.

2.02 CONCRETE MATERIALS

- A. Portland Cement: ASTM C-150, Type I.
- B. Water: From an approved source.
- C. Structural Concrete Aggregate: Coarse aggregate size number 57 or 67 shall be used and shall meet the requirements of MDOT Standard Specifications, 2017 Edition.
- D. Admixtures: Admixtures shall be from the MDOT Approved List. Non-uniform addition of mixtures that result in erratic setting of the concrete will cause rejection of the concrete with subsequent removal from the structure at the concrete producer's expense.

2.03 RELATED MATERIALS

- A. Preformed Expansion Joint Fillers: Provide pre-molded, asphalt impregnated board in widths and thickness required by conditions (1/2-inch minimum). Joint fillers shall conform to ASTM D994, D1751 or D1752.
- B. Chemical Hardener (Sealer): Colorless aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent containing not less than 2 pounds of fluosilicates per gallon. Sealer shall not interfere with floor finish. Refer to Section 09 90 00 for Concrete Floor Coating and Sealer in main shop area and as scheduled on Drawings.
- C. Curing Compound: Clear bond, manufactured by Guardian Chemical Co., Kure-N-Seal, manufactured by BASF / Sonneborn, Safe-Cure, manufactured by Dayton Superior Corp. or approved equal. Compound shall not interfere with bonding or floor finish.
- D. Non-Shrink Grout: Shall be one part Portland cement to 2-1/2 parts of fine aggregate or Cement grout ASTM C 387 Dry Package mixtures similar and equal to Masterflow 713 Plus, manufactured by BASF / Master Builders; Five Star Grout, U.S. Grout Company or approved equal.

2.04 CONCRETE MIXES

- A. Ready-Mixed Concrete: Ready-mix concrete shall be mixed and delivered in accordance with requirements of ASTM C 94. Uniformly and accurately control proportions of material weight. Slump tolerances given in ASTM C 94 apply. Calcium chloride shall not be used.
- B. Failure of concrete to meet the specified requirements may result in rejection with subsequent removal and replacement or re-testing (including coring, load test, etc.) at the supplier's expense.
 - 1. Concrete exhibiting adverse reaction as a result of the presence of deleterious substances shall be removed and replaced or repaired in a manner completely satisfactory to the Project Engineer.
 - 2. All cost of such corrective action, including all necessary testing, shall be borne by the concrete producer.

- C. The Contractor may request adjustment to concrete mix design when characteristics of materials, job conditions, weather, test results, or circumstances warrant, at no additional cost to the Owner and as approved by the Project Engineer. Laboratory test data for revised mix designs and strength results must be submitted to and approved before using in the Work.

PART 3 - EXECUTION

3.01 CONCRETE PLACEMENT

- A. Concrete shall be placed so as to avoid segregation of materials and to prevent cold joints by avoiding re-handling, by keeping pours generally level, and by adequate vibration. Placing is not to be started during rain or snow, and if placing is underway when such conditions occur, continue operations only long enough to provide a suitable construction joint.
- B. During hot weather or periods of low humidity combined with a definite breeze, rapid loss of moisture shall be discouraged by thorough wetting of forms and by using a fine fog spray when finishing. At these times particular attention shall be given to providing an adequate number of finishers to expedite this operation. During cold weather fresh concrete shall be protected from freezing.
- C. Prior to placing, forms shall be cleaned free of foreign material and shall be washed down with water. Placing shall be a continuous operation between planned construction joints with fresh cement mixed only with plastic concrete already in place. Avoid cold joints.
- D. Vibration shall be thorough, using vibrators small enough to work within reinforcing. The vibrator shall be inserted at many points about 24 inches apart. Avoid over-vibration and transporting concrete in form by vibration. A spare vibrator, which will operate, shall be kept on the job during all placing operations.

3.02 CONSTRUCTION JOINTS

- A. Locate construction joints and provide shear keys as directed by the Project Engineer / MDOT Architect. Allow concrete to set for 24 hours before an adjoining pour is started. Slabs across the joint shall be level and the surface shall be level and shall not be feathered. Before proceeding with the following pour at a joint, thoroughly clean the joint, remove all loose material, and brush in a thick cement slurry.

3.03 CURING

- A. Keep all concrete moist for 5 days after placing by covering with concrete curing paper, by leaving forms in place or by using curing compound. All combined with regular wetting as necessary.

3.04 PATCHING

- A. Honeycombed and defective concrete shall be removed and replaced, or repaired, as directed by the Project Engineer. Form tie holes and minor areas, as determined by the Project Engineer, shall be repaired as follows:
1. Completed patch shall be indistinguishable from surrounding surfaces in color and texture.
 2. Patching mixture, using same cement sand as used in concrete shall consist of 1 part cement to 2-parts sand, with just enough mixing water to permit placing. Premix mixture, allow standing at least 30 minutes before using, stirring with trowel during this period.
 3. Remove material to sound concrete, dampen surface and brush thick 1 to 1 cement sand bond coat into surface.
 4. When bond coat begins to lose water sheen, thoroughly pack patching mixture in place, leaving it somewhat higher than adjacent surface. Embed pieces of gravel by hand into patch.

3.05 FINISHES FOR FLATWORK

- A. Trowel finish floor surfaces scheduled as concrete finish walking surfaces, or floor surfaces scheduled to receive floor covering. Trowel finished surfaces shall be true planes within 1/8 inch in 10 feet as determined by a 10 foot straightedge placed anywhere on the slab in any direction.
- B. Smooth trowel finish after the surface is screeded and floated. Start troweling when all water has disappeared from the surface to first level the surface, then start final troweling when concrete has set where it no longer shows indentation from finger pressure. Trowel to a hard, smooth surface free of marks. Dusting of cement or cement and sand will not be permitted.
- C. Interior floors, with concrete finish scheduled, shall receive an application of hardener compound applied according to manufacturer's published instructions. Concrete surfaces to receive ceramic floor tile or brick shall receive float finish.
- D. Exterior walks and ramps shall have smooth trowel and fine broom finish.
- E. Exterior sign base shall have a Class 2, Rubbed Finish as follows:
1. After removal of forms, the Class 1 finish shall be completed and the rubbing of concrete shall be started as soon as its condition will permit. Immediately before starting this work, the concrete shall be kept thoroughly saturated with water for at least three hours.
 2. Surface shall be rubbed with a medium course carborundum stone using a small amount of mortar on its face. The mortar shall be composed of cement and sand mixed in the proportions used in the concrete being finished. Rubbing shall be continued until all form marks, projections, and irregularities have been removed, all voids filled, and a uniform surface has been obtained.
 3. The final finish shall be obtained by rubbing with a fine carborundum stone and water. This rubbing shall continue until the entire surface is a smooth texture and uniform color.
 4. After the final rubbing is completed and the surface has dried, it shall be rubbed with burlap to remove loose powder and objectionable marks.

3.06 FINISHES FOR GRADE BEAMS

- A. Exposed grade beam faces shall have a smooth form finish obtained by using selected form facing plywood, arranged orderly and symmetrically with a minimum of seams.
 - 1. Repair and patch defective areas with all fins or other projections completely removed and smoothed. Provide grout cleaned finish consisting of 1 part Portland cement to 1-1/2 parts fine sand by volume, and mix with water to the consistency of thick paint.
 - 2. Blend standard Portland cement and white Portland cement, amounts determined by trial patches, so that the final color of dry grout will closely match adjacent concrete surfaces.
- B. Thoroughly wet concrete surfaces and apply grout immediately to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.

END OF SECTION

SECTION 03 31 00

STRUCTURAL CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes structural cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, finishes and other related items necessary to complete the Bulk Salt Storage Structure indicated by Contract Documents unless specifically excluded.
- B. Related Sections:
 - 1. Section 03 10 00 - Concrete Forming and Accessories.
 - 2. Section 03 21 15 - Concrete Reinforcing Steel.
 - 3. Section 07 14 00 - Fluid-Applied Dampproofing.
 - 4. Section 07 26 15 - Vapor Barrier.

1.02 SUBMITTALS

- A. Submit concrete mix design, concrete compression test reports and product data and manufacturer's installation instructions for concrete curing compound.

1.03 TESTING LABORATORY SERVICES

- A. The Owner will provide testing as specified in Section 01 45 29.

1.04 QUALITY ASSURANCE

- A. Concrete work shall conform to all requirements of ACI 301, Specifications for Structural Concrete for Buildings and ACI 318 Building Code Requirements for Reinforced Concrete, latest editions, except as modified by supplemental requirements herein.
- B. Mix Design: Concrete mix design proportioning shall be by a certified MDOT Class III technician and submitted to the Project Engineer prior to placing concrete. Mix proportions shall meet the requirements of the 804.02.10 Section of the MDOT's Standard Specifications, 2017 Edition, except concrete requiring a trowel finish shall not be air entrained. Design mix is to be established to provide concrete of 10 percent higher strength than the specified job strength. Concrete shall be sampled according to ASTM C 172 and compression test cylinders made and cured according to ASTM C 31. Control of mixes is to be maintained at the Ready-Mix Plant and on the job site. Adjustments of the mix proportions shall meet the requirements of Section 804.02.10.4 of MDOT's Standard Specifications, 2017 Edition.

- C. The Owner will mold and cure compression test cylinders (two cylinders per set) from concrete at the job site from the first placement of each mix design placed each day and additionally for each 75 cubic yards, or fraction thereof, of each mix design placed in a single day. In addition to sampling concrete in accordance with ASTM C 172, the Owner will follow the sampling requirements Paragraph 6.1.2 in the latest edition of the Department's *Concrete Field Manual*.
1. Cylinders will be tested in accordance with ASTM C 39. The Owner will mold one set of cylinders for ensuring the concrete meets the minimum 28-day acceptance requirements.
 2. The Owner will mold three sets of cylinders for form removal in accordance with Subsection 907-804.03.15. Forms may be removed when the compressive strength of the field cured cylinders reaches 2000 psi.
 3. In addition to determining the slump, temperature, and total air content of the concrete used for molding the test cylinders, the Owner will determine the yield of each mix design during the first placement of each mix design.
 4. Copies of all test reports shall be furnished to the ready mixed concrete producer and as directed by the Project Engineer.

1.05 COORDINATION

- A. The Contractor shall notify the Project Engineer upon completing formwork and all reinforcing steel for the next intended pour, and shall not commence pouring operation until all forms and reinforcing steel are approved by the Project Engineer.
- B. Project Engineer shall have free access to all materials used, and the required samples are to be furnished by the Contractor, as directed.

PART 2 - PRODUCTS

2.01 CONCRETE, GENERAL

- A. All concrete, unless otherwise specifically approved in writing by the Project Engineer, shall be transit-mixed in accordance with ASTM C94. Control of concrete shall be under supervision of testing laboratory as described in Section 01 45 29.
- B. Structural concrete shall have 3,000-psi minimum compressive strengths at 28 days, unless noted otherwise.
- C. Maximum slump for normal weight concrete shall be 4 inches. Slump may be increased to 6 inches with an approved mid-range water reducer and up to 8 inches with an approved high-range water reducer.

2.02 CONCRETE MATERIALS

- A. Portland Cement: ASTM C-150, Type I.
- B. Water: From an approved source.
- C. Structural Concrete Aggregate: Nominal maximum aggregate size 57 or 67 shall be used and shall meet the requirements of MDOT Standard Specifications, 2017 Edition.

- D. Admixtures: Admixtures shall be from the MDOT Approved List. Non-uniform addition of mixtures that result in erratic setting of the concrete will cause rejection of the concrete with subsequent removal from the structure at the concrete producer's expense.

2.03 RELATED MATERIALS

- A. Preformed Expansion Joint Fillers: Provide pre-molded, asphalt impregnated board in widths and thickness required by conditions (1/2-inch minimum). Joint fillers shall conform to ASTM D994, D1751 or D1752.
- B. Chemical Hardener (Sealer): Colorless aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent containing not less than 2 pounds of fluosilicates per gallon.
- C. Curing Compound: Clear bond, manufactured by Guardian Chemical Co., Kure-N-Seal, manufactured by BASF / Sonneborn, Safe-Cure, manufactured by Dayton Superior Corp. or approved equal.
- D. Non-Shrink Grout: Shall be one part Portland cement to 2-1/2 parts of fine aggregate or Cement grout ASTM C 387 Dry Package mixtures similar and equal to Masterflow 713 Plus, manufactured by BASF / Master Builders; Five Star Grout, U.S. Grout Company or approved equal.

2.04 CONCRETE MIXES

- A. Ready-Mixed Concrete: Ready-mix concrete shall be mixed and delivered in accordance with requirements of ASTM C 94. Uniformly and accurately control proportions of material weight. Slump tolerances given in ASTM C 94 apply. Calcium chloride shall not be used.
- B. Failure of concrete to meet the specified requirements may result in rejection with subsequent removal and replacement or re-testing (including coring, load test, etc.) at the supplier's expense.
 - 1. Concrete exhibiting adverse reaction as a result of the presence of deleterious substances shall be removed and replaced or repaired in a manner completely satisfactory to the Project Engineer.
 - 2. All cost of such corrective action, including all necessary testing, shall be borne by the concrete producer.
- C. The Contractor may request adjustment to concrete mix design when characteristics of materials, job conditions, weather, test results, or circumstances warrant, at no additional cost to the Owner and as approved by the Project Engineer. Laboratory test data for revised mix designs and strength results must be submitted to and approved before using in the Work.

PART 3 - EXECUTION

3.01 CONCRETE PLACEMENT

- A. Concrete shall be placed so as to avoid segregation of materials and to prevent cold joints by avoiding re-handling, by keeping pours generally level, and by adequate vibration. Placing is not to be started during rain or snow, and if placing is underway when such conditions occur, continue operations only long enough to provide a suitable construction joint.
- B. During hot weather or periods of low humidity combined with a definite breeze, rapid loss of moisture shall be discouraged by thorough wetting of forms and by using a fine fog spray when finishing. At these times particular attention shall be given to providing an adequate number of finishers to expedite this operation. During cold weather fresh concrete shall be protected from freezing.
- C. Prior to placing, forms shall be cleaned free of foreign material and shall be washed down with water. Placing shall be a continuous operation between planned construction joints with fresh cement mixed only with plastic concrete already in place. Avoid cold joints.
- D. Vibration shall be thorough, using vibrators small enough to work within reinforcing. The vibrator shall be inserted at many points about 24 inches apart. Avoid over-vibration and transporting concrete in form by vibration. A spare vibrator, which will operate, shall be kept on the job during all placing operations.

3.02 CONSTRUCTION JOINTS

- A. Locate construction joints and provide shear keys as directed by the Project Engineer / MDOT Architect. Allow concrete to set for 24 hours before an adjoining pour is started. Slabs across the joint shall be level and the surface shall be level and shall not be feathered. Before proceeding with the following pour at a joint, thoroughly clean the joint, remove all loose material, and brush in a thick cement slurry.

3.03 CURING

- A. Keep all concrete moist for 5 days after placing by covering with concrete curing paper, by leaving forms in place or by using curing compound. All combined with regular wetting as necessary.

3.04 PATCHING

- A. Honeycombed and defective concrete shall be removed and replaced, or repaired, as directed by the Project Engineer. Form tie holes and minor areas, as determined by the Project Engineer, shall be repaired as follows:
1. Completed patch shall be indistinguishable from surrounding surfaces in color and texture.
 2. Patching mixture, using same cement sand as used in concrete shall consist of 1 part cement to 2-parts sand, with just enough mixing water to permit placing. Premix mixture, allow standing at least 30 minutes before using, stirring with trowel during this period.
 3. Remove material to sound concrete, dampen surface and brush thick 1 to 1 cement sand bond coat into surface.
 4. When bond coat begins to lose water sheen, thoroughly pack patching mixture in place, leaving it somewhat higher than adjacent surface. Embed pieces of gravel by hand into patch.

3.05 FINISHES FOR WALLS

- A. Exposed faces shall have a smooth form finish obtained by using selected form facing plywood, arranged orderly and symmetrically with a minimum of seams.
1. Repair and patch defective areas with all fins or other projections completely removed and smoothed. Provide grout cleaned finish consisting of 1 part Portland cement to 1-1/2 parts fine sand by column, and mix with water to the consistency of thick paint.
 2. Blend standard Portland cement and white Portland cement, amounts determined by trial patches, so that the final color of dry grout will closely match adjacent concrete surfaces.
- B. Thoroughly wet concrete surfaces and apply grout immediately to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.

END OF SECTION

SECTION 04 22 00 CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.01 SUMMARY

Section Includes: Concrete masonry units, mortar and reinforcing.

Related Sections:

1. Section 09 05 15 – Color Design.
2. Section 09 90 00– Painting and Coating
3. Section 01 45 23 – Testing and Inspection Services - Contractor

1.02 ACTION SUBMITTALS

Product Data: For each type of product indicated. Include instructions for handling, storage, installation, cleaning, and protection of each.

Shop Drawings: For reinforcing steel. Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.

1.03 INFORMATIONAL SUBMITTALS

Material Certificates: For each type and size of product indicated. For masonry units include data on material properties and material test reports substantiating compliance with requirements.

Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

1.04 QUALITY ASSURANCE

Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6 unless modified by requirements in the Contract Documents.

Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 01 40 00 "Quality Requirements" for mockups.

1.05 PROJECT CONDITIONS

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 602/ACI 530.1/ASCE 6.

Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.01 ACCEPTABLE CONCRETE UNIT MASONRY MANUFACTURERS

Equivalent products by the following manufacturers are acceptable:

1. Block USA, Inc., Jackson, MS. Tel. (601) 355-0691.
2. Columbia Block & Brick, Columbia, MS. Tel (601) 736-3791
3. Saturn Materials, LLC. Columbus, MS. Tel. (262) 902-6011.
4. Tupelo Concrete Products, Tupelo, MS. Tel: (662) 842-7811.

Substitutions that fully meet or exceed the specified requirements may be considered under provisions of Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.02 CONCRETE UNITS MASONRY, GENERAL

Obtain masonry units from one manufacturer, of uniform texture and color for each kind required, for each continuous area and visually related areas.

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.

Manufacturer's standard units. The nominal face dimensions shall be 16 inches long by 8 inches high by 8 inches deep (15-5/8 inches by 7-5/8 inches by 7-5/8 inches actual), unless otherwise shown. Provide special shapes where shown and where required for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.

Hollow Load-Bearing: Provide units complying with ASTM, C 90. Provide normal weight units using ASTM C 331 aggregate for a dry net weight of not less than 125 lbs. per cubic foot.

Classification: Curing shall comply with ASTM C 90, Type II, Nonmoisture-Controlled Units.

Exposed Face: Provide manufacturer's standard color and texture, unless otherwise indicated.

CMUs: ASTM C 90.

1. Density Classification: Normal weight unless otherwise indicated.

2.03 CONCRETE AND MASONRY LINTELS

General: Unless indicated otherwise, provide one of the following:

Concrete Lintels: ASTM C 1623, matching CMUs in color, texture, and density classification; and with reinforcing bars indicated. Provide lintels with net-area compressive strength not less than CMUs.

Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout.

2.04 MORTAR AND GROUT MATERIALS

Mortar mixes shall comply with the requirements of ASTM C 270 Standard Specification for Mortar for Unit Masonry. Type N mortar shall be used for interior Work. Mortar color shall be Manufacturer's standard color.

Portland Cement: ASTM C 150, Type I, except Type III may be used for cold-weather construction. Provide natural color.

Hydrated Lime: ASTM C 207, Type S.

Sand: ASTM C 144, except for joints less than 1/4 inches, use aggregate graded with 70 to 100 percent passing the No. 16 sieve.

Aggregate for Mortar: ASTM C 144.

1. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
2. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.

Aggregate for Grout: ASTM C 404.

Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

3. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF: MasterPel 240MA
 - b. Euclid Chemical Company (The); Accelguard 80.
 - c. Grace Construction Products, W. R. Grace & Co. - Conn.; Morset.

Water: Potable.

2.05 REINFORCEMENT

Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.

Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

1. Interior Walls: Mill- galvanized, carbon steel.
2. Wire Size for Side Rods: 0.148-inch diameter.
3. Wire Size for Cross Rods: 0.148-inch diameter.
4. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
5. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

2.06 Include spec info for vertical reinforcing rods and all cells filled with concrete.
TIES AND ANCHORS

Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

Partition Top anchors: 0.105-inch- thick metal plate with 3/8-inch- diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.

4. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M

Anchor Bolts: Headed or L-shaped 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.

2.07 MISCELLANEOUS MASONRY ACCESSORIES

Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from neoprene or urethane.

Prefomed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

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. Install cut units with cut surfaces and, where possible, cut edges concealed

3.02 TOLERANCES

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.

Lines and Levels:

4. 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.
5. 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.
6. 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.
7. 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.
8. 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.

Joints:

9. 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.
10. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
11. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.03 LAYING MASONRY WALLS

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.

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.

Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

3.04 MORTAR BEDDING AND JOINTING

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.
4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.05 MASONRY JOINT REINFORCEMENT

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. Space reinforcement not more than 16 inches on center.
2. Space reinforcement not more than 8 inches on center 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.

Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

Provide continuity at wall intersections by using prefabricated T-shaped units.

Provide continuity at corners by using prefabricated L-shaped units.

3.06 REINFORCED UNIT MASONRY INSTALLATION

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.

Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

3. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
4. Limit height of vertical grout pours to not more than 60 inches.

3.07 FIELD QUALITY CONTROL

Testing and Inspecting: Engage inspectors to perform tests and inspections and prepare reports. 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.

Inspections: Level of inspections shall comply to the "International Building Code."

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

Testing Prior to Construction: One set of tests.

Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content.

Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.08 REPAIRING, POINTING, AND CLEANING

Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged or if units do not match adjoining units as intended. Provide new units to match units and install with fresh mortar or grout, pointed to eliminate evidence of replacement

Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point up all joints at corners, openings and adjacent work to provide a neat uniform appearance, properly prepared for application of caulking or sealant compounds.

Good workmanship and job housekeeping practices shall be used to minimize the need for cleaning the masonry. Should additional cleaning be required apply chemical (muriatic acid is NOT acceptable) or detergent cleaning solutions in accordance with the masonry and chemical manufacturers' recommendations.

Remove temporary coverings and protection of adjacent work areas. Remove construction debris from the site and legally dispose of debris.

END OF SECTION

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes structural steel framing members, support members, with required bracing, welds, fasteners, base plates, bearing plates, grout, anchor bolts and other related items necessary to complete Project indicated by Contract Documents unless specifically excluded.
- B. Related Sections:
 - 1. Section 09 05 15 "Color Design".
 - 2. Section 09 90 00 "Painting and Coating"

1.02 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.03 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.
 - 1. Select and complete connections using schematic details indicated and AISC 360.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components. Shop drawings shall conform to requirements of current AISC Specifications. Indicate sizes, spacing, connections, and location of structural members. Indicate net weld lengths and welded connections with AWS welding symbols.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer and fabricator.
- B. Welding certificates.
- C. Mill test reports for structural steel, including chemical and physical properties.
- D. Source quality-control reports.

1.06 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. Installer Qualifications: A qualified installer with a minimum of five (5) years experience.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC 303.
 - 2. AISC 360.
 - 3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

PART 2 - PRODUCTS

2.01 STRUCTURAL-STEEL MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. W-Shapes: ASTM A 992/A 992M
- C. Channels, Angles, M or, S-Shapes: ASTM A 572/A 572M, Grade 50.
- D. Plate and Bar: ASTM A 572/A 572M, Grade 50.
- E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- F. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
- G. Welding Electrodes: Comply with AWS requirements.

2.02 BOLTS, CONNECTORS, AND ANCHORS

- A. General: All bolts not indicated otherwise on the Drawings are 3/4 inch. All connections not noted otherwise on the Drawings shall be framed connections.
- B. 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.
- C. Unheaded Anchor Rods: ASTM F 1554, Grade 55, weldable.
 - 1. Configuration: Hooked.
 - 2. Finish: Plain

- D. Headed Anchor Rods: ASTM F 1554, Grade 55, weldable, straight.
 - 1. Finish: Plain
 - E. Threaded Rods: ASTM A 36/A 36M
 - 1. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C
 - F. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.
- 2.03 PRIMER
- A. Primer: Shop coat paint, ICI Devflex 4020, Rustoleum 769, Tnemec 99, Southern Coatings 476, or approved equal. Shop coat shall be compatible with finish coats specified in Section 09 90 00 Painting and Coating.
- 2.04 GROUT
- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
 - 1. Grout shall have a 14-day compressive strength of 6000 psi when mixed to its flowable state.
- 2.05 FABRICATION
- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
 - 1. Fabrication shall not proceed until MDOT Architect's approval is obtained.
- 2.06 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.
 - 1. Joint Type: Snug tightened.
 - 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.
- 2.07 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 be high-strength bolted with slip-critical connections.
 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 5. Galvanized surfaces.
- 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 3, "Power 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.

2.08 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports required by AHJ and ICC Building Code.
1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
1. Liquid Penetrant Inspection: ASTM E 165.
 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 3. Ultrasonic Inspection: ASTM E 164.
 4. Radiographic Inspection: ASTM E 94.

PART 3 - EXECUTION

3.01 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.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Base Bearing and Leveling Plates: 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's "Code of Standard Practice for Steel Buildings and Bridges."

3.03 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 for type of bolt and type of joint specified."
 - 1. Joint Type: Snug tightened
- 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.

3.04 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.
 - 1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
- D. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

END OF SECTION

SECTION 05 50 00 METAL FABRICATIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. All miscellaneous metal work. The Work includes, but is not limited to, steel pipe railings, pipe bollards, steel lintels and miscellaneous framing & supports.

B. Related Sections:

1. Section 09 05 15 – Color Design.
2. Section 09 90 00 - Painting and Coating: Painting for all ferrous metal exposed to view and not covered by masonry or concrete.

1.02 ACTION SUBMITTALS

A. Product Data: For the following:

1. Paint products.
2. Grout.

B. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

PART 2 - PRODUCTS

2.01 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Structural shapes shall be standard sections conforming to the American Society for Testing Materials Specification A-36. Punch and drill as necessary for work of others. Provide bearing plates and anchors, bolts, and etc. The Work shall be true and free of twists, bends and open joints between component parts. Materials shall be thoroughly straightened in the shop before laid off or worked in any way, care being used to avoid injury to the material.

C. Gray cast iron shall conform to ASTM A 48. Castings shall be of uniform quality, free from blowholes, shrinkage defects, swells, cracks or other defects. Castings shall be free of fins, burrs and slag.

- D. Expansion bolts shall be equal to Phillips Red Head or "cinch" bolts as manufactured by the National Lead Company. Hilti Fasteners, Rawlplug Company and Wej-it Corporation are acceptable manufacturers. Use toggle type bolts or similar for all anchorage into hollow construction.
- E. Bolt or weld connections: Provide necessary lugs and brackets for anchorage. Welding shall be in accordance with current "Code of Fusion, Welding and Gas Cutting in Building Construction, Part A - Structural Steel" issued by the American Welding Society, both for fabrication and erection. All welders shall have certification, as a result of tests prescribed by the American Welding Society.
- F. Detail metal Work for ample size, strength and stiffness and as indicated. Countersink and provide reinforcement where necessary; drill or punch holes for bolts and screws. At the proper time furnish the necessary templates, patterns and items of miscellaneous metal, such as sleeves, inserts and similar items to be built into adjoining Work.
- G. Fabricate metal Work with sharp lines and angles, with smooth true surfaces and clean edges. Form exposed joints to exclude water. Furnish certificates from manufacturers stating that materials comply with the specification requirements.
- H. Provide as necessary holes of proper number and spacing for the attachment of Work of other trades. Do not use cutting torch in field without permission of the Project Engineer.
- I. Anchor bolts, washers, nuts and clamps shall be furnished where indicated on the Drawings and where necessary for properly securing Work in place. Bolts and anchors used on the exterior of the building or built into exterior walls shall be cadmium plated. Miscellaneous angles and plates not indicated or specified otherwise shall not be less than 1/4 inch thick.
- J. Shop paint and field touch up shall be ICI Devflex 4020, Rustoleum 769, Tnemec 99, Southern Coatings 476, or approved equal. Shop coat shall be compatible with finish coats specified in Section 09 90 00 – Paints and Coatings

2.02 FASTENERS

- A. General: Fastenings shall be invisible where possible. Where exposed, screws, bolts, and the like shall be vandal-proof. All welded exposed joints on steel manufactured items; etc. shall be ground smooth and filled to receive paint
- B. Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls.
 - 1. Provide stainless-steel fasteners for fastening aluminum.
 - 2. Provide stainless-steel fasteners for fastening stainless steel.
 - 3. Provide stainless-steel fasteners for fastening nickel silver.
 - 4. Provide bronze fasteners for fastening bronze.
- C. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; 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, all hot-dip galvanized per ASTM F 2329.

- D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
1. 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.
 2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.03 PIPE RAILINGS

- A. Structural Performance: 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.
- B. Fabricate railings and posts from 1-1/4 inch round tube steel, ASTM A 53, Type F or S, Grade A, Schedule 40 with galvanized finish. Shop prime after fabrication. 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-inch, unless otherwise shown.
- C. Expansion: Provide expansion joints at locations indicated, or if not indicated, at intervals not to exceed 40 feet. Provide slip joint with internal sleeve extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; locate joint within 6 inches of posts.

2.04 PIPE BOLLARDS

- A. 8-inch round extra strong steel pipe 1/2-inch thick, 36KSI. Form bent corners to the radius shown without causing grain separation or otherwise impairing the Work.

2.05 MISCELLANEOUS FRAMING AND SUPPORTS

- A. Provide miscellaneous steel framing and supports which are not a part of structural steel framework, as required to complete Work.
- B. Fabricate miscellaneous units to sizes, shapes, and profiles indicated, or, if not indicated, of required dimensions to receive adjacent other work to be retained by framing. Except as otherwise indicated, fabricate from structural steel shapes, plates and steel bars of welded construction using mitered joints for field connection. Cut, drill and tap units to receive hardware and similar items.
- C. Galvanize exterior miscellaneous frames and supports.

2.06 MISCELLANEOUS MATERIALS

- A. Metal Primers: Where materials come in contact with dissimilar materials which may cause harmful reaction, where exposed to moisture, or such as aluminum to cement mortar or concrete, the surface shall be protected by zinc chromate primer, bituminous paint or other approved paint.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- E. Concrete: Comply with requirements in Section 03 30 00 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3500 psi.

2.07 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
- C. Weld corners and seams continuously to comply with the following:
 - 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 welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended.
- D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.
- E. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors not less than 24 inches on center.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 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 welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.02 INSTALLING PIPE RAILINGS

- A. Welded Connections: Cope intersections of rails and posts, weld joints and grind smooth. Butt weld end-to-end joints of railings or use welding connectors, at fabricator's option. At connections to steel supports, weld post directly to steel supports, unless otherwise indicated.
- B. Anchorage: Use type of bracket with pre-drilled hole for exposed bolt anchorage. For stud partitions and framing use lag bolts set into wood backing between studs and framing members. Coordinate with stud installations for accurate location of backing members.

3.03 INSTALLING METAL BOLLARDS

- A. Anchor bollards in place with concrete footings. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
- B. Fill bollards solidly with concrete, mounding top surface to shed water.

3.04 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. 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 nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.05 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Concealed wood grounds and blocking to frame openings, form terminations, to provide anchorage and / or support of other interior and exterior locations; plywood, furring channels and rough hardware.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

1.03 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- B. Evaluation Reports: For the following, from ICC-ES:
 - 1. Wood-preservative-treated wood.
 - 2. Fire-retardant-treated wood.
 - 3. Engineered wood products.
 - 4. Power-driven fasteners.
 - 5. Expansion anchors.
 - 6. Metal framing anchors.

1.04 COORDINATION

- A. Fit carpentry Work to other Work; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds and similar supports to allow proper attachment of other Work.

1.05 QUALITY CONTROL

- A. Factory mark each piece of lumber and plywood to identify the type, grade, agency providing the inspection service, the producing mill and other qualities as specified.

1.06 DELIVERY, STORAGE AND PROTECTION

- A. Delivery: Keep materials dry during delivery and storage.

- B. Storage: Stack lumber and plywood, and provide air circulation within stacks. Protect against exposure to weather and contact with damp or wet surfaces.
- C. Protection: Protect installed carpentry work from damage by work of other trades until Owner's acceptance of the Work. Contractor shall comply with manufacturer's required protection procedures.

1.07 PROJECT CONDITIONS

- A. Installer shall examine all parts of the supporting structure and the conditions under which the carpentry Work is to be installed, and notify the Contractor in writing of any conditions detrimental to the proper and timely completion of the Work.
- B. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

PART 2 - PRODUCTS

2.01 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - 3. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.
- C. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - 1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.02 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.
 - 3. Wood floor plates that are installed over concrete slabs-on-grade.

2.03 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 fire-test-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 beyond the centerline of the burners at any time during the test.
 - 1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 - 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- 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. Application: Treat [all rough carpentry unless otherwise indicated.] [items indicated on Drawings, and the following:]
1. Framing for raised platforms.
 2. Concealed blocking.
 3. Framing for non-load-bearing exterior walls.
 4. Plywood backing panels.

2.04 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions: Construction, Stud, or No. 3 grade.
1. Application: All interior partitions.
 2. Species:
 - a. Mixed southern pine; SPIB.
 - b. Northern species; NLGA.
 - c. Eastern softwoods; NeLMA.
 - d. Western woods; WCLIB or WWPA.
- B. Framing Other Than Non-Load-Bearing Interior Partitions: Construction or No. 2 grade.
1. Application: Framing other than interior partitions.
 2. Species:
 - a. Southern pine; SPIB.
 - b. Douglas fir-larch; WCLIB or WWPA.
 - c. Mixed southern pine; SPIB.
 - d. Douglas fir-south; WWPA.
 - e. Hem-fir; WCLIB or WWPA.
 - f. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
- C. Framing Other Than Non-Load-Bearing Interior Partitions: Any species and grade with a modulus of elasticity of at least 1,500,000 psi and an extreme fiber stress in bending of at least 1000 psi for 2-inch nominal thickness and 12-inch nominal width for single-member use.
1. Application: Framing other than interior partitions.

2.05 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
 2. Nailers.
 3. Furring.
 4. Grounds.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber of any species.

- C. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine; No. 2 grade; SPIB.
2. Western woods; Construction or No. 2 Common grade; WCLIB or WWPA.

2.06 PLYWOOD PANELS

- A. Plywood General: For each use, comply with the requirements for "Softwood Plywood/Construction and Industrial" PS 1 by the U.S. Department of Commerce.
- B. Exposed Plywood: Where plywood will be exposed to view, provide 1/2 inch minimum thickness Interior Type plywood B-C Plugged Grade, unless otherwise specified or shown on Drawings. Unless specifically stated otherwise, all exposed plywood shall be painted or stained from standard colors as selected by Project Engineer / MDOT Architect.
- C. Plywood Subfloor: T&G panels shall be 3/4 inch thick and comply with APA-The Engineered Wood Association rated Sturd-I-Floor, Exposure 1.

2.07 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.
- B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- C. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

2.08 FURRING CHANNELS

- A. "Hat-Shaped", 7/8 inch by 2-9/16 inches, cold-rolled, 20 gage, galvanized.

2.09 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Use only sound, thoroughly seasoned materials of the longest practical lengths and sizes to minimize jointing. Use materials free from warp that cannot be easily corrected by anchoring and attachment. Sort out and discard warped material and material with other defects that would impair the quality of the Work.

- B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- C. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- D. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
- E. Do not splice structural members between supports unless otherwise indicated.
- F. Comply with AWPAM4 for applying field treatment to cut surfaces of preservative-treated lumber.
- G. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
 - 3. ICC-ES evaluation report for fastener."

3.02 ATTACHMENT AND ANCHORAGE

- A. Use finishing nails for finish Work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; pre-drill as required.
- B. Exposed Plywood: Panel ends and edges shall have spacing of 1/8 inch maximum, unless otherwise indicated by the panel manufacturer. Fasten 6 inches on center along supported panel edges and 10 inches on center at intermediate supports.
- C. Plywood Subfloor: Fasten to supporting members using combination of glue and wood screws. Mastic construction adhesives shall comply with the APA Glued Floor System and ASTM standard D3498, Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems (based on APA Specification AFG-01). Fasten screws at 6 inches on center along all edges and 10 inches on center at intermediate supports.
- D. Plywood Flooring (Mezzanine): Fasten to plywood subfloor using combination of glue and wood screws. Lay perpendicular to plywood subfloor and stagger joints in both directions. Fasten screws at 6 inches on center along all edges and 10 inches on center at intermediate supports. Install in accordance with installation instructions of The Composite Panel Association.
- E. Furring Channels: Fasten to purlins using self-drilling, self-tapping screws. Space furring at 16 inches on center, perpendicular to purlins.

3.03 WOOD GROUND, NAILERS, BLOCKING, AND SLEEPERS

- A. Provide wherever shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Set true to line and level, plumb with intersections true to required angle. Coordinate location with other Work involved.
- B. Attach to substrates securely with anchor bolts and other attachment devices as shown as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise shown. Building into masonry; anchor to formwork before concrete placement.
- C. Provide grounds of dressed, preservative treated, key-beveled lumber not less than 1-1/2 inch wide and of the thickness required to bring face of ground to exact thickness of finish material involved. Remove temporary grounds when no longer required.

3.04 WOOD FURRING

- A. Install plumb and level with closure strips at all edges and openings. Shim with wood as required.
- B. Suspended Furring: Provide of size and spacing shown, complete including hangers and all attachment devices. Level to a tolerance of 1/8 inch in 12 feet

3.05 WOOD FRAMING

- A. Set wood framing accurately to required lines and levels. Provide framing members of sizes and on spacing shown, and frame openings as shown, or if not shown, comply with the recommendation of the "Manual for Housing Framing" of the National Forest Products Association. Cut, join, and tightly fit framing around other Work. Do not splice structural members between supports unless otherwise detailed.
- B. Anchor and nail as shown, or if not shown, to comply with Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

3.06 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes sufficiently wet that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

SECTION 06 17 33 WOOD I-JOISTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. This work includes the complete furnishings and installation of all Wood I-Joists, Rim Joists, Rim Boards, hangers and accessories as shown on the Drawings herein specified and necessary to complete the work.
2. These products shall be designed and manufactured to the standards set forth in ICC ES ESR-1153.

1.02 ACTION SUBMITTALS

- A. Shop Drawings: Submit shop drawings indicating all Wood I-Joists types, connections, framing members and accessories. Shop drawings shall bear the seal of a professional Engineer registered in the State of Mississippi.

1.03 QUALITY ASSURANCE

- A. Provide the services of a structural engineer registered to practice in the State of Mississippi to design the wood I-Joists and applicable temporary and permanent bracing to sustain the indicated loads for the spans, profiles and arrangements needed to complete the Work.
- B. Comply with provisions of all applicable standards and codes and the 2012 International Building Code.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Wood I-Joists, if stored prior to erection, shall be stored in a vertical position and protected from the weather. Handle with care to avoid damage.
- B. Comply with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Flange members, web members, and adhesives shall conform to the provisions of ICC ES ESR-1153.

2.02 FABRICATION

- A. Wood I-Joists shall be equal to those shown on the Structural Drawings.

- B. Size, stress and arrangement shall be determined by dimensions indicated on the Drawings.
 - 1. Top and bottom chords shall be 3-1/2 inches wide and depth of wood I-joist shall be 16 inches (similar and equal to PRI-70 at 16 inches on center). Refer to Structural Drawings.
 - 2. Each I-Joist shall be custom designed to fit the dimensions indicated on the Drawings.
 - 3. Complete design calculations showing internal layout, member forces, and stress control points are to be furnished for each I-Joist design.
 - 4. Design Calculations shall bear the seal of a professional Engineer registered in the State of Mississippi.

2.03 TOLERANCES

- A. Depth: Plus or minus 1/16 inch.
- B. Flange Width: Plus or minus 1/16 inch.

2.04 IDENTIFICATION

- A. Each of the joists shall be identified by a stamp indicating the joist series, ICC-ES evaluation report number, manufacturer's name, plant number, date of fabrication, and the independent inspection agency's logo.

2.05 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Project Engineer.

PART 3 - EXECUTION

3.01 ACCEPTABLE INSTALLERS

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods needed for proper performance of the Work.

3.02 EXAMINATION

- A. Examine the areas and conditions under which Work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.03 PREPARATION

- A. Erection bracing in addition to specified bridging is to be provided to keep the I-Joists straight and plumb as required to assure adequate lateral support for the individual I-Joist and entire system until the sheathing material has been applied.
 - 1. The Contractor will give one week notification prior to enclosing the I-Joists to provide opportunity for inspection of the installation by the manufacturer's representative and the Project Engineer.

3.04 INSTALLATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the Work of those trades for interface with the Work of this Section.
- B. Temporary construction loads that cause member stresses beyond design limits are not permitted.
- C. Install the Work of this Section in strict accordance with the original design, pertinent requirements of agencies having jurisdiction and manufacturer's recommended installation procedures and approved shop drawings. Anchor all components firmly into position.

END OF SECTION

SECTION 06 40 00

ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Architectural woodwork as shown on the Drawings and schedules. Architectural woodwork is defined to include (in addition to items so designated on the Drawings) miscellaneous exposed wood members commonly known as "Finish Carpentry" or "Millwork", except where specified under another Section of these Specifications
- B. The types of architectural woodwork include, but are not limited to:
 - 1. Standing and Running Trim.
 - 2. Cabinets with stain or for paint finish.
 - 3. Countertops.
 - 4. Shelving.
 - 5. Hardware.
 - 6. Accessory materials.
 - 7. Miscellaneous work.
- C. Related Sections:
 - 1. Section 05 50 00 – Metal Fabrications.
 - 2. Section 06 10 00 – Rough Carpentry.
 - 3. Section 09 05 15 – Color Design.
 - 4. Section 09 90 00 – Painting and Coating

1.02 DEFINITIONS

- A. Terms used in this Section are in accordance with terminology of the Architectural Woodwork Standards, ©2014 AWI I WI 2nd Edition, October 1, 2014 including Errata through, April 29, 2016.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product, including panel products, cabinet hardware and accessories with installation instructions and finishing materials and processes.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
- C. Samples:
 - 1. Thermoset decorative panels, for each color, pattern, and surface finish.
 - 2. Exposed cabinet hardware and accessories, one unit for each type and finish.

1.04 QUALITY ASSURANCE

- A. Unless otherwise shown or specified, comply with specified provisions of the Architectural Woodwork Standards (AWS) and approved "Quality Standards".
- B. Quality Marking: Mark each unit of architectural woodwork with mill's or fabricator's identification and grade marks, located on surfaces which will not be exposed after installation.
- C. Millwork fabricator shall comply with the following:
 - 1. Have a minimum of five (5) years documented experience and shall have completed projects of similar scope and size to the work of this project.
 - 2. Have technologically advanced woodworking facilities employing the use of modern equipment and techniques for fabricating and finishing to meet the level of quality for the manufacture of all fabrication specified.
 - 3. Employ skilled workmen experienced in the fabrication and finishing of premium quality millwork.
 - 4. Be responsible for fabrication, finishing and installation of all products and procedures specified in this Section.
- D. Unless stricter requirements are indicated, comply with the AWS Standards as applicable for (but not limited to) the following types of architectural woodwork:
 - 1. Lumber
 - 2. Standing and running trim
 - 3. Cabinets and Countertops
 - 4. Shelving
 - 5. Miscellaneous work
 - 6. Finishing
 - 7. Installation of woodwork

1.05 DELIVERY, STORAGE AND HANDLING

- A. Protect woodwork during transit, delivery, storage and handling to prevent damage, soiling and deterioration. Do not deliver woodwork until painting, wet work, grinding and similar operations which could damage, soil or deteriorate woodwork have been completed in installation areas. If, due to unforeseen circumstances, woodwork must be stored in other than installation areas, store only in areas meeting requirements specified for installation areas.

1.06 FIELD CONDITIONS

- A. The installer shall examine the substrates and conditions under which the work is to be installed; and notify the Contractor in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer
- B. Environmental Limitations: Do not deliver or install cabinets 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.

PART 2 - PRODUCTS

2.01 ARCHITECTURAL WOODWORK FABRICATORS

- A. Fabricators: Subject to compliance with requirements available fabricators offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Easley & Easley Millwork, Inc., Jackson, MS. Tel. (601) 372-8881.
2. Scanlon -Taylor Millwork Company, Jackson, MS. Tel. (601) 362-5333.
3. Southeastern Constructors, Inc., Brandon, MS. Tel. (601) 825-9791.

2.02 BASIC MATERIALS AND FABRICATION METHODS

- A. Except as otherwise indicated, comply with the following requirements for architectural woodwork not specifically indicated as pre-fabricated or pre-finished standard products.
- B. Wood Moisture Content: Provide kiln-dried lumber and maintain optimum 8 to 13 percent range (damp region) moisture content in solid wood (hardwood and softwood) through fabrication, installation, and finishing operations of interior Work.
- C. Wood for Painted Finish: Comply with AWI quality standards for selection of species, grade and cut (fabricator's option, except as otherwise indicated). Wood for trim shall be maple or other closed-grain hardwood subject to Project Engineer/ MDOT Architect's prior approval.
- D. Wood for Stained Finish: Comply with AWS Edition 2 quality standards for selection of species, grade and cut.
- E. Plastic Laminate: Comply with NEMA LD3; type, thickness, color, pattern and finish as indicated for each application.
- F. Design and Construction Features: Comply with the details shown for profile and construction for architectural woodwork; and where not otherwise shown, comply with applicable Quality Standards, with alternate details at fabricator's option.
- G. Pre-Cut Openings: Fabricate architectural woodwork with pre-cut openings, wherever possible, to receive hardware, appliances, plumbing fixtures, electrical work and similar items. Locate openings accurately and use templates or roughing-in diagrams for proper size and shape. Smooth the edges of cut outs and where located in countertops and similar exposures, seal the edges of cut outs with a water resistant coating.
- H. Measurements: Before proceeding with fabrication of woodwork required to be fitted to other construction, obtain measurements and verify dimensions and shop drawing details as required for accurate fit. Where sequence of measuring substrates before fabrication would delay the project, proceed with fabrication (without field measurements) and provide ample borders and edges to allow for subsequent scribing and trimming of woodwork for accurate fit.

2.03 ARCHITECTURAL WOODWORK TYPES

- A. Wood Cabinets: Custom Grade. Provide plywood (no plywood substitutes) meeting the requirements for the specified Quality Grade. Side receiving hinges shall be "Lumber Core Plywood".
- B. Plastic Laminate Finished Casework: Grade: Premium, Plastic Laminate for Horizontal Surfaces: 0.050" thick, General Purpose Type (high pressure). Plastic Laminate for External Vertical Surfaces: 0.028" thick, General Purpose Type (high pressure).
- C. Plastic Laminate Colors and Patterns: Refer to 09 05 15 Color Design

2.04 CABINETS HARDWARE AND ACCESSORY MATERIALS

- A. Provide cabinet hardware and accessory materials associated with architectural woodwork, except for units that are specified as "door hardware" in other sections of these specifications. Except as otherwise indicated, comply with ANSI A156.9 "American National Standard for Cabinet Hardware." Unless shown or noted otherwise, cabinet hardware shall comply with the following:
 - 1. Hinges: Concealed type equal to Blum No.125 Series using full side adjustment.
 - 2. Pulls: Wire type equal to Stanley No. 4484.
 - 3. Grommets: 2 inches diameter molded plastic grommet liner with cap.
 - 4. Drawer guides: Equal to K&V No. 1300.
 - 5. Adjustable shelf hardware (side support) equal to K&V No. 255-256.
 - 6. Adjustable shelf hardware (back support) equal to K&V No. 87-24 and No.187-16 for 16 inches deep shelves.
 - 7. Adjustable shelf hardware (back support) equal to K&V No. 82-48 and No.182-20 for 20 inches deep shelves complete with fasteners and optional accessories.
 - 8. Keyboard: Underdeck Adjustable Keyboard Platform equal to Kensington Model K60067. Equivalent products by Fellows and Safco are acceptable
 - 9. Hardware finishes to be selected by the Project Engineer / MDOT Architect.

2.05 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesives: Do not use adhesives that contain urea formaldehyde.

2.06 FABRICATION

- A. Complete fabrication, including assembly, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

- B. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.
- B. Deliver concrete inserts and similar anchoring devices to be built into substrates, well in advance of the time substrates are to be built. Prior to installation of architectural woodwork, examine shop fabricated work for completion, and complete work as required, including back priming and removal of packing.

3.02 INSTALLATION

- A. Install the work plumb, level, true and straight with no distortions. Shim as required using concealed shims. Install to a tolerance of 1/8-inch in 8 feet for plumb and level (including countertops); and with 1/16-inch maximum offsets in revealed adjoining surfaces. Scribe and cut work to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.
- B. Secure woodwork with anchors or blocking built-in or directly attached to substrates. Attach to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where pre-finished matching fastener heads are required, use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork, and matching final finish where transparent finish is indicated.
- C. Casework: Install without distortion so that doors and drawers will fit openings properly and be accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete the installation of hardware and accessory items as indicated.
- D. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns, miter at corners, and comply with Quality Standards for joinery.
- E. Countertops: Anchor securely to base units and other support systems as indicated.
- F. Grommets: Provide at openings in countertops at knee spaces.
- G. Keyboard: Install per manufacturer's instructions at knee spaces.

3.03 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth ready for painted or stained finishes.

3.04 ADJUSTMENT, CLEANING, FINISHING AND PROTECTION

- A. Repair damaged and defective woodwork wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean hardware, lubricate and make final adjustments for proper operation. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop applied finishes to restore damaged or soiled areas.
- C. Refer to Section 09 90 00 for final finishing of installed painted and stained architectural woodwork.
- D. Protection: The Installer of architectural woodwork shall advise the Contractor of final protection and maintenance conditions necessary to ensure that the Work will be without damage or deterioration at the time of acceptance

END OF SECTION

SECTION 07 11 14 FLUID-APPLIED DAMPPROOFING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes dampproofing the interior face of the concrete walls and footings of the Bulk Salt Storage Structure.

1.02 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data, installation instructions and recommendations for product specified.

1.03 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer Qualifications: Company with minimum 15 years of experience in manufacturing of specified products and systems.
 - 2. Applicator Qualifications: Company with minimum of 5 years experience in application of specified products and systems on projects of similar size and scope, and is acceptable to product manufacturer.
 - a. Successful completion of a minimum of 5 projects of similar size and complexity to specified Work.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Store tightly sealed materials off ground and away from moisture, direct sunlight, extreme heat, and freezing temperatures.

1.05 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Keep from freezing in the container.
 - 2. Do not apply at temperatures below 40 degrees F or when temperatures are expected to fall to 40 degrees F within 24 hours.
 - 3. Protect from rain until coating has set.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Equivalent products by the following manufacturers are acceptable:
 - 1. Benjamin Moore & Company, Montvale, NJ 07645. Tel. (800) 344-0400.
 - 2. ICI Devco Coatings, Cleveland, OH 44115. Tel. (800) 984-5444.
 - 3. Sherwin-Williams Company, Cleveland, OH 44115. Tel. (800) 321-8194.
- B. Substitutions shall fully comply with specified requirements, Section 01 25 00-Substitution Procedures and Section 01 60 00-Product Requirements.

2.02 FLUID-APPLIED DAMPPROOFING

- A. Provide an emulsion type dampproofing on the inside face of the exterior concrete walls and footings of Coal Tar Epoxy. Coal Tar Epoxy shall be a commercial grade sealer equal to Sherwin Williams Targard®. Color shall be standard black.

PART 3 - EXECUTION

3.01 APPLICATION, GENERAL

- A. Comply with manufacturer's written instructions for substrate preparation, dampproofing application, cure time between coats, and drying time.
 - 1. Apply dampproofing to provide continuous plane of protection.
 - 2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.
 - 3. Surface Preparation: Surface shall be clean, dry, and sound condition.
 - a. Remove oil, dust, dirt, loose rust, and other foreign material to ensure adequate adhesion.
 - b. Refer to product Application Bulletin for detailed surface preparation information.
- B. Apply the dampproofing material consisting of a minimum of two (2) applications with either brush or spray equipment in accordance with the rates and methods recommended by the manufacturer. All surfaces shall be completely covered and areas around penetrations shall be double coated.

END OF SECTION

SECTION 07 21 28

CELLULOSE THERMAL INSULATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Building insulation for interior walls and Mezz. Floor.
 - 1. Pneumatically blown dry into floor assemblies.
 - 2. Pneumatically sprayed damp into open wall cavities.
- B. Related Sections: Section 13 34 18 Metal Building-Equipment Shed for thermal glass-fiber blanket insulation.

1.02 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's product and technical data for insulation describing location, extent, material and method of application prior to installation for MDOT Architect's acceptance.

1.03 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Research/evaluation reports.

1.04 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in the manufacture of Cellulose Thermal Insulation with 10 years minimum experience.
- B. Installer: Company specializing in Cellulose Thermal Insulation Products, with 5 years minimum experience, who has completed work similar to that indicated for this project and with a record of successful in-service performance and is approved by manufacturer to install manufacturer's products. Submit identification of at least 3 projects of similar scope and complexity along with name, address, and telephone number of the Architect, Owner and General Contractor.

1.05 PRODUCT HANDLING

- A. Protect the materials of this section before, during and after installation and to protect the installed work and materials of all other trades. In the event of damage, immediately make all repairs or replacements as necessary.

1.06 WARRANTY

- A. Provide manufacturer's standard life time warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by NU-WOOL Company, Inc., 2472 Port Sheldon Street, Jenison, MI. Tel. (800) 748-0128.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Fiberlite Technologies, Inc., Joplin, MO. Tel: (800) 641-4296.
 - 2. Hamilton Manufacturing Inc., Twin Falls, Idaho. Tel: (208)733-9689.
- C. Alternate Manufacturers: Products produced by other manufacturers that fully meet or exceed the specified requirements may be considered under provisions of Section 01 25 00- Substitution Procedures and Section 01 60 00-Product Requirements.

2.02 CELLULOSE INSULATION MATERIALS

- A. Cellulose Insulation: Insulation shall be manufactured from recycled newspapers containing a minimum of 85 percent paper fiber content. Fibers shall be treated with boric acid and sodium polyborate (ammonium or aluminum sulfate are NOT allowed) to create permanent flame resistance.
 - 1. Shall contain a EPA registered fungicide, be mold-resistant, non-toxic, non-corrosive.
 - 2. Shall not irritate normal skin.
 - 3. Shall not give off odor during or after installation.
 - 4. Shall not attract vermin or insects.
 - 5. Shall not adversely affect other building materials.
- B. Thermal Performance: Cellulose insulation shall resist the flow of heat. Heat transfer is limited as indicated by its R-Value of 3.8 per inch. Air infiltration through the material shall be limited by the density of the material and methods used to install it.
- C. Sound Control: Cellulose insulation shall provide significant noise reduction in walls and floors.
- D. Standards: Cellulose insulation shall conform to the CPSC standard 16 CFR Parts 1209 and 1404. In addition, the cellulose insulation shall meet or exceed all of the test requirements of ASTM C-739, E-84 and E-119, and UL-723.

2.03 MATERIAL CHARACTERISTICS

- A. The following properties were tested by Underwriters Laboratories (R-8078):
 - 1. Settled Density: The maximum density after long-term settling of dry application: 1.6 lb/ft³.
 - 2. Thermal Resistance: The average thermal resistance per inch: 3.8 (R-Value/in).
 - 3. Flammability Characteristics: Critical Radiant Flux - greater than or equal to 0.12 watts/cm²; Smoldering Combustion - less than or equal to 15 percent.

4. Moisture Vapor Sorption: This requirement assures that normal variations in relative humidity will not adversely affect thermal resistance. Cellulose insulation shall meet the requirements of less than 15 percent for maximum weight gain under the specified test conditions.
5. Surface Burning Characteristics: Flame Spread – 15; Smoke Developed – 5.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions where building insulation is to be installed and notify the Contractor and MDOT Architect 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 the Installer.

3.02 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated. If printed instructions are not available, or do not apply to the project conditions, consult the manufacturer's technical representative for specific recommendations before proceeding with the work

3.03 INSTALLATION

- A. Extend insulation full thickness as shown over entire area to be insulated. Fit tightly around obstructions, and fill voids with insulation. Remove projections, which interfere with placement.
- B. Nu-Wool Insulation: Cellulose insulation shall be pneumatically blown dry into floor assemblies after mechanical, plumbing, electrical and other utility installations have been completed and in compliance with manufactures instructions.
- C. Nu-Wool WALLSEAL: Cellulose insulation shall be pneumatically sprayed with a controlled water fog for adhesion into open wall cavities after mechanical, plumbing, electrical and other utility installations have been completed. Drywall may be installed 24 hours after application. Total drying time is approximately 30 days. Installation shall be made only by Nu-Wool factory-certified WALLSEAL contractors using approved equipment.

END OF SECTION

SECTION 07 26 00

VAPOR RETARDERS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Vapor retarder under concrete floor slab.
2. Concrete curing paper on top of freshly poured concrete floor slab.
3. Floor protection paper used for positive protection of finished floors.

1.02 ACTION SUBMITTALS

- A. Product Data: Manufacturer's technical product data, installation instructions and recommendations for products specified.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and specifications are based on products manufactured by Fortifiber Corporation, 300 Industrial Drive, Fernley, NV 89408. Tel. (800) 773-4777.
- B. Equivalent products by the following manufacturers are acceptable:
1. Grace Construction Products, Cambridge, Ma. Tel: (800) 444-6459.
 2. Griffolyn ® Division, Reef Industries, Inc., Houston, TX. Tel: (800) 231-6074.
 3. Stego Industries LLC, San Juan Capistrano, CA. Tel: (877) 464-7834.
- C. Substitutions shall fully comply with specified requirements, Section 01 25 00-Substitution Procedures and Section 01 60 00-Product Requirements.

2.02 VAPOR RETARDER

- A. Membrane shall be a 15 mil polyolefin film meeting ASTM E-1745-97 Class A Test Method, equal to Fortifiber Corporation, Moistop® Ultra™ 15, including Moistop® tape and sealants with the following characteristics:
1. Moisture Vapor Permeance: ASTM E-154, Section 7 (E-96, Method A) = 0.01 perms.
 2. Dry Tensile Strength: ASTM D-882 = (80 lbf/in min)-MD & (78 lbf/in min.) CD.
 3. Puncture Resistance: ASTM D-1709, Method B = 4,900 Grams.

2.03 CONCRETE CURING PAPER

- A. Laminated tri directional glass fiber reinforced long fibered kraft curing papers with double coating of high-melting-point asphalt, meeting ASTM C-171 Test Method, equal to "Orange Label Sisalkraft®".

2.04 FLOOR PROTECTION PAPER

- A. Non-staining reinforced floor protection paper consisting of two heavy kraft sheets and glass reinforcing fibers laminated with a non-staining adhesive, meeting ASTM D 828 and ASTM D 781 Test Methods, equal to "Seekure®".

PART 3 - EXECUTION

3.01 PREPARATION

- A. Ensure items that pass through building paper / membrane are properly and rigidly installed, substrate is free of projections and irregularities that may be detrimental to proper installation of building paper / membrane.

3.02 INSTALLATION

A. Vapor Retarder:

1. Unroll underslab vapor retarder over thoroughly compacted subgrade and turn down at inside perimeter of grade beams.
2. Seal joints watertight, with a pressure sensitive tape as recommended by manufacturer, allowing a minimum overlap of 6 inches.
3. Apply tape evenly over seams and rub out wrinkles formed during application.
4. Seal pipes and conduits passing through the membrane with Moistop boot and tape.
5. Inspect membrane thoroughly and repair all punctures immediately before placing concrete. Equipment, tools, and procedures that might puncture the membrane shall not be used while placing and finishing the concrete.
6. Comply with manufacturer's recommendations and installation procedures as outlined in ASTM E-1643.

B. Curing Paper:

1. Unroll concrete curing paper over the entire surface once the concrete has set sufficiently hard to permit application without marring the surface.
2. Lap joints 4 inches and seal with pressure sensitive tape.
3. Apply tape evenly over seams and rub out wrinkles formed during application.
4. Ensure that all tears or penetrations are repaired.

C. Floor Protection Paper:

1. Apply floor protection paper immediately after floor covering is installed.
2. Do not remove until final completion and acceptance by the Project Engineer.
3. Lay paper in widest practical width with 6-inch laps to provide complete coverage of flooring.
4. Seal joints with minimum 2 inch wide pressure sensitive tape.

3.03 CLEANING

- A. Inspect vapor barrier membrane thoroughly and keep clean. Remove dirt, oils, mud, debris, etc. prior to placing concrete.

END OF SECTION

SECTION 07 26 15

VAPOR BARRIER

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Vapor barrier under concrete spread footings at Bulk Salt Storage Structure.

1.02 ACTION SUBMITTALS

- A. Product Data: Manufacturer's technical product data, installation instructions and recommendations for products specified.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and specifications are based on products manufactured by Fortifiber Corporation, 300 Industrial Drive, Fernley, NV 89408. Tel. (800) 773-4777.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Grace Construction Products, Cambridge, Ma. Tel: (800) 444-6459.
 - 2. Griffolyn ® Division, Reef Industries, Inc., Houston, TX. Tel: (800) 231-6074.
 - 3. Stego Industries LLC, San Juan Capistrano, CA. Tel: (877) 464-7834.
- C. Substitutions shall fully comply with specified requirements, Section 01 25 00-Substitution Procedures and Section 01 60 00-Product Requirements.

2.02 VAPOR BARRIER MATERIAL

- A. Membrane shall be a 6 mil polyolefin film meeting ASTM E-1745-97 Class "B" and "C" Test Method, equal to Fortifiber Corporation, Moistop® Ultra™ 6, including Moistop® tape and sealants with the following characteristics:
 - 1. Moisture Vapor Permeance: ASTM E-154, Section 7 (E-96, Method A) = 0.04 Perms.
 - 2. Tensile Strength: ASTM E-154, Section 9 (Method D-882) = (32lb f/in min)-MD & CD.
 - 3. Puncture Resistance: ASTM D-1709, Method B = 2,100 Grams.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Vapor Retarder:

1. The vapor barrier shall be unrolled over the thoroughly compacted subgrade and turned up at the sides of the spread footings.
2. Joints shall be sealed, watertight, with a pressure sensitive tape or mastic as recommended by the manufacturer, allowing a minimum overlap of 6 inches.
3. Apply tape evenly over seams and rub out any wrinkles formed during application.
4. Inspect the membrane thoroughly and repair all punctures immediately before placing concrete.
5. Equipment, tools, and procedures that might puncture the membrane shall not be used while placing and finishing the concrete

3.02 CLEANING

- A. Inspect vapor barrier membrane thoroughly and keep clean. Remove dirt, oils, mud, debris, etc. prior to placing concrete.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Flashing and sheet metal work as indicated on the Drawings and provisions of this Specification. The types of work include the following:
 - a. Metal flashing and counter flashing.

B. Related Sections:

1. Section 04 20 00 – Unit Masonry (for embedded masonry cavity wall flashing.)
2. Section 09 05 15 – Color Design (for color selection.)

1.02 PREINSTALLATION MEETINGS

1.03 ACTION SUBMITTALS

A. Product Data: Manufacturer's product data, technical specifications, installation instructions and general recommendations for each specified sheet material and fabricated product for Project Engineer / MDOT Architect's approval.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Distinguish between shop- and field-assembled work.
3. Include identification of finish for each item.
4. Include pattern of seams and details of termination points, expansion joints and expansion-joint covers, direction of expansion, and connections to adjoining work.

C. Samples: Submit 2 samples, eight inch square, of specified sheet materials to be exposed as finished surfaces. Submit 2 twelve inches long, completely finished units of specified factory-fabricated products exposed as finished work. Submit 2 color charts of manufacturer's complete line of standard colors available.

1.04 INFORMATIONAL SUBMITTALS

A. Qualification Data: Submit 2 copies for firms and persons that demonstrate capabilities and experience. Include a list with five (5) completed Project names and addresses, and name and addresses of Architects and Owners.

B. Product certificates.

C. Product test reports.

D. Sample warranty.

1.05 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1.07 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

- 1. Finish Warranty Period: 20 years from Date of Completion as determined by MDOT.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Recycled Content of Steel-Sheet Flashing and Trim: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.02 FLASHING AND SHEET METAL MATERIALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

- B. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 coating designation or aluminum-zinc alloy-coated steel sheet according to ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; prepainted by coil-coating process to comply with ASTM A 755/A 755M.
1. Thickness: 24 gage.
 2. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 3. Color: As selected by Architect from manufacturer's full range.
 - a. Equal to Petersen Aluminum Corp., Tel. (800) 722-2523.
 - b. Use galvanized finish where concealed from view only.

2.03 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 2. Fasteners for Zinc-Coated (Galvanized) or Aluminum-Zinc Alloy-Coated Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
- C. Solder:
1. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead with maximum lead content of 0.2 percent.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane, polysulfide and / or silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

- G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- H. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

2.04 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 - 1. Obtain field measurements for accurate fit before shop fabrication.
 - 2. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 - 3. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
 - 2. Use lapped expansion joints only where indicated on Drawings.
- C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.
- F. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- G. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

PART 3 - EXECUTION

3.01 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. Use fasteners, solder, 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, levels, and slopes. 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. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 5. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
1. Coat concealed side of sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate [wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws. Substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 - Joint Sealants.

- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not solder metallic-coated steel sheet.
 2. Do not use torches for soldering.
 3. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.02 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Through-Wall Flashing: Installation of through-wall flashing is specified in Section 04 20 00 - Unit Masonry.
- C. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.03 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.
- E. Protection: Installer shall advise Contractor of required procedures for surveillance and protection of flashings, sheet metal work, and accessories during construction, to ensure that work will be without damage or deterioration, other than natural weathering, at time of substantial completion.
- F. Flashings and sheet metal with cuts, abrasions, or imperfections will not be acceptable and is to be replaced.

END OF SECTION

SECTION 07 84 00 FIRESTOPPING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.
3. Penetrations in smoke barriers.
4. Joints in or between fire-resistance-rated constructions.
5. Joints in smoke barriers.

1.02 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's product data, specifications and installation procedures for each type of firestopping and accessory required. Submit detailed location where each will be used. Submit UL data for assemblies where shown on the Drawings.
- B. Product Schedule: For each firestopping system. Include location and design designation of qualified testing and inspecting agency.
 1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular firestopping condition, submit illustration, with modifications marked, approved by firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.03 INFORMATIONAL SUBMITTALS

- A. Installer Certificates: From Installer indicating firestopping has been installed in compliance with requirements and manufacturer's written recommendations.
- B. Product test reports.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."
- B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:
 1. Penetration and fire-resistive joint system firestopping tests are performed by UL, Intertek ETL SEMKO, or FM Global.
 - a. Qualified testing agency shall be acceptable to authorities having jurisdiction.

2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems bearing marking of qualified testing and inspection agency.
- C. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Hilti, Inc. Tulsa, OK. Tel. (800) 879-8000.,
 2. 3M Fire Protection Products, Saint Paul, MN. Tel. (800) 328-1687.
 3. USG Corporation, Chicago, IL. Tel. (880) 874-4968.

2.02 PENETRATION FIRESTOPPING

- A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls: Ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
1. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
 2. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
- D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.
1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at 0.30-inch wg at both ambient and elevated temperatures.
- E. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

- F. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
1. Sealants: 250 g/L.
 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 3. Sealant Primers for Porous Substrates: 775 g/L.
- G. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.

2.03 FIRE- RESISTIVE JOINT SYSTEMS

- A. Where required, provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which fire-resistive joint systems are installed. Fire-resistive joint systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
- B. Joints in or between Fire-Resistance-Rated Construction: Ratings determined per ASTM E 1966 or UL 2079:
1. Fire - Resistance Rating: Equal to or exceeding the fire-resistance rating of construction they will join.
- C. Joints at Exterior Curtain-Wall/Floor Intersections: Rating determined by ASTM E 119 based on testing at a positive pressure differential of 0.01-inch wg or ASTM E 2307.
1. Fire - Resistance Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.
- D. Joints in Smoke Barriers: Ratings determined per UL 2079.
1. L- Rating: Not exceeding 5.0 cfm/ft of joint at 0.30 inch wg at both ambient and elevated temperatures.
- E. Exposed Fire-Resistive Joint Systems: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- F. VOC Content: Fire-resistive joint system sealants shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
1. Architectural Sealants: 250 g/L.
 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 3. Sealant Primers for Porous Substrates: 775 g/L.

- G. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to maintain ratings required. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing agency for systems indicated.

2.04 FINISHES

- A. Concealed locations: Manufacturer's Standards.
- B. Exposed to View Locations: "Custom" Colors as selected by Project Engineer / MDOT Architect unless Manufacturer's Standards closely matches finish of penetrated surfaces.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, Joint configurations, substrates, and other conditions affecting performance of the Work.
- B. Verify application required and location for each type of firestopping to be used and install firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- C. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.
- D. Install fill materials for firestopping by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, joints and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they contact and adhere to substrates formed by openings, joints and penetrating items.
 - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.
- E. Install approved metal sleeves with fireproof sealant at all communication and control wiring passing through rated walls throughout the entire project.
- F. After installation of all Work, including but not limited to ductwork, fire and smoke dampers, communication cabling, electrical conduit, etc., properly seal all openings, cracks, crevices and penetrations throughout the entire project, to maintain fire ratings shown.

3.02 IDENTIFICATION

- A. Identify firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
1. The words "Warning - Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 2. Contractor's name, address, and phone number.
 3. Designation of applicable testing and inspecting agency.
 4. Date of installation.
 5. Manufacturer's name.
 6. Installer's name.

3.03 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections.
- B. Where deficiencies are found or firestopping is damaged or removed because of testing, repair or replace firestopping to comply with requirements.
- C. Proceed with enclosing firestopping with other construction only after inspection reports are issued and installations comply with requirements.

3.04 FIRESTOPPING SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ, Category XHBN or Category XHDG
- B. Where FM Global-approved systems are indicated, they refer to design numbers listed in FM Global's "Building Materials Approval Guide" under "Wall and Floor Penetration Fire Stops."
- C. Sealants: Equal to Hilti, Inc. FS-One.
- D. Caulking and Putty: Equal to 3M Brand Fire Barrier CP- 25 Caulk and Putty 303.
- E. Penetration Sealants: Equal to 3M Fire Barrier Penetration Sealing Systems 7902 and 7904 series as required.
- F. Insulation: Equal to United States Gypsum Company "Thermafiber" Safing Insulation, 4 pcf density, unfaced.
- G. Intumescent Firestopping: Equal to Hilti, Inc. FS-One, CP 642 and FS 657 Fire Block as required.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Preparation of substrate surfaces to receive materials.
- B. Sealant and joint backing (backer rod) materials and installation in the following general locations (even though not shown on the Drawings):
 - 1. Exterior and interior wall joints, including control / expansion joints and abutting like or similar materials (in walls, ceilings, and roof construction) that have spaces between in excess of 3/16 inch (except where less restrictive tolerances are indicated or where the condition is specifically the responsibility of others).
 - 2. Abutting dissimilar materials, exterior and interior.
 - 3. Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces.
 - 4. Exterior and interior wall openings (including at perimeter doors, exterior thresholds, windows, louvers, and penetrations required by piping, ducts, and other service and equipment, except for sealants provided by Section 07 84 00- Firestopping).
 - 5. Joints in pavement and walks.
 - 6. Other locations, not included above but, specifically required by manufacturers of installed materials / products (except that sealing materials for glazing are under provision of other Section.).
- C. Accessories: Including, but not limited to, primer, cleaner, backer rod, bond breaker, and masking tape.

1.02 RELATED SECTIONS

- A. Section 01 33 00 – Submittal Procedures and Section 09 05 15 – Color Design.

1.03 DEFINITIONS

- A. Whenever the words "caulk" or "seal" occur, they shall be interpreted to mean "effectively seal the indicated joint with a material to render it air and watertight." "Caulk" shall indicate the use of the interior materials specified hereinafter and "Seal" shall indicate the use of the exterior materials.

1.04 PRECONSTRUCTION TESTING

- A. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates. Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

1.05 WORK OF OTHER SECTIONS

- A. Caulking and sealing may be performed as Work of other Sections when specified. However, all Work shall conform to the requirements of this Section.

1.06 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each type of sealant required. Product data shall include chemical characteristics, limitations, and color availability.
- B. Samples: For each kind and color of joint sealant required.
- 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.

1.07 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Certificate.
- B. Applicator's experience documentation.
- C. Product test reports.
- D. Preconstruction field-adhesion test reports.
- E. Field-adhesion test reports.
- F. Warranties.

1.08 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.
- B. Manufacturer's Certificate: Provide manufacturer's letter of certification that products meet or exceed specified requirements and are appropriate for uses indicated.
- C. Applicator: Company specializing in the work of this Section with minimum 3 years documented satisfactory experience.
- D. Preinstallation Conference: Conduct conference at Project site.

1.09 DELIVERY, STORAGE AND HANDLING

- A. Deliver caulking and sealant material to the site in original unopened packages with manufacturer's labels, instructions and product identification and lot numbers intact and legible.
- B. Store materials under cover, protected from inclement weather and adverse temperature extremes, in original containers or unopened packages, in accordance with manufacturer's instructions.

1.10 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from Date of Completion as determined by MDOT.
- 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 do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Five years from Date of Completion as determined by MDOT.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by Pecora Corporation, 165 Wambold Road, Harleysville, PA 19438. Tel: (800) 523-6688.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. BASF Construction Chemicals, LLC, Building Systems. Shakopee, MN. Tel: (800) 243-6739.
 - 2. Dow Corning Corporation, Midland, MI. Tel: (800) 322-8723.
 - 3. GE Silicones, Waterford, NY. Tel: (518) 233-2639.
 - 4. Tremco, Inc., Beachwood, OH. Tel: (800) 562-2728.
- C. Alternate manufacturers: Products produced by other manufacturers that fully meet or exceed the specified requirements may be considered under provisions of Section 01 25 00- Substitution Procedures and Section 01 60 00-Products Requirements.

2.02 MATERIALS, GENERAL

- A. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Architectural Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.

B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.

C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

2.03 SILICONE JOINT SEALANTS

A. Silicone Joint Sealant: ASTM C 920.

2.04 URETHANE JOINT SEALANTS

A. Urethane Joint Sealant: ASTM C 920.

2.05 LATEX JOINT SEALANTS

A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

2.06 PREFORMED JOINT SEALANTS

A. Preformed Foam Joint Sealant: Manufacturer's standard preformed, precompressed, open-cell foam sealant manufactured from urethane foam with minimum density of 10 lb/cu. ft. and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths indicated; coated on one side with a pressure-sensitive adhesive and covered with protective wrapping.

2.07 ACOUSTICAL JOINT SEALANTS

A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

2.08 JOINT SEALANT BACKING

A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

- B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.09 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.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
 - 1. Remove laitance and form-release agents from concrete.
 - 2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by 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 or primer 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.

3.02 INSTALLATION

- A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- B. Install sealant backings of kind 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.

- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. Install sealants using proven techniques that 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 in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs 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 sealant from surfaces adjacent to joints.
 - 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 profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
- F. Acoustical Sealant Installation: Comply with ASTM C 919 and with manufacturer's written recommendations.
- G. Clean off excess sealant 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.

3.03 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - 1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform 5 tests for the first 500 feet of joint length for each kind of sealant and joint substrate.
 - b. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.
 - 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
- B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.04 CURE AND PROTECTION

- A. Cure sealant and caulking compounds in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability.

- B. Sealant Supplier / Applicator shall advise Contractor of procedures required for cure and protection of joint sealers during construction period, so that they will be without deterioration or damage (other than normal wear and weathering) at Time of Completion.

3.05 JOINT-SEALANT SCHEDULE

- A. Type 1: Use for interior locations, sealing around windows, doors, louvers, drywall and other locations to be painted and where joints are less than 1/8 inch with none to slight movement anticipated: Pecora AC-20 + Silicone (Acrylic Latex Caulking Compound).
- B. Type 2: Use for sealing nonporous interior surfaces where conditions of high humidity and temperature extremes exist, including at and in conjunction with toilet fixtures, counters, vanities, thresholds and joints in tile finishes: Pecora 898 (Silicone Sanitary Sealant).
- C. Type 3: Use for horizontal floor and pavement joints: Pecora Urexpan NR-200 (two-part, self-leveling, traffic-bearing, polyurethane sealant).
- D. Type 4: Use for exterior sealing at door, louver, and window frames at masonry, and other materials: Pecora 890NST (one-part Architectural Silicone Sealant). Color(s) to be selected by the Project Engineer / MDOT Architect from manufacturer's full range of standard Architectural colors.
- E. Type 5: Use for Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces. Pecora AC – 20 FTR.

END OF SECTION

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes hollow-metal work, including but not limited to, the following:
1. Interior and exterior hollow metal doors and frames; rated and non-rated.
 2. Trimmed openings.
 3. Preparation of metal doors and bucks to receive finish hardware, including reinforcements, drilling and tapping necessary.
 4. Preparation of hollow metal door to receive glazing (where required).
 5. Factory prime painting of Work in this Section.
- B. Related sections:
1. Section 06 10 00 - Rough Carpentry.
 2. 08 14 29 - Prefinished Wood Doors.
 3. Section 08 71 00 - Door Hardware.
 4. Section 08 80 00 - Glazing.
 5. Section 09 05 15 - Color Design.
 6. Section 09 90 00 - Painting and Coatings.

1.02 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product, including schedule and manufacturer's technical product data / literature.
- B. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, glazing, anchor types and spacing, reinforcement, and other details.
- C. Samples (not required for named products):
1. Submit hollow metal frame, corner section of typical frame, of sufficient size to show corner joint, hinge reinforcement, dust cover boxes, anchors, and floor anchors.
 2. Submit hollow metal door section of typical door, of sufficient size to show edge, top and bottom construction, insulation, hinge reinforcement, face stiffening, corner of vision opening construction, and glazing beads.
- D. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.04 QUALITY ASSURANCE

- A. In addition to complying with all pertinent codes and regulations, manufacture labeled doors in accordance with specifications and procedures of Underwriters' Laboratories, Inc. In guarantee and shop drawings, comply with nomenclature established in American National Standards Institute publication A123.1, latest edition, "Nomenclature for Steel Doors and Steel Door Frames".
- B. Work is subject to applicable portions of the following standards:
 - 1. ANSI A115 "Door and Frame Preparation for Door Locks and Flush Bolts", American National Standards Institute.
 - 2. ANSI A123.1 "Nomenclature for Steel Doors and Steel Door Frames", American National Standards Institute.
 - 3. NFPA 101 "Life Safety Code", National Fire Protection Association.
- C. Hollow metal doors and frames shall comply with the specifications for Custom Hollow Metal Doors and Frames, National Assoc. of Architectural Metal Manufacturers (NAAMM) Standard CHM 1-74, and the Steel Door Institute, SDI 100-80.

1.05 PRODUCT IDENTIFICATION

- A. Deliver doors and frames and other work of this section properly tagged and identified.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle all metal doors and frames in a manner to prevent damage and deterioration.
- B. Provide packaging, separators, banding, spreaders, and individual wrappings as required to completely protect all metal doors and frames during transportation and storage.
- C. Store doors upright, in a protected dry area, at least 4 inches off the ground and with at least 1/4 inch air space between individual pieces, protect all pre-finished and hardware surfaces.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by Steelcraft Manufacturing Company, 9017 Blue Ash Road, Cincinnati, OH 45242 Tel. (513) 745-6400.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Amweld Building Products, Inc., Garrettsville, OH. Tel. (330) 527-4385.
 - 2. Ceco Door Products, Brentwood, TN. Tel. (615) 661-5030.
 - 3. Curries Co., Mason City, IA. Tel. (641) 423-1334.
 - 4. Republic Builders Products, McKenzie, TN. Tel. (901) 352-3383.

- C. Substitutions shall fully comply with specified requirements and Section 01 25 00-Substitution Procedures and Section 01 60 00-Product Requirements.

2.02 FABRICATION, GENERAL

- A. Fabricate hollow metal units rigid, neat in appearance and free from defects, warp or buckle. Accurately form metal to required sizes and profiles. Weld exposed joints continuously, grind, dress, and make smooth, flush and invisible. Metallic filler to conceal manufacturing defects is not acceptable. Unless otherwise indicated, provide countersunk flat Philips or Jackson heads for exposed screws and bolts.
- B. Prepare hollow metal units to receive finish hardware, including cutouts, reinforcing, drilling and tapping per final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 "Specifications for Door and Frame Preparation for Hardware".
- C. Locate finish hardware in accordance with approved shop drawings.

2.03 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Doors:
 1. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
 2. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated.
- C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 1. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
 5. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.

- 3) Four anchors per jamb from 90 to 120 inches high.
 - 4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
 - b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches on center and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - c. Compression Type: Not less than two anchors in each frame.
 - d. Post installed Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches on center.
 6. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- D. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates. Prepare exterior HM frames in Admin and Shop Building for electric strikes and include conduit to above ceiling and provide cover plate to install conventional strike at this time.
1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
- E. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.
1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 4. Provide loose stops and moldings on inside of hollow-metal work.
 5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.04 FRAMES

A. Frames Types:

1. Exterior Openings: Frames shall be made of commercial grade 14 gage minimum cold rolled steel conforming to ASTM A366-68 with a zinc coating conforming to ASTM A653, with a coating designation of A60 or G60 and a minimum coating thickness of 0.60 oz. per sq. ft. minimum.
2. Interior Openings: Frames shall be commercial grade cold rolled steel conforming to ASTM A366-68 or commercial grade hot rolled and pickled steel conforming to ASTM A569-66T. Metal thickness shall be 16 gage for frames in openings 4 feet or less in width; 14 gage for frames in openings over 4 feet in width.

B. Design and Construction: Frames shall be custom made welded units with integral trim, of the sizes and shapes shown on approved shop drawings. Knocked-down frames WILL NOT be accepted. Finished work shall be strong, rigid, and neat in appearance, square, true and free of defects, warp or buckle. Molded members shall be clean cut, straight and of uniform profile throughout their lengths. Jamb depths, trim, profile and backbends shall be as shown on Drawings. Corner joints shall have contact edges closed tight, with trim faces mitered and continuously welded, and stops mitered. The use of gussets will not be permitted.

1. Stops shall be 5/8 inch deep. Cut-off (sanitary or hospital type) stops, where scheduled, shall be capped at 45 degrees at heights shown on Drawings, and all jamb joints below cut-off stops shall be ground and filed smooth, making them imperceptible. Do not cut off stops on frames for soundproof, lightproof and lead-lined doors.
2. When shipping limitations so dictate, frames for large openings shall be designed and fabricated for field splicing by others.
3. Frames for multiple or special openings shall have mullion and / or rail members which are closed tubular shapes having no visible seams or joints. All joints between faces of abutting members shall be securely welded and finished smooth.
4. Hardware reinforcements: Frames shall be mortised, reinforced, drilled and tapped at the factory for fully templated mortised hardware only, in accordance with approved hardware schedule and templates provided by the hardware supplier. Where surface-mounted hardware is to be applied, frames shall have reinforcing plates. Frames shall be reinforced for closers. Minimum thickness of hardware reinforcing plates shall be as follows:
 - a. Hinge and pivot reinforcements - 7 gage, 1-1/4 inch by 10 inches minimum.
 - b. Strike reinforcements - 12 gage.
 - c. Flush bolt reinforcements - 12 gage.
 - d. Closer reinforcements - 12 gage.
 - e. Reinforcements for surface-mounted hardware - 12 gage.
5. Floor anchors: Floor anchors shall be securely welded inside jambs for floor anchorage. Where required, provide adjustable floor anchors, providing not less than 2 inches height adjustment. Floor anchors shall be 14-gage minimum.

- C. Finish: After fabrication, tool marks and surface imperfections shall be removed, and exposed faces of welded joints shall be dressed smooth. Frames shall be chemically treated to insure maximum paint adhesion and coated on accessible surfaces with rust-inhibitive primer complying with FS-TT-P-57 (Type II) or FS-TT-P-659 with 2.0 mils minimum thickness. Fully cure before shipment.

2.05 HOLLOW METAL DOORS

- A. General: Doors shall be made of commercially quality, level, cold rolled steel conforming to ASTM A366-68 and free of scale, pitting or other surface defects.
- B. Face Sheets:
 - 1. Exterior Doors: Shall be 16-gage minimum with zinc coating conforming to ASTM A653, with a coating designation of A60 or G60 and a minimum coating thickness of 0.60 oz. per sq. ft. minimum.
 - 2. Interior Doors: Shall be 18 gage minimum.
- C. Design and Construction: Doors shall be custom made, of the types and sizes shown on the approved shop drawings, and shall be fully welded seamless construction with no visible seams or joints on their faces or vertical edges. Door thickness shall be 1-3/4 inches unless otherwise noted. Doors shall be strong, rigid and neat in appearance, free from warp or buckle. Corner bends shall be true, straight and of minimum radius for the gage of metal used.
- D. Face Sheet Stiffeners: Stiffen with continuous vertical formed steel sections spanning the full thickness of the interior space between door faces. These stiffeners shall be 22 gage minimum, spaced 6 inches apart and securely attached to face sheets by spot welds 5 inches on center. Spaces between stiffeners shall be sound-deadened insulated full height of door with an inorganic non-combustible batt-type material.
- E. Welding: Join door faces at their vertical edges by a continuous weld extending full height of door. Welds shall be ground, filled and dressed smooth to make them invisible and provide a smooth flush surface.
- F. Top and Bottom Edges: Edges of doors shall be closed with a continuous recessed 16 gage minimum steel channel, extending the full width of the door and spot welded to both faces. Exterior doors shall have additional flush closing channel at top edges and, where required for attachment of weather-stripping, a flush closure at bottom edges. Provide openings in bottom closure of exterior doors to permit escape of entrapped moisture.
- G. Edge Profile: Shall be provided on both vertical edges of doors as follows:
 - 1. Single-acting swing doors - beveled 1/8 inch in 2 inches.
 - 2. Double-acting swing doors - rounded on 2-1/8 inch radius.

- H. Hardware Reinforcements: Doors shall be mortised, reinforced, drilled and tapped at the factory for fully templated hardware only, in accord with the approved hardware schedule and templates provided by the hardware supplier. Where surface-mounted hardware (or hardware, the interrelation of which is to be adjusted upon installation - such as top and bottom pivots, floor closures, etc.) is to be applied, doors shall have reinforcing plates. Minimum gages for hardware reinforcing plates shall be as follows:
1. Hinge and pivot reinforcement - 7 gage.
 2. Reinforcement for lock face, flush bolts, concealed holders, concealed or surface-mounted closers - 12 gage.
 3. Reinforcement for all other surface mounted hardware - 16 gage.
- I. Glass Moldings and Stops:
1. Where specified or scheduled, doors shall be provided with hollow metal moldings to secure glazing by others per glass opening sizes shown on Drawings. Fixed moldings shall be securely welded to door on security side.
 2. Loose stops shall be 20-gage steel, with mitered corner joints, secured to the framed opening by cadmium or zinc-coated countersunk screws spaced 8 inches on center. Snap-On attachments will not be permitted. Stops shall be flush with face of door.
- J. Finish: After fabrication, tool marks and surface imperfections shall be dressed, filled and sanded as required to make all faces and vertical edges smooth, level and free of all irregularities. Doors shall be chemically treated to ensure maximum paint adhesion and shall be coated, on all exposed surfaces, with manufacturer's standard rust-inhibitive primer. Fully cure before shipment.
- K. Flatness: Doors shall maintain a flatness tolerance of 1/16 inch maximum in any direction, including a diagonal direction.

2.06 HARDWARE LOCATIONS

- A. Hinges:
1. Top: 9-3/4 inches from head of frame to centerline of top hinge.
 2. Bottom: 10-3/8 inches from bottom of frame to centerline of bottom hinge.
 3. Intermediate centered between top and bottom hinges on Dutch Doors:
 - a. 9-3/4 inches from head of frame to centerline of hinge.
 - b. 10-3/8 inches from bottom of frame to centerline of bottom hinge.
 - c. 5 inches from split line to top and bottom respectively of lower and upper intermediate hinges.
- B. Locks and Latches:
1. Unit and integral type locks and latches – 3'- 2" to centerline of knob.
 2. Deadlocks - 5'- 0" to centerline of cross bar.
 3. Roller latches - 3'-9" to centerline.
- C. Panic hardware – 3'-1" to centerline of cross bar.

D. Pulls and Push Plates:

1. Door pulls – 3'-6" to center of grip.
2. Push-pull bars – 3'-1" to centerline of bar.
3. Arm pulls – 3'-11" to centerline.
4. Push plates – 4'- 0" to centerline of plate.

E. All of the above dimensions from paragraph 2.06(B) through 2.06(D) are from finished floor and shall comply with ADA and AHJ requirements.

2.07 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: SDI A250.10.

2.08 CLEARANCES

A. Edge Clearances:

1. Between doors and frame, at head and jambs - 1/8 inch.
2. Door Sills: where no threshold is used - 1/4 inch maximum above finished floor; where threshold is used - 3/4 inch maximum above finished floor.
3. Between meeting edges of pairs of doors - 1/8 inch.

B. Finished floor is defined as top surface of floor, except when resilient tile or carpet is used, when it is top of concrete slab. Where carpet is more than 1/2 inch thick, allow 1/4 inch clearance.

2.09 PREPARATION FOR FINISH HARDWARE

A. Hardware supplier shall furnish hollow metal manufacturer approved hardware schedule, hardware templates, and samples of physical hardware where necessary to ensure correct fitting and installation. Include preparation for mortise and concealed hardware.

B. Provide reinforcements for both concealed and surface applied hardware. Drill and tap mortise reinforcements at factory, using templates. Install reinforcements with concealed connections designed to develop full strength of reinforcements.

2.10 REJECTION

A. Hollow metal frames or doors which are defective, have hardware cutouts of improper size or location, or which prevent proper installation of doors, hardware or work of other trades, shall be removed. Replace rejected materials.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.
 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of post-installed expansion anchors if so indicated and approved on shop drawings.
 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
 5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 7. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
 8. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

- B. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Steel Doors:
 - a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
 - c. At Bottom of Door:
 - 1) 1/4 inch, where no threshold or carpet.
 - 2) 1/8 inch, where with threshold or carpet.
 - d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.
 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.
- C. Glazing: Comply with installation requirements in Section 08 80 00 "Glazing" and with hollow-metal manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches on center and not more than 2 inches on center from each corner.

3.02 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow-metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION

SECTION 08 14 29

PREFINISHED WOOD DOORS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Extent and location of each type of wood door is shown on the Drawings and in Schedules. Types of doors required include solid core flush wood doors with veneer faces. Lite openings for wood doors, including furnishing and installation, are specified under this Section.
- B. Related Requirements:
 - 1. Section 08 71 00 "Door Hardware" for installation.
 - 2. Section 08 80 00 "Glazing" for glass view panels in flush wood doors.
 - 3. Section 09 05 15 "Color Design" for colors.

1.02 ACTION SUBMITTALS

- A. Product Data: Indicate door core material and construction; veneer species, type and characteristics. Include factory-finishing specifications.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
 - 1. Dimensions and locations of blocking.
 - 2. Dimensions and locations of mortises and holes for hardware.
 - 3. Dimensions and locations of cutouts.
 - 4. Undercuts.
 - 5. Requirements for veneer matching.
 - 6. Doors to be factory finished and finish requirements.
 - 7. Fire-protection ratings for fire-rated doors.
 - 8. Indicate by transmittal form that copy of each instruction has been transmitted to the installer.
- C. Samples: For factory-finished doors.

1.03 INFORMATIONAL SUBMITTALS

- A. Manufacturer's sample warranty.

1.04 QUALITY ASSURANCE

- A. Comply with the requirements of the following standards unless otherwise indicated:
 - 1. Non-Fire Rated Wood Doors: WDMA I.S.1-A, "Architectural Wood Flush Doors."

1.05 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 AWI "Care & Instruction at Job Site" Section 1300, G-22.

1.06 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which 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 Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by Graham Manufacturing Corp., P.O. Box 1647, Mason City, IA. Tel. (641) 423-2444.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Marshfield Door Systems, Inc., Marshfield, WI. Tel. (800) 869-3667.
 - 2. TruStile Doors, LLC, Denver, CO. Tel. (888) 286-3931.
 - 3. VT Industries, Inc., Holstein, IA. Tel. (800) 827-1615.
- C. Substitutions that fully meet or exceed the specified requirements may be considered under provisions of Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.02 DOOR CONSTRUCTION, GENERAL

- A. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.
- B. Regional Materials: Wood doors shall be manufactured within 500 miles of Project site.
- C. Particleboard-Core Doors:
 - 1. Provide Particleboard: ANSI A208.1, Grade LD-1 or Grade LD-2, made with binder containing no urea-formaldehyde resin.
 - 2. Blocking Provide wood blocking in particleboard-core doors as follows:
 - a. 5-inch top-rail blocking, in doors indicated to have closers.
 - b. 5-inch bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
 - 3. Provide doors with either glued-wood-stave or better than stave cores instead of particleboard cores for doors indicated to receive exit devices.

D. Structural- Composite-Lumber-Core Doors:

1. Structural- Composite-Lumber: WDMA I.S.10.
 - a. Screw Withdrawal, Face: 700 lbf.
 - b. Screw Withdrawal, Edge: 400 lbf.

E. Mineral- Core Doors:

1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as follows:
 - a. 5-inch top-rail blocking.
 - b. 5-inch bottom-rail blocking, in doors indicated to have protection plates.
 - c. 5-inch mid-rail blocking, in doors indicated to have armor plates.
 - d. 4-1/2 by 10 inch lock blocks in doors indicated to have exit devices.
3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

F. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.

2.03 VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Premium, with Grade A faces.
2. Species: SELECT White Birch.
3. Cut: Plain sliced (flat sliced).
4. Doors with sharp contrast of shades and/or barber poling SHALL NOT be permitted and will be REJECTED. Provide exposed edges and other exposed solid wood components of same species as face veneers.
5. Match between Veneer Leaves: Slip match.
6. Assembly of Veneer Leaves on Door Faces: Center-balance match.
7. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
8. Room Match: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 20 feet or more.
 - a. Provide door faces of compatible color and grain within each separate room or area of building.
9. Transom Match: Continuous match.
10. Exposed Vertical Edges: Same species as faces or a compatible species.
11. Core Non-rated: Particleboard.
12. Core Fire-rated: Mineral.
13. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.

B. Light Openings: Factory cut openings. Trim openings for non-fire rated doors with solid wood moldings of manufacturer's standard shape, unless indicated otherwise. Same species as door faces.

2.04 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, DHI A115-W series standards, and hardware templates.
 - 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 - 2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- C. Transom and Side Panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.
 - 1. Fabricate door and transom panels with full-width, solid-lumber, rabbeted, meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.
- D. Openings: Factory cut and trim openings through doors.
 - 1. Light Openings: Trim openings with moldings of material and profile indicated.
 - 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 08 80 00 "Glazing."
 - 3. Louvers: Factory install louvers in prepared openings.

2.05 FACTORY FINISHING

- 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. Finish faces, all four edges, edges of cutouts, and mortises.
- B. Transparent Finish:
 - 1. Grade: Premium.
 - 2. Finish: WDMA TR-4 conversion varnish or WDMA TR-6 catalyzed polyurethane.
 - 3. Staining: As selected by Architect from manufacturer's full range.
 - 4. Sheen: Gloss, unless indicated otherwise.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Installer: Examine doorframes and verify that frames are correct type and have been installed for proper hanging of corresponding doors. Installer shall notify Contractor in writing of conditions detrimental to proper and timely installation of wood doors; do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Condition doors to average prevailing humidity in installation area prior to hanging.

3.03 INSTALLATION

- A. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
- B. 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 or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 - 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
 - a. Comply with NFPA 80 for fire-rated doors.

- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.04 ADJUSTING AND CLEANING

- A. Re-hang or replace doors that do not swing or operate freely. Refinish or replace doors damaged during installation.

3.05 PROTECTION OF COMPLETED WORK

- A. Installer shall advise Contractor of proper procedures required for protection of installed wood doors from damage or deterioration until acceptance of the Work.
- B. Doors damaged before acceptance of the Work shall be repaired or replaced.

END OF SECTION

SECTION 08 31 13

ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes access doors and frames for walls and ceilings.
- B. Related Sections include the following:
 - 1. Division 04 Section "Unit Masonry" for anchoring and grouting access door frames set in masonry construction.
 - 2. Division 08 Section "Door Hardware" for mortise or rim cylinder locks and master keying.
 - 3. Division 09 Section "Gypsum Board" for gypsum board ceilings.
 - 4. Division 09 Section "Acoustical Ceilings" for suspended acoustical tile ceilings.
 - 5. Division 23 Section "Duct Accessories" for heating and air-conditioning duct access doors.
- C. References:
 - 1. ITS (DIR) – Directory of Listed Products, Intertek Testing Services NA, Inc. current edition.
 - 2. UL (FRD) – Fire Resistance Directory; Underwriters Laboratories Inc; current edition.
 - 3. Warnock Hersey – Certification Listing.

1.02 COORDINATION

- A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of access door and frame indicated. Include construction details, fire ratings, materials, individual components and profiles, and finishes.
- B. Shop Drawings: Show fabrication and installation details of access doors and frames for each type of substrate. Include plans, elevations, sections, details, and attachments to other work. .
- C. Samples: For each door face material, at least 3 by 5 inches in size, in specified finish.
- D. Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

- E. Ceiling Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim are shown and coordinated with each other.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of access door(s) and frame(s) through one source from a single manufacturer.
- B. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics per the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
 - 2. NFPA 288 for fire-rated access door assemblies installed horizontally.

2.02 STEEL MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
 - 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Steel Sheet: Electrolytic zinc-coated, ASTM A 591/A 591M with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- C. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Surface Preparation for Steel Sheet: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
 - 2. Surface Preparation for Metallic-Coated Steel Sheet: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.
 - a. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
 - 3. Factory-Primed Finish: Apply shop primer immediately after cleaning and pretreating.

- D. Drywall Beads: Edge trim formed from 0.0299-inch zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.
- E. Plaster Beads: Casing bead formed from 0.0299-inch zinc-coated steel sheet with flange formed out of expanded metal lath and in size to suit thickness of plaster.

2.03 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Babcock-Davis; A Cierra Products Co., Minneapolis, MN. Tel. (888) 412-3726.
 2. J. L. Industries, Inc., Bloomington, MN. Tel. (800) 554-6077.
 3. Larsen's Manufacturing Company, Minneapolis, MN. Tel. (800) 527-7367.
 4. Milcor Inc., Lima, OH. Tel. (800) 528-1411.
- B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.
- C. Flush Access Doors and Frames with Exposed Trim: Fabricated from metallic-coated steel sheet.
 1. Locations: Wall surfaces.
 2. Door: Minimum 0.060-inch thick sheet metal, set flush with exposed face flange of frame.
 3. Frame: Minimum 0.060-inch thick sheet metal with 1-inch wide, surface-mounted trim.
 4. Hinges: Continuous piano.
 5. Latch: Self-latching bolt operated by screwdriver with interior release.
 6. Lock: Mortise cylinder.
 - a. Lock Preparation: Prepare door panel to accept cylinder specified in Division 8 Section "Door Hardware (Scheduled by Describing Products)."
- D. Flush Access Doors and Trimless Frames: Fabricated from steel sheet.
 1. Locations: Wall and ceiling surfaces.
 2. Door: Minimum 0.060-inch- thick sheet metal, set flush with surrounding finish surfaces.
 3. Frame: Minimum 0.060-inch- thick sheet metal with drywall bead flange.
 4. Hinges: Continuous piano.
 5. Latch: Self-latching bolt operated by screwdriver with interior release.
 6. Lock: Mortise cylinder.
 - a. Lock Preparation: Prepare door panel to accept cylinder specified in Division 8 Section "Door Hardware (Scheduled by Describing Products)."
- E. Exterior Flush Access Doors and Frames with Exposed Trim: Weatherproof with extruded door gasket.
 1. Locations: Wall surfaces.

2. Door: Minimum 0.040-inch- thick, metallic-coated steel sheet; flush panel construction with manufacturer's standard 2-inch- thick fiberglass insulation.
 3. Frame: Minimum 0.060-inch- thick extruded aluminum.
 4. Hinges: Continuous piano, zinc plated.
 5. Lock: Dual-action handles with key lock.
- F. Fire-Rated, Insulated, Flush Access Doors and Frames with Exposed Trim: Fabricated from steel sheet.
1. Locations: Wall surfaces.
 2. Fire-Resistance Rating: Not less than that of adjacent construction.
 3. Temperature Rise Rating: 250 deg F at the end of 30 minutes.
 4. Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 0.036 inch.
 5. Frame: Minimum 0.060-inch- thick sheet metal with 1-inch- wide, surface-mounted trim.
 6. Hinges: Continuous piano.
 7. Automatic Closer: Spring type.
 8. Latch: Self-latching device operated by flush key with interior release.
 9. Lock: Self-latching device with mortise cylinder lock.
 - a. Lock Preparation: Prepare door panel to accept cylinder specified in Division 8 Section "Door Hardware (Scheduled by Describing Products)."

2.04 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
1. Exposed Flanges: Nominal 1 to 1-1/2 inches wide around perimeter of frame.
 2. For trimless frames with drywall bead, provide edge trim for gypsum board securely attached to perimeter of frames.
 3. Provide mounting holes in frames for attachment of units to metal or wood framing.
 4. Provide mounting holes in frame for attachment of masonry anchors. Furnish adjustable metal masonry anchors.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed. For cylinder lock, furnish two keys per lock and key all locks alike.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.
- C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.02 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION

SECTION 08 33 23

OVERHEAD COILING DOORS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes: Extent of overhead coiling doors is shown on the Drawings. Provide complete operating door assemblies including door curtains, guides, and counterbalance mechanism, hardware, operators and installation accessories.
- B. Related Section:
 - 1. Section 05 50 00 "Metal Fabrications" for miscellaneous steel supports
 - 2. Division 09 Section -09 05 15 - Color Design.
 - 3. Division 26 Sections for electrical connections and service for powered door operators.

1.02 REFERENCES

- A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to the 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 and Materials: ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.03 PERFORMANCE REQUIREMENTS

- A. Structural Performance, Exterior Doors: Exterior overhead coiling doors shall withstand the wind loads, the effects of gravity loads, and loads and stresses within limits and under conditions indicated according to SEI/ASCE 7.
 - 1. Wind Loads: Comply with wind loading shown on Structural Drawing S101.

1.04 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Wiring Diagrams: For power, signal, and control wiring.
- C. Samples: For each exposed product and for each color and texture specified.

1.05 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Certificates: For overhead coiling doors, accessories, and components, from manufacturer.

1.06 CLOSEOUT SUBMITTALS

- A. Maintenance Data.
- B. Warranty Documents.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: Utilize an installer having demonstrated experience on projects of similar size and complexity, and trained and authorized by the door dealer to perform the work of this Section.
- B. 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.
- C. Regulatory Requirements and Approvals: Comply with IBC 2012 and AHJ requirements.
- D. Pre-installation Meeting: Verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Division 01 Project Management and Coordination (Project Meetings) Section

1.08 DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Division 01 Product Requirements.
- B. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- D. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

1.09 WARRANTY

- A. 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.

1.10 MAINTENANCE

- A. Maintenance Service: Submit for Owner's consideration and acceptance maintenance service agreement for products installed.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by Raynor Garage Doors, P.O. Box 448, Dixon, IL 61021. Tel. (800) 472-9667.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. C.H.I. Overhead Doors, Arthur, IL. Tel. (800) 590-0559
 - 2. Overhead Door Corp., Dallas, TX. Tel. (800) 887-3667.
 - 3. Windsor Door, Little Rock, AR. Tel. (800) 946-3767.
- C. Substitutions shall fully comply with specified requirements and Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.02 COILING DOOR

- A. Steel door assembly shall be provided as one complete unit including, but not limited to, sections, brackets, tracks, counterbalance mechanisms and hardware. Equal to DURACOIL STANDARD (IF) by Raynor Garage Doors.

2.03 DOOR OPERATORS

- A. Provide doors designed for electric motor operation.
- B. Operators shall comply with UL 325 standards.
- C. Manufacturer Product Designation: Raynor ControlHoist Standard (Model Series CHS).
 - 1. Type: Jackshaft with manual chain hoist.
 - 2. Motor: Horsepower Rating: Continuous Duty-sized by manufacturer's recommendation.
 - 3. Electric Requirements: 115 volt single phase.
 - 4. Duty Cycle: 30 cycles / hour.
 - 5. Control Wiring: Contractor Style Motor starter 24 volt control with provisions for connection of safety edge to reverse and external radio control hook-up. Three button momentary contact "open-close-stop" Solid State motor controller 24 volt control with provisions to select up to 6 standard wiring types plus delay on reverse, mid stop, maximum run timer, and door lock feature
- D. Sensing Edge Protection: "Monitored electric safety edges" to reverse.
 - 1. Verify mounting height with Project Engineer / MDOT Architect.

2.04 CURTAIN

- A. Material: Interlocking steel slats, 22 gage (0.030 inch minimum thickness) roll-formed from commercial quality hot-dipped galvanized (G-90) steel in compliance with ASTM A-653.
 - 1. Slat Type: Insulated Flat (IF) Slat.
 - a. Insulation: Polyisocyanurate with R-value 6.24 and U-value 0.160.
 - b. Back Covers: Galvanized steel, 24 gage (0.023 inch) minimum thickness.
- B. Mounting: Face Mounting: fasten to face of wall on each side of door opening, unless indicated otherwise on Drawings.
- C. Color and Finish: One finish coat of ArmorBrite™ Powdercoat applied over one coat of white epoxy primer. Color as selected by MDOT Architect from manufacturer's full selection of 187 RAL colors.
- D. End-locks: Lateral movement of the slats to be contained by means of zinc-plated malleable end-locks fastened with two zinc-plated steel rivets.
- E. Bottom Bar and Seal: Two roll-formed galvanized steel angles, minimum 1-1/2 inches by 1-1/2 inches by 1/8 inch with single-contact type bottom astragal. Structural angle bottom bar to receive one coat of rust-inhibitive primer.
 - 1. Bottom bar shall allow for 2-1/2 inches slope to be flush with sloping concrete slab where indicated on drawings.
- F. Curtain Wear Straps: Polyester.

2.05 GUIDES

- A. Guide Assemblies: To consist of three structural steel angles, minimum 3 inches by 2 inches by 3/16 inch and fitted with removable curtain stops. Steel guides to be provided with one coat of rust-inhibitive primer.
- B. Jamb Construction: Steel Jambs with self-tapping fasteners.
- C. Weather Seal: Snap-on vinyl seal.

2.06 COUNTERBALANCE SYSTEM

- A. Head-plates: 3/16 inch steel plate, attached to wall angle of guide assembly with 1/2 inch diameter class 5 case hardened bolts. Inside of drive bracket fitted with sealed ball bearing. Provide head plates with one coat of rust-inhibitive primer
- B. Barrel: Minimum 4-1/2 inches O.D. and 0.120 inch wall thickness structural steel pipe. Deflection of pipe under full load shall not exceed 0.03 inch per foot of span.
- C. Counterbalance: Provide torsion counterbalance mechanism as follows: Torsion Spring: Oil-tempered, helical torsion springs, grease packed and mounted on a continuous steel torsion shaft.

2.07 ENCLOSURES

- A. Round Hood: 24 gauge steel, finish-painted to match curtain.
- B. Hood Baffle: With EPDM rubber seal to inhibit air infiltration through hood cavity.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Site Verification of Conditions: Verify through direct observation and field measurement that site conditions are acceptable for installation of doors, operators, controls and accessories. Ensure that openings square, flush and plumb.
 - 1. Do not proceed with installation of doors, operators, controls and accessories until unacceptable conditions are corrected.

3.02 INSTALLATION

- A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion. Lubricate bearings and sliding parts as recommended by manufacturer. Adjust seals to provide weathertight fit around entire perimeter.

3.03 CLEANING

- A. Remove temporary coverings and protection of adjacent work areas. Repair or replace installed products damaged prior to or during installation.
- B. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove and legally dispose of construction debris from project site.

3.04 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION

SECTION 08 41 13

ALUMINUM-FRAMED ENTRANCE AND STOREFRONT

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Aluminum-framed entrance and storefront system includes tubular aluminum sections with supplementary internal support framing as required, aluminum and glass entrances, shop fabricated, factory finished, glass and glazing, related flashing, anchorage and attachment devices.
- B. Related Sections:
 - 1. Section 07 92 00 – Joint Sealants.
 - 2. Section 08 71 00 – Door Hardware.
 - 3. Section 08 80 00 – Glazing.
 - 4. Section 09 05 15 - Color Design.
 - 5. Section 12 21 14 - Horizontal Louver Blinds-Metal: Attachments to framing member.
 - 6. Division 26 Section for Electrical.

1.02 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.03 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's specifications for materials and fabrication of aluminum-framed entrance and storefront, and instructions and recommendations for installation and maintenance. Include certified test reports showing compliance with requirements where a test method is indicated. Submit product data for door hardware and accessories.
- B. Shop Drawings: Submit drawings showing adaptation of manufacturer's standard system to project; include typical unit elevations at 1/2 inch scale and details at 3 inch scale, to show dimensioning, member profiles, anchorage system, interface with building construction, and glazing. Show section moduli of wind-load-bearing members, and calculations of stresses and deflections for performance under design loading. Show clearly on shop drawings where and how manufacturer's system deviates from Contract Drawings and these Specifications.
- C. Samples: Submit samples of each type and color of aluminum finish, on 12 inch long sections of extrusions of formed shapes and on 6 inch squares of sheet/plate. Include 2 or more samples in each set, showing near-limits of variations (if any) in color and texture of finish.
- D. Delegated-Design Submittal: For glazed aluminum-framed entrance and storefront walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.04 INFORMATIONAL SUBMITTALS

- A. Energy Performance Certificates: NFRC-certified energy performance values from manufacturer.
- B. Product test reports.
- C. Field quality-control reports.
- D. Sample warranties.

1.05 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Installer experienced to perform work of this section who has at least five years experience in the installation of work similar to that required for this project and who is acceptable to product manufacturer.
- B. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction, approving acceptable installer and approving application method.
- C. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.
- D. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
 - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Ordering Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- B. Packing, Shipping, Handling, and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle storefront material and components to avoid damage. Protect material against damage from elements, construction activities, and other hazards before, during and after installation.

1.08 WARRANTY

- A. Special Assembly Warranty: Manufacturer agrees to repair or replace components of glazed aluminum curtain wall that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
1. Warranty Period: Two years from date of Final Completion.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design glazed aluminum curtain walls.
- B. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum-framed entrance and storefront walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
1. Glazed aluminum-framed entrance and storefront walls shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.
- C. Uniform Loads:
1. A static air design load of 40 psf 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 percent of their clear spans shall occur.
- D. Air Infiltration:
1. The test specimen shall be tested in accordance with ASTM E 283. Air infiltration rate shall not exceed 0.06 cfm/ft² at a static air pressure differential of 6.24 pounds per square foot.
- E. Water Resistance, (Static):
1. 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 pounds per square foot as defined in AAMA 501.

- F. 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 pounds per square foot as defined in AAMA 501.
- G. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than 73 for frame.
- H. Seismic: When tested to AAMA 501.4, system must meet design displacement of 0.010 x the story height and ultimate displacement of 1.5 x the design displacement.
- I. Sound Transmission Loss: When tested to ASTM E90, the Sound Transmission Class (STC) shall not be less than 34 based upon one inch insulating glass (1/4 inch glass, 1/2 inch air space, 1/4 inch glass).

2.02 MANUFACTURERS

- A. Drawings and Specifications are based on products as manufactured by Kawneer Company, Inc., 555 Guthridge Court, Norcross, GA 30092. Tel. (770) 449-5555.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. EFCO Corporation, Monett, MO. Tel. (800) 221-4169.
 - 2. Oldcastle Building Envelope, Terrell, TX. Tel. (866) 653-2278.
 - 3. Traco, Cranberry Township, PA. Tel. (724) 776-7000.
- C. Substitutions that fully meet or exceed the specified requirements may be considered under provisions of Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.03 MATERIALS

- A. Aluminum-framed Storefront Framing: Kawneer Trifab VG 451 - 2 inches by 4-1/2 inches and 4-1/2 inches by 4 -1/2 inches nominal dimensions; Screw Spline Fabrication.
 - 1. Material Standard: Extruded Aluminum, ASTM B 221, 6063-T5 or 6063-T6 alloy and temper.
 - 2. Member Wall Thickness: Each framing member shall have a wall thickness sufficient to meet the specified structural requirements
 - 3. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront wall members are nominal and in compliance with AA Aluminum Standards and Data.

2.04 ACCESSORIES

- A. Fasteners: Where exposed, shall be Stainless Steel.
- B. Gaskets: Glazing gaskets shall comply with ASTM C 864 and be extruded of a silicone compatible EPDM rubber that provides for silicone adhesion.
- C. Perimeter Anchors: Aluminum. When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

- D. Thermal Barrier: Thermal separator shall be extruded of a silicone compatible elastomer that provides for silicone adhesion.

2.05 ENTRANCES

- A. Aluminum entrance doors shall be equal to Kawneer Series 350 Medium Style Swing Doors. Coordinate door hardware with Division 26 Sections.

2.06 HARDWARE

- A. Refer to Section 08 71 00 – Door Hardware for requirements for hardware items other than those indicated herein to be provided by manufacturer of aluminum entrances.

- B. Exterior Door: Provide door manufacturer's standard heavy-duty hardware units as shown, schedule, or required for operation of each door, including the following items of size, number, and type recommended by manufacturer for service required, finish to match door, unless otherwise indicated:

1. Top, Bottom, and Intermediate Pivots: Cast aluminum ally with steel pins and oilite bearings (ball-bearing bottom pivots). Finish No. 17 Clear.
2. Overhead Closers: Equal to LCN 4040 Parallel Arm with Cush-N-Stop and custom powder coat metal cover.
3. Locks: Adams-Rite MS 1850A (Refer to Section 08 71 00 for cylinder) mount 41-9/16 inches above bottom of door.
4. Push / Pull Handles: Architects Classic Hardware Style "CO-9" pull and "CP-11" push bar. Mount pull top attachment 44-3/16 inches above bottom of door and push bar 37 inches above bottom of door. Finish shall be No. 17 clear anodized aluminum.
5. Weatherstripping: Sealair weathering comprised of a thermoplastic elastomer weathering on a tubular shape with a semi-rigid polymeric backing.
6. Sill Sweep Strips: EPDM blade gasket sweep strip in an aluminum extrusion applied to the interior exposed surface of the bottom rail with concealed fasteners. Finish shall match door color.
7. Thresholds: Extruded aluminum in clear anodized finish, complete with anchors and clips, coordinate with pivots. Size and shape of thresholds as indicated on the Drawings.

- C. Interior Door: Provide door manufacturer's standard heavy-duty hardware units as shown, schedule, or required for operation of each door, including the following items of size, number, and type recommended by manufacturer for service required, finish to match door, unless otherwise indicated:

1. Top, Bottom, and Intermediate Pivots: Cast aluminum ally with steel pins and oilite bearings (ball-bearing bottom pivots). Finish No. 17 Clear
2. Overhead Closers: Equal to LCN 4040 Parallel Arm with Cush-N-Stop and custom powder coat metal cover.
3. Refer to Section 08 71 00 for cylinder.
4. Weatherstripping: Sealair weathering comprised of a thermoplastic elastomer weathering on a tubular shape with a semi-rigid polymeric backing.
5. Thresholds: Extruded aluminum in clear anodized finish, complete with anchors and clips, coordinate with pivots. Size and shape of thresholds as indicated on the Drawings.

- 6. Electronic Hardware as follows
 - a. EL Paneline exit device with CPN offset pull.
 - b. EPT power transfer unit.
 - c. SP1000 power supply unit (mount in ceiling or closet).
 - d. Provide remote push button Kawneer No. 050401. Locate as directed at reception desk.

2.07 FABRICATION

A. General:

- 1. Fabricate components per manufacturer's installation instructions and with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- 2. Accurately fit and secure joints and corners. Make joints flush, hairline and weatherproof.
- 3. Prepare components to receive anchor devices. Fabricate anchors.
- 4. Arrange fasteners and attachments to conceal from view.

2.08 ALUMINUM FINISHES

- A. Anodic Finish: Kawneer Permanodic™ AA-M10C21A31, Architectural Class II Clear Anodic Coating (Color No. 17 Clear)..

2.09 SOURCE QUALITY CONTROL

- A. Source Quality: Provide aluminum-framed entrance and storefront specified herein from a single source.
 - 1. Building Enclosure System: When aluminum-framed entrance and storefront are part of a building enclosure system, including entrances, entrance hardware, windows, storefront framing and related products, provide building enclosure system products from a single source manufacturer.

PART 3 - EXECUTION

3.01 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. Verify openings are sized to receive curtain wall system and sill plate is level in accordance with manufacturer's acceptable tolerances.
 - 1. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.

3.02 INSTALLATION

- A. General: Install aluminum-framed entrance and storefront systems plumb, level, and true to line, without warp or rack of frames with manufacturer's prescribed tolerances and installation instructions. Provide support and anchor in place.
 - 1. Dissimilar Materials: Provide separation of aluminum materials from sources of corrosion or electrolytic action contact points.
 - 2. Glazing: Glass shall be outside glazed and held in place with extruded aluminum pressure plates anchored to the mullion using stainless steel fasteners spaced no greater than 9" on center.
 - 3. Water Drainage: Each light of glass shall be compartmentalized using joint plugs and silicone sealant to divert water to the horizontal weep locations. Weep holes shall be located in the horizontal pressure plates and covers to divert water to the exterior of the building.

3.03 PROTECTION AND CLEANING

- A. Protection: Protect installed product's finish surfaces from damage during construction. Protect aluminum-framed entrance and storefront system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.
- B. Cleaning: Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions. Clean units and glazing again no more than one week prior to Substantial Completion. Remove construction debris from project site and legally dispose of debris.

END OF SECTION

SECTION 08 45 19

POLYCARBONATE WALL SYSTEM

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes:

1. The design, manufacture and installation of an aluminum and polycarbonate insulating translucent system. A complete assembly of extruded cellular UV resistant polycarbonate glazing panels incorporated into a complete aluminum framing system, tested and warranted by the manufacturer.
2. All anchors, brackets, and hardware attachments necessary to complete the specified structural assembly, when included within project scope.
3. Weatherability and water-tightness performance as specified.
4. All flashings up to adjoining work are also required as part of the system and shall be included, unless specifically noted as being supplied by others.
5. Installation of the system.

B. Related Sections

1. Section 13 34 19 – Metal Building Systems.
2. Sealants 79 92 00 – Joint Sealants.
3. Section 09 05 15 – Color Design.

1.02 SYSTEM DESCRIPTION

- A. An aluminum-framed wall system that is to be glazed with translucent cellular polycarbonate panels that interconnect via extruded tongue and groove edges.

B. Design Requirements:

1. Support structure, constructed of materials of adequate load bearing capacity and to maintain visual design concepts, and for attachment to and support of the specified system, supplied by other trades.
2. Glazing panels, extruded and supplied in one single length whenever possible. In addition, they shall be extruded with integral tongue and groove vertical edges that facilitate connecting the panels together.
3. Whenever possible, fasteners shall be concealed.
4. System shall be dry glazed.
5. Bottom edges of glazing panels shall rest on a continuous integral setting fin or non-continuous supports, which is designed to allow atmospheric air to reach their bottom edges, which shall be covered by a continuous air permeable tape. EPDM, silicone rubber, or neoprene setting blocks, or any other support method that would tend to restrict the flow of air through the panels is not acceptable.
6. Air permeable tape shall also be applied to the top edge of the glazing panels.

7. Unrestricted thermal movement of the glazing panels shall be allowed to occur within the framing system without compromising its weathertightness.
8. The rabbet depth of all framing members shall, at a minimum, be based on a 3/4 inch engagement of the glazing panel, plus 1/8 inch cutting tolerance, plus .005 x the glazing dimension (in inches) that affects that rabbet. For example, a glazing panel that is 100" long will require a minimum rabbet depth of $0.75 \text{ inch} + 0.125 \text{ inch} + (.005 \times 100 \text{ inches}) = 1.375 \text{ inches}$.

C. Performance Requirements:

1. Air Infiltration: Not to exceed 0.072 cfm/sq. ft. of glazing area when tested at a pressure of 6.24 psf in accordance with ASTM E-283.
2. Water Penetration: None when tested vertically at a pressure equal to 15 percent of the design pressure for the project, in accordance with ASTM E-331.
3. Structural Performance: The system shall be capable of supporting the design loading for this project as indicated on sheet S100.
4. Testing by a certified independent testing laboratory, in accordance with ASTM E-330, shall evidence this. In addition, the deflection of all framing members oriented normal to the glazing plane shall not exceed $L/175$.

1.03 Submittals

A. Submit for each of the following to the Project Engineer / MDOT Architect's for review:

1. Each aluminum frame section – 6 inches long.
2. Samples of aluminum illustrating the specified finish.
3. Glazing gaskets – 6 inches long – each type.
4. Samples of glazing, each minimum 6 inches by 6 inches, in specified color.
5. Test reports.
6. Product Data.

B. Shop Drawings:

1. Shall include plans and/or elevations and details of the system and its installation. Flashings, sealants, and anchorage shall be clearly indicated.
2. Shall note gauges of brake metal, the finish(es) on the framing members, and any other information necessary to properly describe and install the system.

1.04 Quality Assurance

- A. Materials and Products shall be manufactured by a company continuously and regularly employed in the manufacture of glazing systems using cellular polycarbonate panel systems for a period of at least ten (10) years. Manufacturers shall provide a list of at least ten (10) projects having been in place a minimum of five (5) years.
- B. Erection shall be by the manufacturer or an installer experienced in erection of systems of the type specified for a minimum of five (5) years.
- C. The manufacturer shall be responsible for the configuration and fabrication of the complete system, and will ensure that it fully meets all requirements of this specification.

1.05 Delivery, Storage and Handling

- A. Deliver materials to the jobsite in the manufacturer's original and unopened containers and bearing labels as to type of material and manufacturer's name. Delivered materials shall be identical to approved samples.
- B. Store materials under cover in a dry, clean location, off the ground. Remove from the jobsite any materials that are damaged or otherwise not suitable for installation and replace with acceptable materials.
- C. Protective coverings containing PVC shall not be used in contact with polycarbonate.

1.06 Warranty

- A. The Manufacturer shall provide a written warranty certifying that if, within one (1) year from the Date of Completion as determined by MDOT, the system experiences water leakage owing to defects in fabrication or materials, the Manufacturer will, in a timely manner, furnish (only) new components to replace all of those found to be defective.
- B. The above warranty does not apply in the cases of structural movement of the building(s), negative air pressure inside the building(s), acts of God, alteration or abuse of the products, or unreasonable use.
- C. The liability of the Warrantor shall be limited to the above and shall not include incidental or consequential damages of any kind.
- D. The polycarbonate or glass glazing materials or any other materials or system (example... finishes on metals) furnished and warranted by others, shall be covered by only those warranties.
- E. These additional written warranties will also be provided:
 - 1. The polycarbonate manufacturer's ten (10) year prorated warranty against defective materials, color change and damage.
 - 2. The framing finish applicator's warranty as specified below:
 - a. Anodized Finish: Five (5) years from date of application against chalking, fading, cracking, crazing, and blistering.

PART 2 - PRODUCTS

2.01 MANUFACTURER AND PRODUCT

- A. EXTECH/Exterior Technologies, Inc., 200 Bridge Street, Pittsburgh, PA 15223; Phone (800) 500-8083, Fax (800) 500-8012, website www.extechinc.com or approved equal. Series #3440 Interconnecting Cellular Polycarbonate Translucent Wall System.
- B. Equivalent products by the following manufactures are acceptable:
 - 1. CPI Daylighting Inc., Lake Forest, IL. Tel. (800) 759-6985. Uniquad Quadwall
 - 2. Wasco Skylights, Wells, ME. Tel. (800) 388-0293. Lumiwall

- C. Substitutions that fully meet or exceed the specified requirements may be considered under provisions of Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.02 MATERIALS

A. Framing:

1. Shall be extruded aluminum of 6063-T5, 6005-T5 or 6105-T5 alloy and temper. All sections shall be formed true to detail and free from defects impairing appearance, strength or durability.
2. Thermally broken perimeter aluminum framing members, exclusive of cover caps, shall incorporate an integral structural polyurethane thermal break.
3. Perimeter framing members are to be dry glazed profiles, using no welding, or adhesives.

B. Glazing Gaskets:

1. Shall be elastomeric, having low friction surfaces where they contact the glazing.
2. Shall be tested for chemical compatibility with the glazing, and test reports evidencing same shall be presented to the Architect.

C. Fasteners:

1. In general, concealed fasteners are to be used for all aluminum framing.
2. In system construction, the use of adhesives, plastic welding, or sealants is not allowed.
3. Where exposed, shall be stainless steel, 300 Series, with stainless steel backed neoprene washers.
4. Concealed fasteners they may be stainless or zinc-plated steel in accordance with ASTM Specifications A165-55 or A164-55.
5. Bolts, anchors and other fastening devices shall be as required for the strength of the connections and shall be suitable for conditions encountered. Washers shall be of the same metals as fasteners.

D. Flashing:

1. Minimum 0.040 thick Aluminum anodized finish: 5005-H34. Clear Anodized Aluminum
2. Factory formed to required profile(s) in 10-ft lengths, whenever practical, to allow for field trimming to suit as-built conditions.
3. The finish on this metal shall match as closely as possible that which is on the extruded aluminum framing members.

E. Polycarbonate Glazing Panels:

1. Appearance:
 - a. The extruded panels shall be uniform in color with an integral extruded multi-cell core. The panel's exterior skins shall be interconnected and spaced apart by continuous ribs, perpendicular and/or be diagonal "X" Pattern to the skins. The space between the two exterior skins, in a cross section, shall be divided by multiple parallel intermediate walls.

- b. Panels shall consist of a polycarbonate resin with permanent, co-extruded, ultraviolet (UV) protective layers on both sides of the panels. These protective layers shall be co-extruded by the manufacturer during the original extrusion of the panel and shall be a permanent part of both the interior and exterior of the panels. Post-applied coating or films of dissimilar materials are unacceptable.
 - c. Panel thickness shall be a minimum of 1-9/16 inch.
 - d. Panel width shall be nominally 19-11/16 inches
 - e. Panel weight shall be nominally 0.82 lbs. per sq. ft.
 - f. The panels shall be designed and formed with interlocking sides so that multiple panel installations can be achieved without the need to introduce independent mullion framing members.
 - g. The panels shall be designed and formed in a manner that allows the insertion of optional internal reinforcement bars, each in close proximity to the interlocking joints of a multiple panel application.
 - h. Panel shall be extruded in one single length. Transverse connections are not acceptable.
 - i. Free thermal movement of the panels shall be allowed to occur without compromising the weather tightness of the completed system.
 - j. Panels shall be supplied with closed cell, factory applied, and continuous gasket material on the panel tongue.
 - k. The interior cells of the cellular polycarbonate sheets shall be blown clean prior to being sealed. The top and bottom of each sheet shall be sealed with an air permeable filter tape.
 - l. The open end of each panel shall rest on a continuous metal setting fin or setting block which is designed to allow atmospheric air to reach the air permeable tape at the bottoms of the panels.
 - m. Glazing shall be installed in accordance with panel and system manufacturer's guidelines.
2. Thermal and Solar Performance:
- a. Insulation Value ("U-Value"): 0.264 BTU/hr. – sq. ft. degree F.
 - b. Light Transmission (LT percent): 47 percent.
 - c. Shading Coefficient (SC): 0.52.
 - d. Solar Heat Gain Coefficient (SHGC): 0.45.
3. Flammability:
- a. The panel shall have a CC1 fire rating classification when tested in accordance with ASTM D-635 or equivalent.
 - b. The panel shall have a Class C flame spread and smoke development rating when tested in accordance with ASTM E-84.

2.03 FABRICATION AND WORKMANSHIP

- A. Construct wall(s) using extruded aluminum members.
- B. Carefully and accurately design, fabricate and assemble work with proper provision for thermal contraction and expansion. Work shall conform to profiles and sections noted on the shop drawings. Work shall be assembled with joints in a neat and finished manner.
- C. All framing members shall be factory fabricated and assembled to the greatest degree possible, including the following:
 - 1. Cutting members to length.
 - 2. Installation of glazing gaskets, to be glued within extruded gasket tracks.

3. Drilling straight and countersunk mounting holes, fastener access holes, and weep holes.
4. Fabricating miter joints with concealed joint reinforcements and joint gaskets.
5. Installation of non-metallic thermal isolation spacers.
6. Removal of extrusion portions to accommodate tight over-lapping joinery and connections, including coped ends, mid-span notches, etc.
7. Fabrication and installation of splice plates at jointed connections.

2.04 FINISHES

- A. Exposed surfaces of the aluminum framing members shall be clear anodized finish.

Part 3 – EXECUTION

3.01 EXAMINATION

- A. All submitted opening sizes, dimensions and tolerances are to be field verified by the installer unless otherwise stipulated.
- B. Installer to examine site conditions to verify readiness. Notify general contractor or owner about any defects requiring correction, including but not limited to improperly sloping sill substrates and uneven planar substrates. Do not work until conditions are satisfactory.

3.02 INSTALLATION

- A. Install components in strict accordance with manufacturer's instructions and approved shop drawings. Use proper fasteners and hardware for material attachments as specified.
- B. Use methods of attachment to structure which include provisions for thermal movement.
- C. Glazing shall be installed in accordance with panel and system manufacturer's guidelines.
- D. Remove all protective coverings on polycarbonate panels during or immediately after installation.
- E. Installation shall be performed by a company with ten (10) years continuous experience in commercial construction.
- F. Protect contact points between unprotected dissimilar metals (except stainless steel) using continuous separators of FRP, PVC tape (or approved equal)

3.03 CLEANING AND PROTECTION

- A. During installation, protect exposed surfaces against accumulation of paint, caulking, disfiguration and damage.
- B. Interior glazing surfaces shall be cleaned as the panels are being installed. The exterior shall be cleaned as each phase of the work is completed.
- C. Follow panel manufacturer instructions when cleaning exposed panel surfaces. Clean polycarbonate and frame at time of installation.
- D. Follow panel manufacturer's guidelines when removing foreign substances from panel surfaces. Use only solvents that are deemed acceptable for use.
- E. Before final acceptance, repair and/or replace any defective materials or work.

END OF SECTION

SECTION 08 51 12

ALUMINUM WINDOWS-SINGLE HUNG

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes aluminum single hung exterior window units located in Shed with enclosed bay.
- B. Related Sections:
 - 1. Section 08 80 00 – Glazing for glazing requirements of aluminum windows, including windows specified herein shall be factory pre-glazed.
 - 2. Section 09 05 15 – Color Design..

1.02 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's sample warranty, specifications, standard details, and installation recommendations for components of aluminum window units required for project, including independent laboratory certified test reports that products tested comply with performances requirements.
- B. Shop Drawings: Submit shop drawings for fabrication and installation of aluminum windows, including unit elevations, full-or half-scale detail sections of typical composite members. Show anchorage locations and other components not included in manufacturer's standard data. Indicate type glazing, screening and window finish being supplied.
- C. Samples:
 - 1. Two samples of each required aluminum finish, on a three-inch long section of an extruded shape or flat aluminum sheet.
 - 2. Additional samples, if required and as directed by the Project Engineer / MDOT Architect, to show fabrication techniques, workmanship of component parts and design of hardware and other exposed auxiliary items.
- D. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

1.03 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranties.

1.04 QUALITY ASSURANCE

- A. Except as otherwise indicated, requirements for aluminum windows, terminology, tolerances, standards of performance, and fabrication workmanship are those specified and recommended in AAMA/WDMA/CSA 101/I.S.2/A440-08 and AAMA 910-93 and applicable general recommendations published by AAMA and AA.
- B. Manufacturer: Provide aluminum window units and framing system produced by a single firm with minimum 5 years successful experience in fabricating types required for this Project.
- C. Installer Qualifications: Skilled craftspeople who have demonstrated a successful history of installing windows for five years.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle windows, mullions, panels, hardware and all appurtenant items in strict compliance with the manufacturer's instructions.
- B. Protect windows and all accessory materials adequately against damage from the elements, construction activities and other hazards before, during and after installation.

1.06 SPECIAL PROJECT WARRANTY

- A. Provide written warranty signed by Manufacturer, Installer, and Contractor, agreeing to replace aluminum windows which fail in materials or workmanship within 3 years of acceptance.
 - 1. Failure of materials or workmanship includes excessive leakage or air infiltration, excessive deflections, faulty operation of sashes, deterioration of finish or construction in excess of normal weathering, and defects in hardware, weather-stripping, and other components of the Work.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Drawings and Specifications are based on Model 4130 Single Hung Tilt Windows with integral trim as manufactured by Peerless Products, Inc., Lenexa, KS 66219. Tel. (800) 279-9999.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. All Seasons Commercial, Bryan, TX. Tel. (800) 444-1444.
 - 2. Winco Window Company, Saint Louis, MO. Tel. (800) 525-8089.
- C. Substitutions shall fully comply with specified requirements and Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.02 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: AAMA/WDMA/CSA 101/I.S.2/A440-08
 - 1. AAMA Certification: Conformance with AW50.
- B. Performance and Testing:
 - 1. Except as otherwise indicated, comply with air infiltration tests, water resistance tests and applicable load tests in AAMA/WDMA/CSA/101/I.S.2/A440-08 for type and classification of window units required in each case.
 - 2. Where manufacturer's standard window units comply with requirements and have been tested in accordance with specified tests, provide certification by manufacturer showing compliance with such tests.
- C. Uniform Load Structural Test:
 - 1. A minimum exterior and interior uniform load of 75 pounds per square foot shall be applied to the entire outside surface of the test unit.
 - 2. This test load shall be maintained for a period of 10 seconds.
 - 3. At the conclusion of the test, there shall be no glass breakage, permanent damage of fasteners, hardware parts, support arms, actuating mechanisms, or any other damage causing the window to be inoperable.
 - 4. There shall be no permanent deformation of any frame or sash member in excess of 0.4 percent of span.
- D. Air Infiltration Test:
 - 1. With the sash in a closed and locked position, the window shall be subjected to an air infiltration test in accordance with ASTM E 283-04.
 - 2. Air infiltration shall not exceed 0.22 cubic feet per minute, per square foot of window area.
- E. Water Resistance Test: No water shall pass the interior face of the window frame and there shall be no leakage as defined in tests methods ASTM E 331-00 and ASTM E547
- F. Condensation Resistance Factor: The window shall be tested in accordance with AAMA 1503 standards and tests of thermal performance and shall have a condensation resistance factor of no less than .45
- G. Operating Force: The sash shall have been adjusted to operate in either direction with a force not exceeding 45 pounds after the sash is in motion.
- H. Field Measurement:
 - 1. Wherever possible, take field measurements prior to preparation of shop drawings and fabrication, to ensure proper fitting of work.
 - 2. However, proceed with fabrication and coordinate installation tolerances as necessary when field measurements might delay the Work.

2.03 ALUMINUM WINDOW MATERIALS AND ACCESSORIES

- A. Aluminum Members:
 - 1. Extruded Sections: 6063-T5 aluminum.
 - 2. Alloy and Temper: Recommended by manufacturer for strength, corrosion resistance, and application of required finish; ASTM B 221 for extrusions, ASTM B 209 for sheet/plate.
 - 3. Main Frame: Extruded members; minimum depth of 4-3/4 inches.
- B. Fasteners:
 - 1. Aluminum, non-magnetic stainless steel, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum components.
 - 2. Do not use exposed fasteners except where unavoidable for application of hardware.
 - 3. Match finish of adjoining metal. Provide Phillips flat-head machine screws for exposed fasteners.
 - 4. Locate all fasteners so as not to bridge the thermal break construction of windows.
- C. Concealed Flashing: Dead-soft stainless steel, 26 gage minimum, type selected by manufacturer for compatibility.
- D. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible; otherwise, nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A 386.
- E. Sliding Weather-stripping: Provide double weather-stripping using silicone-coated woven pile with polypropylene fin center complying with AAMA 701.
- F. Glass and Glazing Materials: Provide glass and glazing materials that comply with requirements of Section 08 80 00 of these Specifications.

2.04 WINDOW TYPE (OPERATION)

- A. Aluminum Single Hung Tilt Window:
 - 1. Type: Single Hung aluminum window units containing one balanced vertically sliding sash; requiring up to four (4) counter balancing mechanisms complying with AAMA 902 "Voluntary Specifications for Sash Balances", and as specified hereinafter, lift handles on lower rail of lower sash.
 - a. Provide Zamac sweep lock latches at meeting rails to lock sash in closed position.
 - b. Provide units with "tilt-in" feature which permit sash to be cleaned from the interior.
 - c. Sash shall not tilt in without the use of a maintenance-only release mechanism.

2.05 INSECT SCREENS

- A. General: Fabricate manufacturer's standard aluminum insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.

1. Type and Location: Half, outside for single hung sashes.

- B. Aluminum Frames: Complying with SMA 1004 or SMA 1201.

2.06 FABRICATION

- A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

B. Glaze aluminum windows in the factory.

C. Weather strip each operable sash to provide weathertight installation.

D. Provide weep holes and internal passages to conduct infiltrating water to exterior.

E. Provide water-shed members above side-hinged sashes and similar lines of natural water penetration.

F. Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design wind loads of window units.

G. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.07 ALUMINUM FINISHES

- A. High-Performance Organic Finish (Two-Coat Fluoropolymer): Thermocured system consisting of inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight complying with AAMA 2605.

1. Color and Gloss: Finish to be selected by Project Engineer / MDOT Architect from manufacturer's full range of standard colors available. Refer to Section 09 05 15 – Color Design for selected color.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.
- B. Install windows 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 to produce weathertight construction.
- C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
- E. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- F. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- G. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Hardware as shown on the Drawings and in Schedules. Door hardware is hereby defined to include all items known commercially as builders hardware, as required for swing doors, except special types of unique and non-matching hardware specified in the same section as the door and door frame.
- B. The required types of hardware include (but are not limited to) the following:
1. Butts and hinges
 2. Lock cylinders and keys
 3. Lock and latch sets
 4. Bolts
 5. Panic exit devices
 6. Push / pull units
 7. Closers
 8. Door trim units
 9. Stripping and seals
 10. Thresholds
- C. Items of hardware not definitely specified, but required for the completion and proper operation of the doors, shall be suitable in type, comparable to the type specified for similar openings.
1. Labeled doors shall be fitted with labeled hardware.
- D. Modifications of hardware required by reason of construction characteristics shall provide the proper operation or functional features.
1. Contractor shall be fully responsible for checking all details, such as wall trim clearance, bevels, backsets, proper type strike plates, length of spindles, hands of locks, etc., in order that all items of hardware shall fit properly.
 2. Hardware for application to metal shall be made to standard templates.
 3. Furnish template information to door and frame fabricators and all other trades requiring same, in order that they may cut, reinforce or otherwise prepare in the shop, materials for reception of hardware.
- E. Hardware shall be free from defects affecting appearance and serviceability.
1. Working parts shall be well fitted and smooth working without unnecessary play.
 2. Hardware shall be delivered to the building site in sufficient time in advance of its requirement for use for inspection prior to installation.

1.02 REFERENCES

A. Coordinate with the following Sections for the installation of finish hardware:

1. Section 08 11 13 – Hollow Metal Doors and Frames.
2. Section 08 14 29 – Pre-finished Wood Doors.
3. 08 41 13 – Aluminum Framed Entrances and Storefronts.
4. Divisions 26 and 28 Sections for electronic door hardware.

1.03 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's product data, roughing-in diagrams, and Installation instructions for each type of hardware.

1. Include operating instructions, maintenance information and spare part sources.

B. Shop Drawings: Details of electrified door hardware.

C. Samples: Submit samples for color of finishes (Black WILL NOT Be Acceptable In Lieu Of Antique Bronze Oiled Finish) and such samples as required by the Project Engineer / MDOT Architect for approval. Do not deliver hardware until approval is obtained.

D. Templates: Provide templates and / or physical hardware to trades as required and in sufficient time to prevent delay in the execution of the Work.

E. Other Action Submittals:

1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - a. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
 - b. Content: Include the following information:
 - 1) Identification number, location, hand, fire rating, size, and material of each door and frame.
 - 2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
 - 3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
 - 4) Description of electrified door hardware sequences of operation and interfaces with other building control systems.
2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks.
3. Approval of schedule will not relieve Contractor of responsibility for furnishing all necessary hardware.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, MDOT Architect and Project Engineer (Owner's Representative) about door hardware and keying.
- B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as follows:
 - 1. For door hardware, an Architectural Hardware Consultant (AHC).
- C. Source Limitations: Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.
- D. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C, unless otherwise indicated.
- E. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meet requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 - 1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. at the tested pressure differential of 0.3-inch wg of water.
- F. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- G. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- H. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1
 - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
 - 2. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
 - b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
 4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.
- I. Keying Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination."
- 1.05 DELIVERY, STORAGE, AND HANDLING
- A. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.
 - B. Packing and Marking: Package each item of hardware and lockset separately in individual containers, complete with screws, keys, instructions and installation template for spotting mortising tools. Mark each container with item number corresponding to number shown on Contractor's hardware schedule.
- 1.06 WARRANTY
- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 1. Warranty Period: Three years from date of Completion, unless otherwise indicated.
 - a. Electromagnetic Locks: Five years from date of Completion.
 - b. Exit Devices: Two years from date of Completion.
 - c. Manual Closers: 10 years from date of Completion.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Equivalent products by the following manufacturers are acceptable:
 1. Hinges – Hager, Ives, McKinney.
 2. Continuous Hinges – Hager, Ives, Markar.
 3. Cylinders – Best, Corbin/Russwin, Sargent, Schlage.
 4. Flushbolts and Accessories – Hager, Ives, Rockwood.
 5. Locksets – Baldwin, Corbin/Russwin, Sargent, Schlage.
 6. Deadbolts – Baldwin, Corbin/Russwin, Sargent, Schlage.
 7. Exit Devices – Precision, Sargent, Von Duprin.
 8. Door Closers – Corbin/Russwin (DC3000), LCN (1460), Sargent (1430).
 9. Protective Plates – Hager, Ives, Rockwood.
 10. Door Stops – Hager, Ives, Rockwood.
 11. Overhead Stops / Holders – Glynn Johnson, Rixson, Sargent.
 12. Magnetic Hold Opens – LCN, Rixson, Sargent.
 13. Gasketing and Thresholds – National Guard Products, Pemko, Reese.
 14. Silencers – Hager, Ives, Rockwood.
 15. Power Supplies – Schlage Electronics, Securitron, Von Duprin.

- B. Substitutions: Comply with specified requirements and Section 01 25 00 – Substitution Procedures and Section 01 60 00 – Product Requirements.

2.02 SCHEDULED DOOR HARDWARE

- A. Provide door hardware for each door as scheduled on Drawings to comply with requirements in this Section.
 - 1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products equivalent in function and comparable in quality to named products
 - 2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.
 - 2. References to BHMA Designations: Provide products complying with these designations and requirements for description, quality, and function.

2.03 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.
 - 1. Master Key System: Change keys and a master key operate cylinders.
 - 2. New Building:
 - a. Master key or grand master key locks to a new key system.
 - 3. Keyed Alike: Key all cylinders to same change key.
- B. Removable Cores: Furnish all cylinders & locksets with removable type cores. The removable core system shall be one that uses either temporary construction cores or construction keyed cores operated by a construction key until such time the construction key is rendered inactive by the change key or retractor key.
- C. Keys: Brass.
 - 1. Quantity: In addition to one extra key blank for each lock, provide the following:
 - a. Cylinder Change Keys: Three.
 - b. Master Keys: Six.

2.04 ACCESSORIES FOR PAIRS OF DOORS

- A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release.

B. Carry-Open Bars: BHMA A156.3; prevent the inactive leaf from opening before the active leaf; provide polished brass or bronze carry-open bars with strike plate for inactive leaves of pairs of doors unless automatic or self-latching bolts are used.

C. Astragals: BHMA A156.22.

2.05 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Fire-Rated Applications:
 - a. Wood or Machine Screws: For the following:
 - 1) Hinges mortised to doors or frames.
 - 2) Strike plates to frames.
 - 3) Closers to doors and frames.
 - b. Steel Through Bolts: For the following unless door blocking is provided:
 - 1) Surface hinges to doors.
 - 2) Closers to doors and frames.
 - 3) Surface-mounted exit devices.
3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
4. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."
5. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.06 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
- B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

- C. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 2. Custom Steel Doors and Frames: HMMA 831.
 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- D. Install each door hardware item to comply with manufacturer's 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. Do not install surface-mounted items until finishes have been completed on substrates involved.
1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- E. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- F. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches of door height greater than 90 inches.
- G. Lock Cylinders: Install construction cores to secure building and areas during construction period.
1. Replace construction cores with permanent cores as indicated in keying schedule.
 2. Furnish permanent cores to Owner for installation.
- H. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- I. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 07 92 00 "Joint Sealants."
1. Cut and fit threshold and floor covers to profile of door frames, with mitered corners and hairline joints.
 2. Screw thresholds to substrate with No. 10 or larger screws, of the proper type for permanent anchorage and of bronze or stainless steel that will not corrode in contact with the threshold metal.
 3. Do not plug drainage holes or block weeps.
 4. Remove excess sealant.
- J. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- K. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

- L. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- M. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.
- N. 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.
 - 1. Lubricate moving parts with type lubrication recommended by manufacturer (graphite-type if no other recommended).

3.02 FIELD QUALITY CONTROL

- A. Independent Architectural Hardware Consultant: Engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

3.03 DOOR HARDWARE SCHEDULE

HW1 (For Exterior Aluminum Storefront Door)
 Each Opening Shall Have:

2 – Each Cylinders As Required
 (Balance of Hardware by Door Manufacturer)

HW3 (For Exterior Single Hollow Metal Doors)
 Each Opening Shall Have:

3 – Each Hinges	McKinney	TA2714 4 1/2 X 4 1/2 X NRP X 626
1 – Lockset	Sargent	10G24LL X 626
1 – Closer	Sargent	1431P9 X TB X EN
1 – Kickplate	Rockwood	8 X 2 LDW 0.050 X 626 (Mounted push side)
1 – Threshold	Pemko	2005AV
1 – W/Strip	Pemko	303DV
1 – Door Bottom	Pemko	2211DV (for Hollow Metal Doors)
1 – Stop	Rockwood	(As Required)
3 – Silencers		

HW4 (For Interior Wood Door @ Crew Room)
 Each Opening Shall Have:

3 – Each Hinges	McKinney	TA2714 4 1/2 X 4 1/2 X 626
1 – Passage	Sargent	10U15LL X 626
1 – Closer	Sargent	1431P/O X TB X EN LCN
1 – Kickplate	Rockwood	8 X 2 LDW 0.050 X 626 (Mounted push side)
1 – Mop Plate	Rockwood	6 X 1 LDW 0.050 X 626 (Mounted pull side)
1 – Stop	Rockwood	440 X 626
3 – Silencers		

HW5 (For Interior Wood Door @ Offices)

Each Opening Shall Have:

3 – Each Hinges	McKinney	TA2714 4 1/2 X 4 1/2 X 626
1 – Lockset	Sargent	10G24LL X 626
1 – Cylinder		As Required
1 – Stop	Rockwood	440 X 626
3 – Silencers		

HW6 (For Interior Hollow Metal Door @ Men's Toilet & Locker Room)

Each Opening Shall Have:

3 – Each Hinges	McKinney	TA2714 4 1/2 X 4 1/2 X 626
1 – Passage	Sargent	10U15LL X 626
1 – Closer	Sargent	1431P/O X TB X EN LCN
1 – Kickplate	Rockwood	8 X 2 LDW 0.050 X 626 (Mounted push side)
1 – Mop Plate	Rockwood	6 X 1 LDW 0.050 X 626 (Mounted pull side)
1 – Stop	Rockwood	440 X 626
3 – Silencers		

HW7 (for Interior Wood Door @ Women's Toilet and Shower Room)

Each Opening Shall Have:

3 – Each Hinges	McKinney	TA2714 4 1/2 X 4 1/2 X 626
1 – Privacy	Sargent	10U15LL X 626
1 – Indicator Deadbolt	Yale	D291 X 626
1 – Closer	Sargent	1431P/O X TB X EN
1 – Kickplate	Rockwood	8 X 2 LDW 0.050 X 626 (Mounted push side)
1 – Mop Plate	Rockwood	6 X 1 LDW 0.050 X 626 (Mounted pull side)
1 – Stop	Rockwood	440 X 626
3 – Silencers		

HW8 (For Interior Hollow Metal Door @ Crew Room, Corridor & Shop Storage Room)

Each Opening Shall Have:

3 – Each Hinges	McKinney	TA2714 4 1/2 X 4 1/2 X 626
1 – Lockset	Sargent	10G24LL X 626
1 – Cylinder		As Required
1 – Closer	Sargent	1431P/O X TB X EN
1 – Kickplate	Rockwood	8 X 2 LDW 0.050 X 626 (Mounted push side)
1 – Stop	Rockwood	440 X 626 (Overhead Stop as Required)
3 – Silencers		

HW9 (for Exterior Dbl Hollow Metal Doors @ Pressure Washer Room)

Each Opening Shall Have:

6 – Each Hinges	McKinney	TA2714 4 1/2 X 4 1/2 X NRP X 626
1 – Lockset	Sargent	10G04LL X 626
1 – Cylinder		As Required
2 – Flushbolts	Rockwood	555-12" X 626
1 – Threshold	Pemko	2005AV X Required Length
1 – W/Strip	Pemko	303DV
2 – Door Bottom	Pemko	2211DV (for Hollow Metal Doors)
2 – Stops	Rockwood	473 X 626
2 – Silencers		

END OF SECTION

SECTION 08 80 00 GLAZING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Glass and glazing for doors, windows, Aluminum Framed Entrances and Storefronts, and other glazed openings, interior and exterior locations.
- B. Related Sections:
 - 1. Section 08 11 13 - Hollow Metal Doors and Frames.
 - 2. Section 08 14 29 - Prefinished Wood Doors.
 - 3. Section 08 41 13 - Aluminum Framed Entrances and Storefronts..
 - 4. Section 08 51 12 - Aluminum Windows-Single Hung.

1.02 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
 - 1. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.

1.03 ACTION SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.04 INFORMATIONAL SUBMITTALS

- A. Preconstruction adhesion and compatibility test report.

1.05 QUALITY ASSURANCE

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. Prime Glass Standard: FS DD-G-45I.
 - 2. Heat-Treated Glass Standard: FS DD-G-I403.
 - 3. Safety Glass Standard: CPSC I6 CFR I20I.

- 4. GANA Publications: GANA's "Glazing Manual."
- 5. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect glass during transit, storage and handling to prevent scratching or breakage of glass. Replace broken glass.

1.07 PROJECT CONDITIONS

- A. Schedule meeting with Glazier and other trades affected by glass installation, prior to beginning of installation.
 - 1. Do not perform work under adverse weather or job conditions.
 - 2. Install liquid sealant when temperatures are within lower or middle third of temperature range recommended by manufacturer.

1.08 WARRANTY

- A. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
 - 1. Warranty Period: 10 years from date of Completion.
- B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
 - 1. Warranty Period: 10 years from date of Completion.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Equivalent products by the following prime glass manufacturers are acceptable:
 - 1. Arch Aluminum & Glass Co., Inc., Columbus, OH. Tel No. (800) 870-2519.
 - 2. Cardinal Glass Industries, Eden Prairie, MN. Tel. (952) 229-2600.
 - 3. Old Castle Building Envelops, Santa Monica, CA. Tel. (866) 653-2278.
 - 4. PPG Industries, Inc., Pittsburgh, PA. Tel. (800) 377-5267.

5. Safti First, San Francisco, CA. Tel. (888) 653-3333.
6. Viracon, Inc., Owatonna, MN. Tel. (800) 533-2080.

- B. Substitutions shall fully comply with specified requirements and Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.02 GLASS PRODUCTS, GENERAL

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
- B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.
- C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 1. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
 2. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 3. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.03 GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
- B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

2.04 INSULATING GLASS

- A. Material: Organically sealed panes of glass enclosing a hermetically sealed dehydrated air space and complying with ASTM E 774 for performance classification indicated. Unless shown otherwise on Drawings, use this type glass for all exterior applications.
- B. Characteristics: Other requirements specified for glass characteristics, air space, sealing system, sealant spacer material, corner design and desiccant are as follows:
 1. Thickness of Each Pane: 1/4 - inch.
 2. Airspace Thickness: 1/2 - inch.
 3. Sealing System: Manufacturer's standard 1 inch sealing system with Argon.
 4. Spacer Material: Manufacturer's standard metal-white.
 5. Desiccant: Manufacturer's standard, either molecular sieve or silica gel.
 6. Corner Construction: Manufacturer's standard.
 7. Exterior Pane: Tinted; color – "Solargray" with Solarban 60 MSVD (Sputter) Low-E on 2nd (air space) surface by PPG Industries, Inc.

8. Interior Pane: Clear.
9. Unit Performance Requirements for "Solargray"
 - a. Light Transmission (visible): 35 percent
 - b. U-Value, Summer: 0.28
 - c. U-Value, Winter: 0.29
 - d. Relative Heat Gain: 73 BTU per Hour Ft².
 - e. Solar Heat Gain Coefficient (SHGC): 0.25
 - f. Shading Coefficient: 0.29

2.05 LAMINATED CLEAR SAFETY GLASS

- A. Two layers of 1/8 inch glass Type 1 (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select) with a 0.030 polyvinyl butyryl interlayer. Total thickness, 1/4 inch (plus). Unless shown otherwise on Drawings, use this type glass for all interior applications.

2.06 UNFRAMED MIRRORS

- A. Number 1 quality, 1/4 inch thick, select float glass mirror electrolytically copper-plated surface, guaranteed against silver spoilage for 10 years. Size as shown on the Drawings. Mirror edges shall be eased. Mounting clips shall be bright polished chrome corrosion resistant metal.

2.07 SETTING MATERIALS

- A. Provide necessary primers, sealants, channels, setting blocks, etc. with items to be glazed. Conform to requirements set forth in FGJA Glazing Manual.

2.08 MISCELLANEOUS GLAZING MATERIALS

- A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- C. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- D. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- E. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- F. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

PART 3 - EXECUTION

3.01 PREPARATION FOR GLAZING

- A. Clean glazing channel and other framing members to receive glass, immediately before glazing. Remove coatings that are not firmly bonded to substrate. Remove lacquer from metal surfaces where elastomeric sealants are used.
 - 1. Apply primer or sealant to joint surfaces where recommended by sealant manufacturer.

3.02 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage to ensure that gasket will not "walk" out when installation is subjected to movement. Anchor gasket to stop with matching ribs, or by proven adhesives, including embedment of gasket tail in cured heel-bead.
- J. Tool exposed surfaces of glazing liquids and compounds to provide a substantial "wash" away from glass. Install pressurized tapes and gaskets to protrude slightly out of channel, so as to eliminate dirt and moisture pockets.

3.03 GLAZING INSTALLATION

- A. Do not commence glazing Work until the required primers have been applied and have dried. Clean all surfaces to which setting materials are to be applied to assure that the materials properly adhere and seal.
- B. Experienced glaziers having highest quality workmanship shall perform all glazing. Glass shall be set without springing or forcing. Putty, glazing compound, stops and the like shall not project above the sight line. Exposed surfaces of putty and glazing compound shall be left straight, flat and clean. Corners shall be well formed.
- C. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.
- D. Apply clear glazing compound around perimeter and at all glass-to-glass connections of butt-glazing system. Compound shall be the type recommended by the glass manufacturer for this particular installation.
- E. Door Lites: Install glass in frames in sizes as shown on the Drawings. Where fire ratings are indicated for doors, frames shall comply with applicable U.L. fire rating standards.
- F. Unframed Mirrors: Install unframed mirrors with a combination of metal clips and construction adhesive securely attached to the wall studs and/or concealed blocking.

3.04 STANDARDS AND PERFORMANCE

- A. Watertight and airtight installation of each glass product is required, except as otherwise shown. Each installation must withstand normal temperature changes, wind loading, impact loading (for operating sash and doors), without failure including loss or breakage of glass, failure of sealant or gaskets to remain watertight and airtight, deterioration of glazing materials and other defects in the Work.
- B. Protect glass from edge damage during handling and installation, and subsequent operation of glazed components of the Work. During installation, discard units with significant edge damage or other imperfections.
- C. Glazing channel dimensions where shown are intended to provide for necessary bite on glass, minimum edge clearance, and adequate sealant thickness, with reasonable tolerances. Adjust as required by job conditions at time of installation.
- D. 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.

3.05 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.
 - 1. Cure sealant for high early strength and durability
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

END OF SECTION

SECTION 08 91 19 FIXED LOUVERS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Extruded aluminum and fixed louvers with insect/bird screens and sill extensions as indicated on the Drawings including indications of sizes and locations.
- B. Related Requirements:
 - 1. Section 07 92 00 – Sealants (for sealant in connection with installations of louvers).
 - 2. Section 09 05 15 – Color Design (for color selection).
 - 3. Divisions 23 and 26 for operable dampers behind louvers where scheduled.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product; Submit manufacturer's specifications; certified test data, where applicable; and installation instructions for required products, including finishes.
 - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
- C. Samples: Submit 6-inch square samples of each required finish.
 - 1. Prepare samples on metal of same gage and alloy to be used in Work.
 - 2. Where normal color and texture variations are to be expected, include two or more units in each sample showing limits of such variations.
- D. Delegated-Design Submittal: For louvers indicated to comply with structural and seismic performance requirements, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.03 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on tests performed according to AMCA 500-L.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials and products in labeled protective packages. Store and handle in strict compliance with manufacturers' instructions and recommendations. Protect from damage from weather, excessive temperatures and construction operations.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by Construction Specialties, Inc., 49 Meeker Ave., Cranford, NJ 07016. Tel. (908) 272-5200.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. All-Lite Louvers, Mineral Wells, WV. Tel. (304) 489-8113.
 - 2. Ruskin Manufacturing, Kansas City, MO. Tel. (816) 761-7476.
- C. Substitutions that fully meet or exceed the specified requirements may be considered under provisions of Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design louvers, including comprehensive engineering analysis by a qualified professional engineer, using structural and seismic performance requirements and design criteria indicated.
- B. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.
 - 1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
 - 2. Wind Loads: Determine loads based on a uniform pressure of 20 lbf/sq. ft. acting inward or outward.
- C. Seismic Performance: Louvers, including attachments to other construction, shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. Design earthquake spectral response acceleration, short period (Sds) for Project as required by IBC 2012 and AHJ.
 - 2. Component Importance Factor 1.0, unless noted otherwise.
- D. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

2.03 FIXED, EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal, Drainable-Blade Fixed Louver-4 Inches Deep:
 - 1. Manufacturer and Model: Equal to C/S Model A4097.
 - 2. Louver Depth: 4 inches.
 - 3. Frame and Blade Nominal Thickness: Not less than 0.081 inch.

4. Mullion Type: Hidden vertical mullions of type and at spacing indicated but not further apart than recommended by manufacturer or 72 inches on center, whichever is less.
 - a. At horizontal joints between louver units provide horizontal mullions except where continuous vertical assemblies are indicated
5. Louver Performance Ratings:
 - a. Free Area: Not less than 50.44 percent for 48-inch- wide by 48-inch- high louver.
 - b. Air Performance: Not more than 0.14-inch wg static pressure drop at 872-fpm free-area intake velocity.
6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

B. Horizontal, Operating Louver- 4 Inches Deep:

1. Manufacturer and Model: Equal to C/S Model 4830.
2. Louver Depth: 4 inches.
3. Frame and Blade Nominal Thickness: Not less than 0.081 inch.
4. Operation: Internal drive arms.
5. Provide optional jamb gaskets at blade ends.
6. Louver Performance Ratings based on 4'x4' unit:
 - a. Free Area: Not less than 5.30 sq. ft. for 48-inch- wide by 48-inch- high louver.
 - b. Intake Pressure drop at 700 fpm free area velocity: 0.07 in. H₂O
 - c. Exhaust pressure drop at 1000 FPM free area velocity: 0.21 in.
7. AMCA Seal: Mark units with AMCA Certified Ratings Seal

2.04 LOUVER SCREENS

- A. Provide removable screens for exterior louvers. Fabricate screen frames of same metal and finish as louver units to which secured, unless otherwise indicated. Provide frames consisting of U-shaped metal for permanently securing screen mesh.
- B. Use insect screens of 18X14 aluminum mesh and additional 1/2-inch sq. mesh, 0.050-inch aluminum wire bird screen. Locate screens on inside face of louvers, unless otherwise indicated. Secure screens to louver frames with machine screws, spaced at each corner and at 12 inches on center between.
- C. Use bird screen only for louvers that are connected to duct work.

2.05 MATERIALS

- A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T2. Blade and frame thickness shall be 0.081 inch minimum.
- B. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Fasteners: Use types and sizes to suit unit installation conditions.
 1. Use Phillips flat-head screws for exposed fasteners unless otherwise indicated.
 2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
 3. For color-finished louvers, use fasteners with heads that match color of louvers.

- D. Anchors and Inserts: Use non-ferrous metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.06 FABRICATION

- A. Provide louvers and accessories of design, materials, sizes, depth, arrangement, and metal thickness indicated, or if not indicated, as required for optimum performance with respect to airflow; water penetration; air leakage; strength; durability; and uniform appearance.
- B. Fabricate frames including integral sills to suit adjacent construction with tolerances for installation, including application of sealant in joints between louvers and adjoining Work.
- C. Include supports, anchorage, and accessories required for complete assembly.
- D. Sill Extensions: Loose sills made of same material as louvers, where indicated, or required for drainage to exterior and to prevent water penetrating to interior.
 - 1. Setback dimension is 3-3/4 inches to 6 inches.
- E. Join frame members to one another and to stationary louver blades.
 - 1. Maintain equal blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.

2.07 ALUMINUM FINISHES

- A. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range of standard and premium colors. Refer to Section 09 05 15 for color.

2.08 SOURCE QUALITY CONTROL

- A. Performance Requirements: Where louvers are indicated to comply with specific performance requirements, provide units whose performance ratings have been determined in compliance with Air Movement and Control Association (AMCA) Standard 500.
- B. SMACNA Recommendations: Comply with SMACNA "Architectural Sheet Metal Manual" recommendations for fabrication, construction details and installation procedures, except as otherwise indicated.

- C. Shop Assembly: Coordinate field measurements and Shop Drawings with fabrication and shop assembly to minimize field adjustments, splicing, mechanical joints and field assembly of units.
 - 1. Pre-assemble units in shop to greatest extent possible and disassemble as necessary for shipping and handling limitations.
 - 2. Clearly mark units for re-assembly and coordinated installation.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- D. Protect unpainted galvanized and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
- E. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

END OF SECTION

SECTION 09 05 15 COLOR DESIGN

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: A coordinated comprehensive Color System in which requirements for materials specified in other Sections of this Specification and / or shown on the Drawings are identified for quality, color, finish, texture and pattern.
- B. Related Sections: Section 01 33 00 – Submittal Procedures.

1.02 MANUFACTURER'S TRADE NAMES

- A. Manufacturer's trade names and number designations used herein identify colors, finishes, textures and patterns for materials and products specified in the technical sections of the Specifications. Wherever such products are referred for selection or approval in other sections, such products shall be understood to be referenced to this Section.
- B. If no selection is listed herein for products, the Project Engineer / MDOT Architect shall be contacted for a color selection.
- C. Subject to approval of the Project Engineer / MDOT Architect, products of other manufacturers will be considered, provided they are equivalent to the quality, colors, finishes, textures and patterns listed and meet the requirements of the Specifications and Drawings.

1.03 SAMPLES

- A. Color samples shall be submitted for approval prior to applying or installing finishes or items that are included in this Section. See appropriate technical Sections for submittal requirements. Upon receipt of samples, the Project Engineer / MDOT Architect may make revisions to the Color schedule.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials are specified in other Sections of the Specifications. Reference by trade name or manufacturer shall be considered as establishing a standard of quality and shall in no way limit competition.

2.02 MANUFACTURERS

A. The following manufacturers were used in preparing the Color Schedule:

SECTION / MATERIALS	MANUFACTURER / NUMBER & COLOR NAME
• 03 33 00 - Concrete Floor -Shop	SW7016 Mindful Gray
• 04 20 00 - CMU	SW7029 Agreeable Gray
• 06 40 00 - Plastic Lam PLAM1	Formica - 5880-58 Earthen Warp
• 06 40 00 - Plastic Lam PLAM2	Formica - 7708-58 Flax Gauze
• 06 40 00 - Plastic Lam PLAM3	Wilsonart - 4846-60 Morrow Zephyr
• 07 92 00 - Joint Sealants	Pecora-Match adjacent lighter color
• 08 11 13 - HM Drs & Frames (Ext)	(P4) SW7674 Peppercorn
• 08 11 13 - HM Drs & Frames (Int)	(P3) SW7025 Backdrop
• 08 41 13 - Alum Fr Ent & Storefront	Kawneer - #17 Clear Anodized
• 08 14 29 - Prefinished Wood Doors	Graham - #425 Cactus
• 08 33 23 - Overhead Coiling Doors	Raynor - RAL 7004
• 08 51 12 - Al Windows (Sing Hung)	Peerless - Clear Anodized
• 08 71 00 - Door Hardware	Satin Chrome
• 08 91 19 - Fixed Louvers	C/S Group - #549 Charcoal
• 09 29 00 - Gypsum Board(Walls)	(P1) SW7029 Agreeable Gray
• 09 29 00 - Gypsum Board(Ceilings)	(P2) SW7008 Alabaster
• 09 31 13 - Ceramic Tile Floor	POR-1 American Olean (24x24) Series: Theoretical Absolute Brown TH93
• 09 31 13 - Ceramic Tile Base	POR-1 American Olean (24x24) Series: Theoretical Absolute Brown TH93
• 09 31 13 - Ceramic Tile Wall	POR-2 American Olean (12x24) Series: Theoretical Ideal Beige TH91
• 09 31 13 - Grout (Floors)	Laticrete - Marble Beige
• 09 31 13 - Grout (Walls)	Laticrete - Marble Beige
• 09 65 00 - Lux Vinyl Floor Plank	Mannington Luxury Vinyl Plank (6x36) Series: Amtico Wood Color: Wild Walnut
• 09 65 00 - Rubber Base	Johnsonite -63 Burnt Umber
• 09 68 13 – Modular Textile Flooring	TCF-1 Kinetex by J+J Flooring Pattern: Strata Color: 1848 Feldspar
• 09 68 13 – Modular Walk-Off Carpet	CPT-1 J+J Flooring Pattern: Incognito Color: 1841 Intelligence

- 10 51 13 - Metal Lockers Penco - 723 Light Putty
- 10 56 13 - Metal Shelving Penco - 028 Gray
- 10 73 16 - Canopies Mapes - Clear Anodized
- 11 31 15 - Appliances (Range) GE-Stainless Steel
- 11 31 15 - Appliances (Microwave) GE-Stainless Steel
- 11 31 15 - Appliances (Refrigerator) GE-Stainless Steel

- 12 21 14 - Horiz Lvr Blinds - Metal Hunter Douglas - Color TBD
- 12 48 43 - Floor Mats (Carpet) C/S Group - 7325 Wrought Iron
- 12 48 43 - Floor Mats (Rails) C/S Group - Black
- 12 48 43 - Floor Mats (Vinyl Edge) C/S Group - Black
- 12 48 43 - Floor Mats (Frame) C/S Group - Black

- 13 34 18 - Roof Panels - Equip Shed Ceco - Galvalume® Plus
- 13 34 18 - Wall Panels Morin - Galvalume® Plus
- 13 34 18 - Trim (Panels) Morin - Galvalume® Plus
- 13 34 18 - Roof Fascia Ceco - Galvalume® Plus
- 13 34 18 - Gutter & Downspouts Ceco - Galvalume® Plus

- 13 34 19 - Roof Panels - Shop Kingspan - Galvalume® Plus
- 13 34 19 - Wall Panels #1 Morin - Galvalume® Plus
- 13 34 19 - Wall Panel #2 Morin - Blue Gray
- 13 34 19 - Trim (Panels) Kingspan/Morin - Match Adjacent Material
- 13 34 19 - Roof Fascia Kingspan - Galvalume® Plus
- 13 34 19 - Gutter & Downspouts Kingspan - Galvalume® Plus

- 13 34 26 – Roof Panels SteelMaster - Galvanized

PART 3 - EXECUTION

3.01 INSTALLATION / APPLICATION, GENERAL

- A. Refer to execution requirements specified in other Sections of this Specification for the specific products listed. Colors, finishes, textures or patterns not included in this Color Design will be selected by the Project Engineer / MDOT Architect upon written notification and subsequent submittals by the Contractor.

END OF SECTION

SECTION 09 29 00

GYPSUM BOARD

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Gypsum board work with a tape-and-compound joint treatment system known as "drywall finishing" work.
- B. The types of Work required include the following:
 - 1. Gypsum board applied to wood framing and furring.
 - 2. Gypsum backing boards for application of other finishes.
 - 3. Drywall finishing (joint tape-and-compound treatment).

1.02 ACTION SUBMITTALS

- A. Product Data: Manufacturer's technical product data, installation instructions and recommendations for products specified.

1.03 QUALITY ASSURANCE

- A. Fire Resistance: Where work is indicated for fire resistance ratings, including those required to comply with governing regulations, provide materials and installations identical with applicable assemblies which have been tested and listed by recognized authorities, including UL.
- B. Industry Standard: Comply with applicable requirements of GA-216 "Application and Finishing of Gypsum Board" by the Gypsum Association, except where more detailed or more stringent requirements are indicated including the recommendations of the manufacturer.
- C. Allowable Tolerances: 1/8 inch offsets between planes of board faces, and 1/4 inch in 8 ft. for plumb, level, warp and bow.
- D. Manufacturer: Obtain gypsum boards, framing and fasteners, trim accessories, adhesives and joint treatment products from a single manufacturer, or from manufacturers recommended by the prime manufacturer of gypsum boards.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver gypsum drywall materials in sealed containers and bundles, fully identified with manufacturer's name, brand, type and grade; store in a dry, well ventilated space, protected from the weather, under cover and off the ground.

1.05 PROJECT CONDITIONS

- A. Installer must examine the substrates and the spaces to receive gypsum drywall, and the conditions under which gypsum drywall is to be installed; and shall notify the Contractor, in writing, of conditions detrimental to the proper and timely completion of the work.
 - 1. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.
- B. Maintain ambient temperatures at not less than 55 degrees F., for the period of 24 hours before drywall finishing, during installation and until compounds are dry.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Obtain gypsum board, framing and fasteners, trim accessories, adhesives and joint treatment products from one of the following:
 - 1. CertainTeed Corporation, PA Tel: (800) 233-8990.
 - 2. Georgia-Pacific Corp, Atlanta, GA, Tel. (800) 327-2344.
 - 3. National Gypsum Company, Charlotte, NC, Tel. (800) 343-4893.
 - 4. United States Gypsum Company, Chicago, IL, Tel. (800) 874-4968.

2.02 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.03 GYPSUM BOARD PRODUCTS

- A. Furnish gypsum board products in maximum lengths available to minimize end-to-end butt joints. To the extent not otherwise indicated, comply with GA-216, as specified and recommended.
- B. Exposed gypsum board shall be Type X, fire rated type with tapered long edges and as follows:
 - 1. Edge Profile: Special rounded or beveled edge.
 - 2. Sheet Size: Maximum length available that will minimize end joints.
 - 3. Thickness: 5/8 inch, except where otherwise indicated.
 - 4. Water-resistant Type (WR-1): Provide at exterior walls and at "Wet" areas without ceramic tile; equal to 5/8 inch thick DensArmor Plus Fireguard by G-P Gypsum.
 - 5. Cement Board: Provide water-resistant cement based backer board as a base for all ceramic wall tiles, equal to 5/8 inch thick Durock by USG.

2.04 TRIM ACCESSORIES

- A. Manufacturer's standard galvanized steel beaded units with flanges for concealment in joint compound including corner beads, edge trim and control joints; except provide semi-finishing type (flange not concealed) where indicated.
- B. Where metal moldings are specifically called out on the Drawings, provide the appropriate item from below:
 - 1. Edge Trim: USG No. 200-A.
 - 2. Control Joint: USG No. 093.

2.05 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper, perforated type.
 - 2. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound: On interior work provide chemical hardening type for bedding and filling, ready-mixed vinyl-type or non-case in-type for topping. On exterior work provide water-resistant type.

2.06 MISCELLANEOUS MATERIALS

- A. Provide auxiliary materials for gypsum drywall work of the type and grade recommended by the manufacturer of the gypsum board. Gypsum board fasteners shall comply with GA-216. Provide anti-corrosive type at exterior applications.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Install supplementary framing, runners, furring, blocking and bracing at opening and terminations in the Work, and at locations required to support fixtures, equipment, services, heavy trim, furnishings and similar work which cannot be adequately supported directly on gypsum board alone.

3.02 GENERAL GYPSUM BOARD INSTALLATION REQUIREMENTS

- A. Meet at the project site with the installers of related work and review the coordination and sequencing of work to ensure that everything to be concealed by gypsum drywall has been accomplished, and that chases, access panels, openings, supplementary framing and blocking and similar provisions have been completed. In addition to compliance with GA-216 and ASTM C 840, comply with manufacturer's instructions and requirements for fire resistance ratings (if any), whichever is most stringent.

- B. Install wall / partition boards vertically to avoid end-butt joints wherever possible. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs. Form control joints and expansion joints with space between edges of boards, prepared to receive trim accessories.
- C. Install sound attenuation blankets and insulation as indicated, prior to gypsum board unless readily installed after board has been installed.
- D. Floating Construction: Where feasible, including where recommended by manufacturer, install gypsum board with "floating" internal corner construction, unless isolation of the intersecting boards is indicated or unless control or expansion joints are indicated.
- E. Space fasteners in gypsum boards in accordance with manufacturer's recommendations.

3.03 SPECIAL GYPSUM BOARD APPLICATIONS

- A. Where drywall is base for thin set ceramic tile and similar rigid applied wall finishes, install water-resistant cement based backing board.
- B. At toilets, showers, labs, janitor closets, drinking fountains, kitchen sinks and similar "wet" areas without ceramic tile, install water-resistant gypsum board.
- C. Apply with uncut long edge at bottom of work, and space 1/4 inch above fixture lips. Seal ends, cut-edges and penetrations of each piece with water-resistant sealant before installation.

3.04 INSTALLATION OF DRYWALL TRIM ACCESSORIES

- A. Where feasible, use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to the supports. Otherwise, fasten flanges by nailing or stapling in accordance with manufacturer's instructions and recommendations.
- B. Install metal corner beads at external corners of drywall work.
- C. Install metal edge trim whenever edge of gypsum board would otherwise be exposed or semi-exposed. Provide type with face flange to receive joint compound except where semi-finishing type is indicated. Install L-type trim where work is tightly abutted to other work, and install special kerf-type where other work is kerfed to receive long leg of L-type trim. Install U- type trim where edge is exposed, revealed, gasketed, or sealant-filled (including expansion joints.) Install metal control joint (beaded type) where indicated or required for proper installation.

3.05 INSTALLATION OF DRYWALL FINISHING

- A. Apply treatment at gypsum board joints (both directions), flanges of trim accessories, penetrations, fastener heads, surface defects and elsewhere as required to prepare Work for decoration. Pre-fill open joints and rounded or beveled edges, using type of compound specified herein and recommended by manufacturer.
- B. Apply joint tape at joints between gypsum boards, except where a trim accessory is indicated.

- C. Apply joint compound in 3 coats (not including pre-fill of openings in base), and sand between last 2 coats and after last coat.
- D. Base for Ceramic Tile: Do not install drywall finishing where ceramic tile and similar rigid applied finishes are indicated.
- E. Unless otherwise indicated, install drywall finishing at all gypsum board exposed to view and to receive finishes as specified. Where not exposed to view and above ceilings, sanding is not required.
- F. Finishing Gypsum Board Assemblies: Level 4 finish, unless otherwise indicated; Level 1 finish for concealed areas, unless a higher level of finish is required for fire-resistance-rated assemblies and Level 2 finish where panels form substrates for tile, Level 5 finish is required in areas with a gloss or epoxy finished coating.

3.06 PROTECTION OF WORK

- A. Installer shall advise Contractor of required procedures for protection of the gypsum drywall Work from damage and deterioration during the remainder of the construction period.

END OF SECTION

SECTION 09 31 13

THIN-SET CERAMIC TILING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Thin-set ceramic floor tile, cove base, wall tile and accessories.
- B. Related Sections:
 - 1. Section 07 26 00 - Vapor Retarders (for floor protection paper).
 - 2. Section 09 29 00 - Gypsum Board (for cement based backer board).
 - 3. Section 09 05 15 - Color Design (for color selections).

1.02 ACTION SUBMITTALS

- A. Product Data: Manufacturer's product data and written instructions for recommended installation and maintenance practices for each type of product indicated.
- B. Samples:
 - 1. Two samples of each type and composition of tile and for each color and finish required.
 - 2. Assembled samples, with grouted joints, for each type and composition of tile and for each color and finish required.
 - a. Mount on 24 Inches square plywood or hardboard backing.
 - 3. Stone thresholds in 6-inch lengths.
- C. Contract Closeout: Provide Maintenance Data and Manufacturer's recommendations on cleaning.

1.03 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

1.04 QUALITY ASSURANCE

- A. Furnish tile conforming to the Standard Grade Requirements of ANSI A137.1.
 - 1. Coefficient of Friction: Slip resistant in accordance with the Ceramic Tile Institute, i.e. a static coefficient of friction of not less than 0.60 when tested in accordance with ASTM C 1028-89 as modified by the Ceramic Tile Institute
- B. Provide materials obtained from only one source for each type of tile, grout and color to minimize variations in appearance and quality.

1.05 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 directions.

1.06 PROJECT CONDITIONS

- A. Continuously heat areas to receive tile to 50 degrees F. for at least 48 hours prior to installation, when project conditions are such that heating is required.
 - 1. Maintain 50 degrees F. temperature continuously during and after installation as recommended by tile manufacturer but not less than 7 days.
- B. Maintain a minimum lighting level of 50 fc during installation.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Equivalent tile products by the following manufacturers are acceptable:
 - 1. American Olean Tile Company, Lansdale, Pennsylvania.
 - 2. Crossville Inc., Crossville, Tennessee
 - 3. Dal-Tile Corporation, Dallas, Texas.
 - 4. Floor Gres Ceramiche, Italy.
 - 5. Florida Tile Industries, Lakeland, Florida.
 - 6. Lone Star Porcelain Mosaic Tile, Dallas, Texas.
 - 7. Mohawk.
 - 8. United States Ceramic Tile Co., East Spatra, Ohio.
- B. Alternate manufacturers: Products produced by other manufacturers that fully meet or exceed the specified requirements may be considered under provisions of Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.02 MATERIALS

- A. General: Comply with ANSI standard referenced with products and materials indicated for setting and grouting.
- B. Porcelain Floor Tile: 12 inches by 24 inches by 5/16 inch, cushioned edge, unglazed, color to be selected from standard colors available.
- C. Porcelain Wall Tile (Field): Size 12 inches by 24 inches by 5/16 inch, cushioned edge, unpolished, colors to be selected from standard colors available.
 - 1. Internal and Exterior Corners: Field-buttet square, except use square corner, combination angle and stretcher type cap.
- D. Marble Thresholds: Provide sound Group "A" marble with an abrasive hardness of not less than 10.0, when tested in accordance with ASTM C 241. Color of marble threshold to be selected by the Project Engineer / MDOT Architect from manufacturer's full range of standard colors.

- E. Stainless Steel transition strip equal to Schluter – Reno-TK.
- F. Adhesive: ANSI A136.1 and ANSI A118.4 when mixed with additive, with Tile Contractor's Association or Adhesive and Sealant Council certification of conformance, for base and wall tile set on each type of substrate. Provide primer-sealer as recommended by adhesive manufacturer. Equal to Laticrete Type 272 Premium or 317 Floor 'N Wall Thin-Set with 333 Super Flex Additive. Equivalent products by Mapei and Bostik are acceptable.
- G. Grout: ANSI A 118.3, with Tile Contractor's Association certification of conformance. Equal to Laticrete Type SpectraLOCK Pro Grout.
 - 1. Equivalent products by Custom Building Products and Mapei are acceptable.
 - 2. Color of grout to be selected by the MDOT Architect from manufacturer's full range of standard colors.
- H. Accessories: Three way cove-shaped profiles made of recycled rigid PVC for inside wall corners equal to Schluter®-DILEX-EKE.
 - 1. Equivalent products by Blanke Corp are acceptable.
 - 2. Color to be selected by the MDOT Architect from manufacturer's full range of standard colors.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - 1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

3.02 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer..
- B. Blending: For tile exhibiting color variations, use factory blended tile or blend tiles at Project site before installing.
- C. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.03 INSTALLATION

- A. Comply with the applicable parts of ANSI 108 Series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile", and the tile and grout manufacturer's printed instructions, and applicable installation specifications of the Tile Council of America's "Handbook for Ceramic Tile Installation", latest edition.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
- F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. Porcelain Floor Tile: 1/16 inch.
 - 2. Porcelain Wall Tile: 1/16 inch.
- G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
 - 2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 "Joint Sealants."
- I. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
 - 1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thin set).
- J. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.
- K. Accessories: Comply with manufacturer's installation instructions.

- L. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.
- M. Color Pattern: A simple color pattern shall be provided with approved color chart and sample submittal to Contractor using 3 or less colors on walls and floors.

3.04 CLEANING AND PROTECTION

- A. Cleaning: Clean grout and setting materials from face of tile while materials are workable. Leave tiles face clean and free of all foreign matter.
 - 1. Unglazed tile may be cleaned with acid solutions only when permitted by the tile and grout manufacturer's printed instructions, but not sooner than 14 days after installation.
 - 2. Protect metal surfaces, cast iron and vitreous plumbing fixtures from effects of acid cleaning.
 - 3. Flush the surface with clean water before and after cleaning.
- B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, or otherwise defective tile Work.
- C. Protection: When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors.
 - 1. Protect installed tile Work by covering with floor protection paper during the construction period to prevent damage and wear.
 - 2. Prohibit all foot and wheel traffic from using tiled floors for 7 days after installation.
 - 3. Before final inspection, remove protective covering and rinse neutral cleaner from all tile surfaces.

END OF SECTION

SECTION 09 51 00 ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Lay-in acoustical panels (2 ft. by 2 ft. grids) and exposed suspension systems for ceilings.
2. Suspended metal grid system complete with wall trim.

B. Related Sections:

1. Section 07 21 00 – Thermal Insulation.
2. Section 09 29 00 – Gypsum Board.
3. Division 23 for Mechanical Requirements.
4. Division 26 for Electrical Requirements.

1.02 ACTION SUBMITTALS

A. Product Data: Manufacturer's product specifications, and installation instructions for each acoustical ceiling material required, and for each suspension system, including certified laboratory test reports and other data as required to show compliance with these specifications.

1. Include manufacturer's recommendations for cleaning and refinishing acoustical units, including precautions against materials and methods that may be detrimental to finishes and acoustical performances.

B. Samples: For each exposed product and for each color and texture specified.

1.03 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Evaluation reports.

C. Field quality-control reports.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.05 QUALITY ASSURANCE

A. Installer: A company with not less than 3 years of documented successful experience in installation of acoustical ceilings similar to requirements for this Project.

1. References required for approval.

1.06 PROJECT CONDITIONS

- A. Do not install acoustical ceilings until the following conditions are met:
 - 1. Space is enclosed and weatherproof.
 - 2. Wet work in space completed and nominally dry.
 - 3. Work above ceilings is completed.
 - 4. Ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.
- B. Maintain a light level of a minimum of 50 fc during entire installation.

1.07 COORDINATION

- A. It shall be this contractor's responsibility to coordinate with mechanical and electrical trades with respect to their requirements for additional suspension system components. Additional components required shall be furnished and installed by this contractor.

1.08 MAINTENANCE STOCK

- A. At time of completing installation, deliver stock of maintenance material to Owner.
 - 1. Furnish full size units matching units installed, packaged with protective covering for storage, and identified with appropriate labels.
 - 2. Furnish amount equal to 3 percent of acoustical units and exposed suspension installed.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
 - 2. Smoke-Developed Index: 50 or less.

2.02 ACOUSTICAL PANEL CEILINGS, GENERAL

- A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.
- B. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.
- C. Acoustical Panel Standard: Comply with ASTM E 1264.
- D. Metal Suspension System Standard: Comply with ASTM C 635.

- E. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

2.03 ACOUSTICAL PANELS

- A. Manufacturers: Provide manufacturer's standard lay-in panels of type recommended by manufacturer for application indicated. Provide sizes shown by reflected ceiling plans or, if not otherwise indicated, 2 ft. by 2 ft. grid-size panels, with white washable finish.
- B. Mineral Fiber Acoustical Tile: Provide units that are sag resistant and with Antimicrobial solution (MOLD AND MILDEW GUARD) not less than 5/8-inch thick and of density not less than 10 pounds per cubic foot, medium-coarse non-directional texture, NRC 0.50 to 0.60, CAC 25 to 33, light reflectance over 75 percent. Products offered by manufacturers to comply with requirements include the following:
1. No. 1728 Fine Fissured Square Edge; Armstrong World Industries, Inc.
 2. Van-157 Vantage 10 Trim Edge; CertainTeed Corp.
 3. No. 2210 Radar ClimaPlus Square Edge; U.S. Gypsum Co.

2.04 METAL SUSPENSION SYSTEM

- A. Comply with ASTM C 635, 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, HVAC equipment, and partition system (if any). Structural Class of the system shall be intermediate-duty.
- B. Attachment Devices: Size for 5 times design load indicated in ASTM C 635, Table I, Direct Hung.
1. Hanger Wires: Galvanized carbon steel, ASTM A 641, soft temper pre-stretched, yield-stress load of at least 3 times design load, but not less than 12 gage (0.106 inch).
 2. Type of System: Either direct or indirect-hung suspension system, at Contractor's option.
 3. System Manufacturer: Same as acoustical unit manufacturer or one of the following:
 - a. Armstrong World Industries, Inc.
 - b. CertainTeed Corp.
 - c. Chicago Metallic Corp.
 - d. USG Interiors, Inc.
- C. Edge Moldings: Manufacturer's standard channel molding for edges and penetrations of ceiling, with single flange of molding exposed, white baked enamel finish unless otherwise indicated.
- D. Exposed Suspension System: Manufacturer's standard exposed runners, cross-runners and accessories, or types and profiles indicated, with exposed cross runners coped to lay flush with main runners. Provide uniform factory-applied finish on exposed surfaces of ceiling suspension system, including moldings, trim, and accessories. Use manufacturer's standard baked enamel finish, color white, unless otherwise selected by MDOT Architect.

2.05 MISCELLANEOUS MATERIALS

- A. Edge Trim Molding: Metal or extruded PVC plastic, of types and profiles indicated, white finish unless otherwise indicated.
- B. Hold-Down Clips: Where required for wind uplift resistance or fire-resistance rating, provide standard spring steel clips, except provide accessible type at locations indicated on drawings.

PART 3 - EXECUTION

3.01 COORDINATION

- A. Mechanical and electrical work above suspended ceiling shall be strictly coordinated with the work in this Section.

3.02 EXAMINATION

- A. Installer must examine conditions under which acoustical ceiling work is to be performed and must notify Contractor in writing of unsatisfactory conditions.
 - 1. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.03 PREPARATION

- A. Furnish layouts for inserts, clips, or other supports required to be installed by other trades for support of acoustical ceilings.
 - 1. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling.
 - 2. Avoid use of less-than-half width units at borders, and comply with reflected ceiling plans wherever possible.

3.04 INSTALLATION

- A. Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
 - 1. Comply with governing regulations, fire resistance rating requirements as indicated, and industry standards applicable to the Work.
 - 2. Hangers: Support only from building structural members.
 - a. Locate hangers near each end and spaced 4 feet along each carrying channel or direct-hung runner, unless otherwise indicated, leveling to tolerance of 1/8 inch in 12 feet.
 - b. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eye-screws, or other devices which are secure and appropriate for substrate, and which will not deteriorate or fail with age or elevated temperatures.

3. Edge Molding: install edge moldings of type indicated at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units.
 - a. Screw-attach moldings to substrate at intervals not over 16 inches on center and not more than 3 inches from ends, leveling with ceiling suspension system to tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
 4. Install acoustical panels in coordination with suspension system, with edges concealed by support of suspension members.
 - a. Scribe and cut panels to fit accurately at borders and at penetrations.
 - b. Install hold-down clips in areas indicated, and in areas where required by governing regulations or for fire- resistance ratings; space as recommended by panel manufacturer, unless otherwise indicated or required.
- B. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.
- 3.05 ADJUSTING AND CLEANING
- A. Adjust sags or twists which develop in the ceiling system and replace parts that are damaged or faulty.
 - B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage.
 1. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09 65 00 RESILIENT FLOORING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Luxury Vinyl Plank (LVP), rubber base, and accessories.
- B. Related Sections:
 - 1. Section 07 26 00 – Vapor Retarders (for floor protection paper).
 - 2. Section 09 05 15 – Color Design (for color selection).

1.02 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data (Not MSDS) and written instructions for recommended installation and maintenance practices for each type of resilient flooring and accessories.
- B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 1. Show details of special patterns.
- C. Samples: Full-size units of each color and pattern of floor tile required.

1.03 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.04 QUALITY ASSURANCE

- A. Wherever possible, provide resilient flooring, adhesives, cleaners, polishes and accessories produced by a single manufacturer.
- B. Secure the service of an experienced, professional floor service company to provide necessary equipment and manpower to complete the Work.

1.05 PROJECT CONDITIONS

- A. Continuously heat areas to receive flooring to 70 degrees F. for at least 48 hours prior to installation, when project conditions are such that heating is required.
 - 1. Maintain 70 degrees F. temperature continuously during and after installation as recommended by flooring manufacturer but not less than 48 hours.
 - 2. Maintain a minimum lighting level of 50 fc during installation.

1.06 WARRANTY

- A. Special Warranty for LVP: Manufacturer agrees to repair or replace components of LVP installation that fail in materials or workmanship within specified warranty period.
1. Warranty does not include deterioration or failure of due to unusual traffic, failure of substrate, vandalism, or abuse.
 2. Warranty Period: Limited 10 year commercial wear from date of completion Commercial Warranty and limited 5 year from date of completion under bed warranty (when installed with Shaw 4100 or S150 adhesive).

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Luxury Vinyl Plank is based on products manufactured by Mannington Commercial, Amtico, Hard Surface, Calhoun, GA 30701, Tel. No. (800) 241-2262.
- B. Equivalent products by the following manufacturers are acceptable:
1. Armstrong Commercial Flooring, Lancaster, PA. Tel. No. (800) 292-6308.
 2. Johnsonite, Chagrin Falls, OH. Tel. No. (800) 899-8916.
 3. Patcraft, Dalton, GA. Tel. No. (800) 241-4014.
- C. Substitutions that fully meet or exceed the specified requirements may be considered under provisions of Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.02 LUXURY VINYL FLOOR PLANK

- A. Style / Number: Amtico – Wood 6 inch.
- B. Construction: High Performance Luxury Vinyl Plank.
- C. Class / ASTM F-1700: Class III Printed Film Vinyl Tile.
- D. Finish: Quantum Guard HP.
- E. Nominal Dimensions: 6 inches wide, by 36 inches long.
- F. Pattern: “Row by Row fashion” (Refer to Drawing for directions).
- G. Overall Thickness: Nominal 1/8 inch.
- H. Wearlayer Thickness: 0.039 inches.
- I. Installation Method: Glue down.
- J. Adhesive: XpressStep.
- K. Color: Color to be selected by Project Engineer / MDOT Architect from manufacturer’s full range of colors. Refer to Section 09 05 15 – Color Design for color selection.

L. Testing:

- | | |
|---|--|
| 1. Slip Resistance (ASTM D-2047): | ADA Compliant. |
| 2. Heat Stability (ASTM F-1514): | Passes. |
| 3. Light Resistance (ASTM F-1515): | Passes. |
| 4. Stain & Chemical Stability (ASTM F-925): | Passes. |
| 5. Flooring Radiant Panel (ASTM E-648): | ≥ 0.45 watts/cm ² , NFPA Class I. |
| 6. N.B.S. Smoke Chamber (ASTM E-662): | < 450, Passes. |
| 7. FloorScore Indoor Air Quality: | SCS Certified. |

2.03 ACCESSORIES

- A. Rubber Base: Comply with ASTM F-1861, Type TP, Group 1 (solid) Standard Specification for Resilient Wall Base, with matching end stops and preformed or molded corner units.
1. Base shall be 4 inches high, 0.125 inch gage, length 120 feet, standard top-set cove.
- B. Resilient Edge Strips: 1/8-inch thick, homogenous vinyl of rubber composition, tapered or bullnose edge, color to match flooring, or as selected by MDOT Architect from standard colors available; not less than 1 inch wide.

2.04 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by LVP floor and adhesive manufacturer(s) to suit LVP floor, rubber wall base and substrate conditions indicated.
1. Adhesives shall comply with the following limits for VOC content:
 - a. LVP Adhesives: 50 g/L or less.
 - b. Rubber Floor Base Adhesives: 60 g/L or less.
- C. Concrete Slab Primer: Non-staining type as recommended by flooring manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Installer shall examine the areas and conditions under which resilient flooring and accessories are to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the Work.
1. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

3.02 PREPARATION

- A. Prepare substrates according to LVP floor manufacturer's written instructions to ensure adhesion of resilient products.

- B. Concrete Substrates: Prepare according to ASTM F 710.
1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by luxury vinyl plank floor manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Perform tests recommended by luxury vinyl plank floor manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
 4. Moisture Testing: Proceed with installation only after substrates pass testing according to LVP floor manufacturer's written recommendations, but not less stringent than the following:
 - a. Perform anhydrous calcium chloride test according to ASTM F-1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.
 5. Apply concrete slab primer, if recommended by flooring manufacturer, prior to application of adhesive.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install LVP until they are the same temperature as the space where they are to be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by LVP.
- 3.03 LUXURY VINYL PLANK (LVP)INSTALLATION
- A. Comply with manufacturer's written instructions for installing floor plank.
 - B. Install flooring after finishing operations, including painting, have been completed and permanent-heating system is operating. Moisture content of concrete slabs, building air temperature and relative humidity must be within limits recommended by flooring manufacturer.
 - C. Scribe, cut, and fit floor planks to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
 - D. Extend floor planks into toe spaces, door reveals, closets, and similar openings. Extend floor planks to center of door openings.
 - E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor planks as marked on substrates. Use chalk or other nonpermanent marking device.

- F. Install floor planks on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- G. Adhere floor planks to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.04 ACCESSORIES INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilaster, casework and other permanent fixtures in rooms or areas where base is required. Install base in as long lengths as practicable (continuous between openings and wall to wall), with preformed corner units.
- C. Tightly bond base to backing throughout the length of each piece, with continuous contact at horizontal and vertical surfaces.
- D. Place resilient edge strips tightly butted to flooring and secure with adhesive. Install edging strips at all unprotected edges of flooring, unless otherwise shown.

3.05 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor plank and wall base.
- B. Initial Cleaning: Remove excess adhesive or other surface blemishes, using neutral type cleaners as recommended by flooring manufacturer.
- C. Maintenance Immediately After Installation:
 - 1. Do not wash or scrub the floor for 5 days after installation to allow the floor planks to bond to the underlayment / subfloor.
 - 2. Keep heavy furniture and equipment off the floor at least 48 hours to allow the adhesive to set.
 - 3. Sweep or vacuum thoroughly, and remove residual adhesive with a clean white cloth dampened with cleaners as recommended by flooring manufacturer.
- D. Protection: Protect installed flooring from damage by covering with floor protection paper. Protect completed Work from traffic and damage until acceptance by the Owner

END OF SECTION

SECTION 09 68 18

TEXTILE COMPOSITE FLOORING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes: Textile composite flooring modules and accessories as shown on the drawings and schedules and as indicated by the requirements of this section.
- B. Related Sections:
 - 1. Division 03 Concrete - not included work this section.
 - 2. Division 07 Thermal and Moisture Protection - not included work this section.
 - 3. Section 09 65 00 Resilient Flooring for rubber base and accessories.

1.02 QUALITY ASSURANCE AND REGULATORY REQUIREMENTS

- A. Qualifications of flooring installation contractor: All work shall be done by installation firms specializing in commercial flooring and carpet installation. It is required, that the firm or individual shall be a member of the Floor Covering Installation Contractors Association (FCICA) and/or certified by the Certified Floorcovering Installers Association (CFI). Flooring contractor to be specialty contractor normally engaged in this type of work and shall have three (3) years minimum documented experience in commercial installation of similar flooring materials and participation in manufacturer's environmental program including responsible flooring removal, recycling, and installation.
- B. Flooring contractor will be responsible for the proper product installation, including floor preparation in all the areas indicated in the Drawings to receive Kinetex modules. The installation standard will be as listed in J+J Flooring Group Kinetex Installation Instructions.
- C. Flooring subcontractor to provide owner a written warranty that guarantees the completed installation to be free from defects in materials and workmanship for a period of no less than two (2) years after the Date of Completion.
- D. Manufacturer qualifications: Manufacturing facility to ISO 14001 certified and have a minimum of 10 years experience in the manufacture of commercial flooring.
- E. All warranties shall be issued by the manufacturer as standard published warranties on all types of flooring modules within this document. Second source warranties that involve parties other than the textile composite flooring manufacturer are unacceptable. If the product fails to perform as warranted when installed according to the J+J Flooring Group's Kinetex installation instruction and maintained according to J+J Flooring Group's Kinetex maintenance instructions, the affected area will be repaired or replaced at the expense of the manufacturer. J+J Flooring Group will provide standard published written performance warranties for the following:
 - 1. Lifetime product performance. Will not delaminate along seams or lose more than five (5%) percent by weight of fiber during its useful life.
 - 2. Lifetime static propensity, meaning built-in protection below 3.0 kv as tested under AATCC-134.

3. Lifetime Stain Removal
 4. Lifetime Colorfastness (Light and Crocking)
- F. Manufacturer to provide field service personnel to assist in project start-up as required by the job and will notify Owner, Architect, General Contractor, or another designated contact if any installation instructions are not followed.
- G. Provide flooring material to meet the following test performance criteria as tested by a recognized independent testing laboratory. Certified test reports shall be submitted by the manufacturer for each test method. Requirements listed below must be met by all products being submitted for approval:
1. Pill Test / DOC-FF-1-70 (ASTM D-2589) - Requirement: Pass
 2. Flooring Radiant Panel / ASTM E-648 - Requirement: Class I (Above .45 w/cm)
 3. CRI VOC Chamber Test/Indoor Air Quality test (CRI-IAQ) Green Label Plus™ Test.
 4. Lightfastness: Rating of not less than 5 on International Grey Scale after 40 SFU's when tested in accordance with AATCC Test Method 16E.
 5. Crockfastness: Minimum stain rating on International Grey Scale of not less than 5 wet or dry when tested in accordance with AATCC Test Method 165.
 6. Atmospheric Fading: Burned Gas shall not be less than 5 on International Grey Scale after two cycles on each test as per AATCC Test Method 129 Ozone and AATCC Test Method 23.
 7. Noise Reduction Coefficient (ASTM C 423-02): NRC Rating of 0.30
 8. Impact Insulation Classification (ASTM E 492-09): IIC Rating of 64
 9. Slip Resistance (ASTM 1028-96): Complies with ADA Guidelines for level surface
 10. Thermal Insulation (ASTM C 518): R-4

1.03 SUBMITTALS

- A. Submit to Architect and/or Owner two (2) 6-1/2 inches by 6-1/2 inches (minimum size) finished samples of the exact type of flooring proposed, including quality, pattern, color and backing for acceptance prior to shipment.
- B. Submit manufacturer's warranties, installation instructions, and maintenance instructions before bid date.
- C. Submit the manufacturer's certification that the flooring has been tested by an independent laboratory and complies with the required flammability tests as well as other testing requirements as listed under 1.03 G

1.04 ENVIRONMENTAL/FIELD CONDITIONS

- A. Deliver all materials to the installation site in the manufacturer's original packaging and in good condition. Packaging to contain manufacturer's name and marks, identification number, shipping and handling instructions and related information.
- B. Delivered and stored materials must be available for inspection as required by the Owner, Architect, General Contractor and the manufacturer.
- C. Floor slab preparation is to include all required work to prepare the floor for installation of the product as specified in this document. Floor slab preparation shall meet all conditions as specified in J+J Flooring Group's Kinetex textile composite flooring installation instructions.

- D. Materials, including adhesives, shall be delivered to the site of installation at a minimum of 48 hours prior to the start of installation and stored in a clean and dry room that measures above 65 deg F and below 95 deg F and measures between 10 percent and 65 percent relative humidity (RH). To maintain temperature and relative humidity, permanent heating and air conditioning systems (HVAC) shall be in operation. Place pallets of textile composite flooring modules on a flat surface (do not double stack pallets). After work is completed, the ambient room temperature should remain at 65 deg F and relative humidity between 10 percent and 65 percent for 48 hours. These materials and related adhesives shall be protected from the direct flow of heat from heating fixtures and appliances such as hot-air registers, radiators, or other. Site conditions shall include those specified in the flooring manufacturer's installation instructions and shall also include sufficient heat, light and power required for effective and efficient working condition.
- E. Once the temperature and relative humidity in area for installation have been stabilized, loose lay the modules within the installation area and allow them to precondition for 48 hours prior to installation. Module installation shall not commence until painting and finishing work is complete and ceiling and overhead work is tested, approved and completed. Traffic shall be closed during the installation of the textile composite flooring products. Verify concrete slabs are dry per the standards for bond and moisture tests listed in the manufacturer's installation instructions.

1.05 SUBSTITUTIONS

- A. Comply with Project Manual Section 01 25 00 – Substitution Procedures and Section 01 60 00 – Product Requirements..

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Kinetex and Invision brands of J+J Flooring Group, P.O. Box 1287, Dalton, GA, 30722. [\(800\) 241-4586](tel:8002414586). JJ-KINETEX.COM and JJ-INVISION.COM. Please contact Amy Taylor , [\(601\) 317-9919](tel:6013179919), Amy.Taylor@jjflooringgroup.com .
1. Manufacturers: Subject to compliance with requirements, the following manufacturers products are acceptable::
- a. Forbo - Flotex
 - b. Bolyu - Svelte

2.02 FLOORING MATERIALS

- A. Kinetex flooring modules (tiles) CP01:
1. Product: Strata Plank 1826
 2. Color: Feldspar 1848
 3. Backing: Polyester Felt Cushion
 4. Dye Method: Solution Dyed
 5. Wear Layer: Universal Fibers Polyester
 6. Total Weight (Nominal Average): 4.5 oz - 5.2 oz / square foot
 7. Pattern Repeat: N/A
 8. Soil Release: Yes
 9. Standard Size: 18 inches by 36 inches

10. Warranties: Lifetime Product Performance, Colorfastness to Light & Crocking, Stain Removal, Static Protection, Protection from Edge Ravel and Delamination Failure; Lifetime Dimensional Stability.
11. Testing Specifications - Pill Test: Yes
12. Testing Specifications - Flooring Radiant Panel: Class 1
13. Testing Specifications - Smoke Density: Less than 450.0 flaming (ASTM E 662)
14. Testing Specifications - Static Test: Less than 3.0kv (AATCC-134)
15. Recycled content: Minimum of 55 percent recycled content
16. NSF/ANSI 140 Platinum Certified
17. Closed-loop recyclable

C. J+J Incognito Walk-off Modular (tiles) CP03:

1. Product: Incognito Walk-off Modular 7069 manufactured by J&J Flooring Group
2. Color: Intelligence 1841
3. Construction: Textured Patterned Loop
4. Backing: Nexus® Modular
5. Dye Method: Solution Dyed
6. Fiber Type: Encore® SD (with recycled content)
7. Face Weight: 29oz./s(983grams/m2)
8. Pile Density: 8717 oz./y3. (323.kg/
9. Gauge: 1/12 (4.72 rows/cm)
10. Stitches: 12.00 stitches/in (4.72 stitches/cm)
11. Pattern Repeat: N/A
12. Soil Release: No
13. Stain Resistance: Yes
14. Bleach Resistance: Yes
15. Optional Treatments: Yes
16. Standard Size: 24 inches by 24 inches
- 17.. Warranties: Lifetime Fiber Performance for Wear, Lifetime for Tuft Bind Strength (edge ravel, yarn pulls, zippering), Lifetime Protection from Delamination Failure, Lifetime Fiber Performance for Static, Lifetime Colorfastness to Atmospheric Contaminants, Lifetime Stain Removal
18. Testing Specifications - Pill Test: Yes
19. Testing Specifications - Flooring Radiant Panel: Class 1
20. Testing Specifications - Smoke Density: Less than 450.0 flaming (ASTM E 662)
21. Testing Specifications - Static Test: Less than 3.0kv (AATCC-134)
22. Testing Specifications - Lightfastness Test: 1

2.03 ADHESIVES

A. Comply with manufacture's written recommendations.

1. Kinetex® Adhesive, an aggressive, pressure-sensitive adhesive designed for the installation of Kinetex textile composite flooring modules is required.
2. Commercialon® Premium Modular Pressure Sensitive Adhesive, a premium modular flooring adhesive specifically formulated for bonding J+J Flooring Group's Nexus® Modular PVC backed carpet to the floor

2.04 ACCESSORIES

- A. Provide transition/reducing strips tapered to meet abutting materials as indicated in the Drawings.
- B. Provide edge strips made of extruded aluminum with a mill finish, unless otherwise noted.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine and verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive installation of modules.
- B. Verify that concrete sub-floor surfaces are dry enough and ready for flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F 710; obtain instructions if test results are not within limits recommended by carpet manufacturer and adhesive materials manufacturer.
- C. Verify that required floor-mounted utilities are in correct location.
- D. J+J Flooring Group requires that flooring be inspected prior to installation for proper style, color and potential defects. No claims will be honored if the modules are installed with visible defects. Should there be a problem, call J+J Flooring Group's Customer Relations Department at [800.241.4586](tel:800.241.4586).

3.02 PREPARATION

- A. Surface Preparation: Dust, dirt, debris and non-compatible adhesive must be removed before the installation begins. Surfaces must be smooth and level with all holes and cracks filled with Portland cement-based patch reinforced with polymers. Adhesive cannot be applied to any substrate where chemical or solvent-based cleaners have been used.
- B. Concrete Moisture Testing and Ph Testing: Substrate surfaces must be tested for moisture emission. It is the responsibility of the Contractor to perform moisture testing prior to starting the installation. ASTM-F 2170-2 relative humidity probe moisture testing is required. Acceptable relative humidity probe testing results are up to 95 percent RH. Alkalinity tests should also be performed per ASTM F 710. The maximum acceptable pH is 10.0.
- C. New Concrete - New concrete must be fully cured and free of moisture (comply with ASTM F 710). New concrete requires a curing period of approximately 90 days.

3.03 INSTALLATION OF FLOORING

- A. Install flooring in strict accordance with the finish drawings and J+J Flooring Group's installation instructions for each type of flooring.

- B. Full Spread Adhesive System: J+J Flooring Group require the use of their adhesives. No substitutions are allowed for adhesive
1. Full Spread Kinetex Adhesive: The spread rate for Kinetex Adhesive is approximately 1080 square feet per four gallon pail and can be spread using a 1/16 inch by 1/32 inch by 1/32 inch U-notched trowel or applied using a 3/8 inch foam or nap roller. Allow to dry until transparent or adhesive does not transfer to finger when touched. Drying time will vary with temperature, humidity and air velocity, however modules must be installed within two hours after adhesive has dried.
 2. Full spread Commercialon® Premium Modular Pressure Sensitive Adhesive using a 1/32 inch by 1/16 inch by 1/16 inch "U" or "V" notch trowel or spread using a 3/8 inch foam paint roller. Keep the roller saturated and wet with adhesive throughout the installation in order to maintain a constant spread rate. Allow to completely dry so adhesive does not transfer when touched. The spread rate for Commercialon Premium Modular Adhesive is approximately 140 sq. yds. per four gallon bucket. Nexus® Modular Spray Adhesive is available in a 14 lbs cylinder (coverage is approx. 165 sq yds). Note: Inadequate amounts of adhesive can cause modules to shift and move and will not be covered warranty. Warranty coverage requires the use of Commercialon Premium Modular.
- C. Module Placement: Arrows are printed on the module backing to show pile/machine direction. A tight installation without compression is mandatory for optimum performance and appearance of the modular installation. It is critical that each module uniformly touch each adjoining module without a gap. To ensure a clean tight fit, do not pull/tug or slid-in modules, but instead lay each module into its location against the adjoining module. See specific product specifications for approved installation method(s).
- D. Pallet and Bundle Sequencing: It is very important to install Kinetex and Invision modules in the order they were manufactured; this is easily accomplished by selecting pallets in sequential order and following the numbers located on each bundle of modules. Typically, an installation will begin with the lowest bundle numbers and progress through the highest numbers until the project is complete. Installing modules by bundle sequence will assure the most even uniform look possible. (For layout and installation instructions refer to J+J Flooring Group's Kinetex and Invision Installation Instructions.)
- E. Completing Installation: To avoid dislodging modules, do not walk on or move furniture onto modules until the area is completely anchored. Roll entire area with 75-100 lb. roller in both directions (north-south and east-west) after completion of installation. It is also required that sheets of plywood or hardboard be laid over the new modular surface when transporting heavy furniture on carts or dollies. As a final step, vacuum the entire area with an upright vacuum.

3.04 INSTALLATION OF ACCESSORIES

- A. Install accessories as required by drawings and per manufacturer's specifications.

3.05 CLEANING AND PROTECTION

- A. Follow J+J Flooring Group's maintenance guidelines.
- B. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- C. Clean and vacuum surfaces.

END OF SECTION

SECTION 09 90 00

PAINTS AND COATINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. Painting and finishing of exterior and interior exposed items and surfaces throughout the project, except as otherwise indicated. Surface preparation, priming and finish coats specified in this Section are in addition to shop priming and surface treatment specified under other Sections of the Work.
1. The Work includes field painting of exposed bare and covered pipes and ducts (including color coding), and of hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under the mechanical and electrical Work, except as otherwise indicated.
 2. "Paint" means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.
 3. Paint all exposed surfaces whether or not colors are designated in "schedules", except where the natural finish of the material is specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint these the same as adjacent similar materials or areas. If color or finish is not designated, the Architect will select these from standard colors available for the materials system specified.
- B. Related Sections: Section 09 05 15 – Color Design.

1.02 PAINTING NOT INCLUDED

- A. The following categories of Work are not included as parts of the field-applied finish Work, or are included in other Sections of these Specifications.
- B. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under the various Sections for structural steel, miscellaneous metal, hollow metal work, and similar items. Also, for fabricated or factory-built mechanical and electrical equipment or accessories.
- C. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer finishing is specified for such items as (but not limited to) plastic toilet enclosures, prefinished partition systems, acoustic materials, architectural woodwork and casework, finished mechanical and electrical equipment including light fixture, switch-gear and distribution cabinets, elevator entrance frames, door and equipment.
- D. Concealed Surfaces: Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, foundations spaced, furred areas, utility tunnels, pipe spaces, duct shafts and elevator shafts.
- E. Finished Metal surfaces: Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting, unless otherwise indicated.

- F. Operating Parts and Labels: 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 Underwriter's Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical information including basic materials analysis and application instructions for each coating material specified.
- B. Samples for Initial Selection: For each type of topcoat product indicated. Submit color samples for selection by Architect from manufacturer's full range of colors. Indicate submitted manufacturer's closest STANDARD colors that match colors specified or provide "Custom" color if not match.
- C. Samples for Verification: For each type of paint system and each color and gloss/sheen of topcoat indicated.
1. Submit Samples on rigid backing, 8 inches square.
 2. Step coats on Samples to show each coat required for system.
 3. Label each coat of each Sample.
 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
1. Comply with Articles 3.7 and 3.8 indicating each type of primer, intermediate coat and topcoat required for each substrate by product name and number.
 2. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
- E. Coating Maintenance Manual: Upon conclusion of the project, the Contractor or paint manufacturer / supplier shall furnish a coating maintenance manual, such as Sherwin-Williams "Custodian Project Color and Product Information" report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product / color / finish was used, product data pages, Material Safety Data sheets (MSDS), care and cleaning instructions, including touch-up procedures.
- F. Substitutions for Convenience: Architect will consider formal written requests from Contractor for substitution of products in place of those specified if received within 30 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect. Substitutions which decrease the film thickness, the number of coats applied, change the generic type of coating or fail to meet the performance criteria of the specified materials WILL NOT be approved. All primers and topcoats plus the seam sealer and pit filler shall be furnished by the same manufacturer to ensure compatibility.

1.04 QUALITY ASSURANCE

- A. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
 2. Final approval of color selections will be based on benchmark samples.
 - a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. 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. Fed. Spec. Number, if applicable.
 3. Manufacturer's stock number and date of manufacturer.
 4. Manufacturer's name.
 5. Contents by volume, for major pigment and vehicle constituents.
 6. Thinning instructions.
 7. Application instructions.
 8. Color name and number.
- B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.06 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paint in snow, rain, fog or mist; or when the relative humidity exceeds 85 percent; or to damp or wet surfaces; unless otherwise permitted by the paint manufacturer's printed instruction. Painting may be continued during inclement weather only if the areas and surfaces to be painted are enclosed and heated within the temperature limits specified by the paint manufacturer during application and drying periods.

1.07 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
 - 1. Quantity: Furnish an additional 5 percent, but not less than 1 gallon of each material and color applied.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Benjamin Moore & Company, Montvale, NJ. Tel. (800) 344-0400.
 - 2. Farrell-Calhoun Paint, Memphis, TN. Tel. (901) 526-2211.
 - 3. PPG Paints, Inc., Pittsburgh, PA. Tel (412) 434-3131.
 - 4. Rust-Oleum, Vernon Hills, IL. 60061. Tel. (800) 323-3584.
 - 5. Sherwin-Williams Company, Cleveland, OH 44115. Tel. (800) 321-8194.
- B. Substitutions shall fully comply with specified requirements and Section 01 25 00-Substitution Procedures and Section 01 60 00-Product Requirements.

2.02 COLORS AND FINISHES

- A. Paint colors, surface treatments, and finishes will be selected from color chips submitted by contractor. Prior to beginning Work, the Architect will select color chips for surfaces to be painted. Use representative colors when preparing samples for review. Final acceptance of colors will be from samples.
- B. Colors Pigments: Pure, non-fading, applicable types to suit the substrates and service indicated. Lead content in the pigment, if any, is limited to contain not more than 0.5 percent lead, as lead metal based on the total non-volatile (dry-film) of the paint by weight.
- C. Paint Coordination: Provide finish coats which are compatible with prime paints used. Review other sections of these Specifications in which prime paints are to be provided to ensure compatibility of total coats system for various substrates. Upon request from other trades, furnish information on characteristics of finish materials provided for use, to ensure compatible prime coats are used. Provide barrier coats over incompatible primer or remove and reprime as required. Notify the Architect in writing of any anticipated problems using specified coating systems with substrates primed by others.

2.03 MATERIAL QUALITY

- A. Provide the best quality grade of the various types of coatings 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. Proprietary names used to designate colors or materials are not intended to imply that products of the named manufacturers are required to the exclusion of equivalent products of other manufacturers.
- B. Provide undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer, and use only within recommended limits.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Applicator must examine the areas and conditions under which painting Work is to be applied and notify the Contractor 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 the Applicator. Starting of painting Work will be construed as the Applicator's acceptance of the surfaces and conditions within any particular area.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Masonry (Clay and CMU): 12 percent.
 - 3. Wood: 15 percent.
 - 4. Plaster: 12 percent.
 - 5. Gypsum Board: 12 percent.
- C. 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. Perform preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified, for each particular substrate condition.
 - 1. 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.
 - 2. Remove, if necessary, for the complete painting of the items and adjacent surfaces.
 - 3. Following completion of painting of each space or area, re-install the removed items by workmen skilled in the trades involved.
 - 4. Clean surfaces to be painted before applying paint or surface treatments.

5. Remove oil and grease prior to mechanical cleaning.
6. Schedule the cleaning and painting so that contaminants from the cleaning process with not fall onto wet, newly painted surfaces.

B. Ferrous Metals:

1. Clean ferrous surfaces, which are not galvanized or shop-coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.
2. Touch-up shop-applied prime coats wherever damaged or bare. Where required by other Sections of these Specifications, clean and touch-up with the same type shop primer.

C. Galvanized Surfaces: Clean free of oil and surface contaminants with acceptable non-petroleum based solvent.

D. Wood: Clean wood surfaces to be painted of all dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer before application of the priming coat.

1. Prime, stain, or seal wood required being job-painted, as soon as practicable upon delivery to job. Prime edges, ends, faces, under sides, and backsides of such wood, including cabinets, counters, cases, paneling, etc. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dry.
2. When transparent finish is required, use sealer as recommended by manufacturer. Seal tops, bottoms, and cutouts of unprimed wood doors with sealer immediately upon delivery to project.

3.03 MATERIALS PREPARATION

- A. Mix and prepare painting materials in accordance with manufacturer's directions. 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. Stir materials before application to produce a mixture of uniform density, and stir as required during the application of the materials. Do not stir surface film into the material. Remove the film and if necessary, strain the material before using.

3.04 APPLICATION

- A. Apply paint in accordance with the manufacturer's directions. Use applications and techniques best suited for the substrate and type of material being applied. 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. Give special attention to insure that all surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

- B. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint. Paint the back-sides of access panels, and removable or hinged covers to match the exposed surfaces.
- C. Finish exterior doors on tops, bottoms and side edges the same as the exterior faces, unless otherwise indicated.
- D. Sand lightly between each succeeding enamel or varnish coat.
- E. Omit the first coat (primer) on metal surfaces that have been shop-primed and touch-up painted, unless otherwise indicated or barrier coat is required for compatibility.
- F. Scheduling Paint: 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. Allow sufficient time between successive coatings to permit proper drying. Do not re-coat 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.
- G. Minimum Coating Thickness: Apply each material at not less than the manufacturer's recommended spreading rate, to establish a total dry film thickness as indicated or, if not indicated, as recommended by coating manufacturer.
- H. Mechanical and Electrical Work: Painting of mechanical and electrical Work include items exposed to view in mechanical equipment rooms, in occupied spaces and where indicated on Drawings or specified in other Sections. Coordinate with Mechanical, Plumbing and Electrical Sections.
 - 1. Mechanical 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.
 - e. Motor, mechanical equipment and supports.
 - f. Accessory items.
 - 2. Electrical items to be painted include, but are not limited to, the following:
 - a. Conduit and fittings.
 - b. Switchgear.
- I. Prime Coats: Apply a prime coat of material which is required to be painted or finished, and which has not been prime coated by others. Re-coat 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.
- J. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, or other surface imperfections will not be acceptable.

- K. Transparent (Clear) Finishes: Use multiple coats to produce glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections. Provide satin finish for final coats, unless otherwise indicated.
- L. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint Work not in compliance with specified requirements.

3.05 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:
 1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 2. Testing agency will perform tests for compliance of paint materials with product requirements.
 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements.
 4. Contractor shall remove non-complying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials.
 5. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.06 CLEANING AND PROTECTION

- A. Cleaning: During the progress of the Work, remove from the site all discarded paint materials, rubbish, cans and rags at the end of each workday. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.
- B. Protection: Protect Work of other trades, whether to be painted or not, against damage by painting and finishing Work. Correct damage by others for protection of their Work, after completion of painting operations. At the completion of Work of other trades, touch-up and restore all damaged or defaced painted surfaces.

3.07 EXTERIOR PAINTING SCHEDULE

- A. Provide the following Benjamin Moore paint systems for the various substrates, as indicated:
 1. Ferrous and Zinc Coated Metal
 - a. Prime Coat: Super Spec HP P04 Acrylic Metal Primer
 - b. Intermediate Coat: Super Spec HP P29 D.T.M. Acrylic Semi-gloss
 - c. Topcoat: Super Spec HP P29 D.T.M. Acrylic Semi-gloss
 2. Steel Shop Primed: Structural steel framing exposed to view including steel lintels
 - a. Prime Coat: Super Spec HP P04 Acrylic Metal Primer
 - b. Intermediate Coat: Super Spec HP P29 D.T.M. Acrylic Semi-gloss
 - c. Topcoat: Super Spec HP P29 D.T.M. Acrylic Semi-Gloss

3. Concrete Walls at Salt Storage Structure
 - a. (Ref to Section 07 11 14)
- B. Provide the following Ferrell-Calhoun paint systems for the various substrates, as indicated:
1. Ferrous and Zinc Coated Metal
 - a. Prime Coat: F/C #5-56 Waterborne 100% Acrylic All Purpose Metal Primer (1.8 mils DFT)
 - b. Intermediate Coat: F/C Tuff-Boy 8000 Line Waterborne 100% Acrylic DTM (1.7 mils DFT)
 - c. Topcoat: F/C Tuff-Boy 8000 Line Waterborne 100% Acrylic DTM (1.7 mils DFT)
 2. Steel Shop Primed: Structural steel framing exposed to view including steel lintels
 - a. Prime Coat: F/C #5-56 Waterborne 100% Acrylic All Purpose Metal Primer (1.8 mils DFT)
 - b. Intermediate Coat: F/C Tuff-Boy 8000 Line Waterborne 100% Acrylic DTM (1.7 mils DFT)
 - c. Topcoat: F/C Tuff-Boy 8000 Line Waterborne 100% Acrylic DTM (1.7 mils DFT)
 3. Concrete Walls at Salt Storage Structure
 - a. (Ref to Section 07 11 14)
- C. Provide the following PPG Paints, Inc. paint systems for the various substrates, as indicated:
1. Ferrous and Zinc Coated Metal
 - a. Prime Coat: PPG Pitt Tech DTM Acrylic Primer Finish, 90-712 Series (2.0-3.0 mils dry)
 - b. Intermediate Coat: PPG Pitt Tech DTM Acrylic Gloss Enamel, 90-374 Series (2.0-3.0 mils dry)
 - c. Topcoat: PPG Pitt Tech DTM Acrylic Gloss Enamel, 90-374 Series (2.0-3.0 mils dry)
 2. Steel Shop Primed: Structural steel framing exposed to view including steel lintels
 - a. Prime Coat: PPG Pitt Tech DTM Acrylic Primer Finish, 90-712 Series (2.0-3.0 mils dry)
 - b. Intermediate Coat: PPG Pitt Tech DTM Acrylic Gloss Enamel, 90-374 Series (2.0-3.0 mils dry)
 - c. Topcoat: PPG Pitt Tech DTM Acrylic Gloss Enamel, 90-374 Series (2.0-3.0 mils dry)
 3. Concrete Walls at Salt Storage structure
 - a. (Ref to Section 07 11 14)
- D. Provide the following Rust-Oleum paint systems for various substrates, as indicated:
1. Ferrous and Zinc Coated Metal
 - a. Prime Coat: Rust-Oleum Universal Primer, (1.0-2.0 mils dry)
 - b. Intermediate Coat: Rust-Oleum 3700 Series DTM Acrylic, (2.0-3.0 mils dry)
 - c. Topcoat: Rust-Oleum 3700 Series DTM Acrylic, (2.0-3.0 mils dry)

2. Steel Shop Primed: (structural steel framing exposed to view including steel lintels and steel stairs and handrails)
 - a. Prime Coat: Rust-Oleum Universal Primer (1.0-2.0 mils dry)
 - b. Intermediate Coat: Rust-Oleum Sierra Performance Beyond No VOC UMA (2.0-3.0 mils dry)
 - c. Topcoat: Rust-Oleum Sierra Performance Beyond No VOC UMA (2.0-3.0 mils dry)
 3. Concrete Walls at Salt Storage Structure
 - a. (Ref to Section 07 11 14)
- E. Provide the following Sherwin-Williams paint systems for the various substrates, as indicated:
1. Ferrous and Zinc Coated Metal
 - a. Prime Coat: S-W ProCryl® Universal Primer, B66-310 Series (2.0-4.0 mils dry)
 - b. Intermediate Coat: Sher-Cryl™ HPA Acrylic, B66-350 Series (2.5-4.0 mils dry)
 - c. Topcoat: Sher-Cryl™ HPA Acrylic, B66-350 Series (2.5-4.0 mils dry)
 2. Steel Shop Primed: (structural steel framing exposed to view including steel lintels and steel stairs and handrails)
 - a. Prime Coat: S-W ProCryl® Universal Primer, B66-310 Series (2.0-4.0 mils dry)
 - b. Intermediate Coat: S/W Sher-Cryl™ HPA Acrylic, B66-350 Series (2.5-4.0 mils dry)
 - c. Topcoat: S/W Sher-Cryl™ HPA Acrylic, B66-350 Series (2.5-4.0 mils dry)
 3. Concrete Walls at Salt Storage Structure
 - a. (Ref to Section 07 11 14)

3.08 INTERIOR PAINTING SCHEDULE

- A. Provide the following Benjamin Moore paint systems for the various substrates, as indicated:
1. Gypsum Drywall (Semi-Gloss)
 - a. Prime Coat: #N534 Ultra Spec 500 Interior Latex Primer
 - b. Intermediate Coat: #N539 Ultra Spec 500 Interior Semi-gloss Enamel
 - c. Topcoat: #N539 Ultra Spec 500 Interior Semi-gloss Enamel
 2. Gypsum Drywall(Egg Shell)
 - a. Prime Coat: #N534 Ultra Spec 500 Interior Latex Primer
 - b. Intermediate Coat: #N538 Ultra Spec 500 Interior Eggshell Enamel
 - c. Topcoat: #N538 Ultra Spec 500 Interior Eggshell Enamel
 3. Gypsum Drywall (in wet areas)
 - a. Prime Coat: #N534 Ultra Spec 500 Interior Latex Primer
 - b. Intermediate Coat: #V341 Waterborne Epoxy
 - c. Topcoat: #V341 Waterborne Epoxy
 4. Concrete Masonry Units (Enamel)
 - a. Prime Coat: #206 Super Spec Hi-Build Block Filler
 - b. Intermediate Coat: #N539 Ultra Spec 500 Interior Semi-Gloss Enamel
 - c. Topcoat: #N539 Ultra Spec 500 Interior Semi-Gloss Enamel
 5. Ferrous and Zinc Coated Metal
 - a. Prime Coat: P04 Super Spec HP Acrylic Metal Primer
 - b. Intermediate Coat: #N539 Ultra Spec 500 Interior Semi-Gloss Enamel
 - c. Topcoat: #N539 Ultra Spec 500 Interior Semi-Gloss Enamel

6. Exposed Structural steel and Roof Deck (shop primed steel)
 - a. Prime Coat: P04 Super Spec HP Acrylic Metal Primer
 - b. Intermediate Coat: #N110 SK 5000 Dry Fall Flat
 - c. Topcoat: #N110 SK 5000 Dry Fall Flat
 7. Painted Woodwork
 - a. Prime Coat: #N534 Ultra Spec 500 Interior Latex Primer Sealer
 - b. Intermediate Coat: #N539 Ultra Spec 500 Interior Semi-Gloss Enamel
 - c. Topcoat: #N539 Ultra Spec 500 Interior Semi-Gloss Enamel
 8. Concrete Garage Floor (Industrial Epoxy Floor)
 - a. Prime Coat: V150 Corotech 100% Solids Epoxy Pre-Primer
 - b. Top Coat(2 coats): V400 Polyamide Epoxy Hi-Build
 9. Concrete Floor Sealer (Clear)
 - a. Prime Coat: TuffCrete Solvent Acrylic Stain Clear
 - b. Topcoat: TuffCrete Solvent Acrylic Stain Clear.
- B. Provide the following Ferrell-Calhoun paint systems for the various substrates, as indicated:
1. Gypsum Drywall (Semi-Gloss)
 - a. Prime Coat: F/C #380 Perfik-Seal Interior Latex Primer/Sealer (1.8mils DFT)
 - b. Intermediate Coat: F/C #3300 Line Evergreen "Zero Voc" Acrylic Int/Ext Semi-Gloss Enamel (2.0 mils DFT)
 - c. Topcoat: F/C #3300 Line Evergreen "Zero Voc" Acrylic Int/Ext Semi-Gloss Enamel (2.0 mils DFT)
 2. Gypsum Drywall(Egg Shell)
 - a. Prime Coat: F/C #380 Perfik-Seal Interior Latex Primer/Sealer (1.8mils DFT)
 - b. Intermediate Coat: F/C #3900 Line Evergreen "Zero Voc" Acrylic Int/Ext Latex Eggshell Enamel (2.1 mils DFT)
 - c. Topcoat: F/C #3900 Line Evergreen "Zero Voc" Acrylic Int/Ext Latex Eggshell Enamel (2.1 mils DFT)
 3. Gypsum Drywall (in wet areas)
 - a. Prime Coat: F/C#235 Interior/Exterior 100% Acrylic Latex Undercoater (1.7 mils DFT)
 - b. Intermediate Coat: F/C #3300 Line 100% Acrylic Interior Semi-Gloss Enamel (1.6 mils DFT)
 - c. Topcoat: F/C #3300 Line 100% Acrylic Interior Semi-Gloss Enamel (1.6 mils DFT)
 4. Concrete Masonry Units (Enamel)
 - a. Prime Coat: F/C #470A Interior/Exterior Acrylic Latex Masonry Block Filler (10 mils DFT)
 - b. Intermediate Coat: F/C #600 Line 100% Acrylic Interior Semi-Gloss Latex Enamel (1.9 mils DFT)
 - c. Topcoat: F/C #600 Line 100% Acrylic Interior Semi-Gloss Latex Enamel (1.9 mils DFT)
 5. Ferrous and Zinc Coated Metal
 - a. Prime Coat: F/C #5-56 100% Acrylic All Purpose Metal Primer (1.8 mils DFT)
 - b. Intermediate Coat: F/C #600 Line 100% Acrylic Interior Semi-Gloss Latex Enamel (1.9 mils DFT)
 - c. Topcoat: F/C #600 Line 100% Acrylic Interior Semi-Gloss Latex Enamel (1.9 mils DFT)

6. Exposed Structural steel and Roof Deck (shop primed steel)
 - a. Prime Coat: F/C #5-56 100% Acrylic All Purpose Metal Primer (1.8 mils DFT). Spot prime if needed.
 - b. Intermediate Coat: F/C #999 Tuff-Boy Water-Base Dry Fog Flat (3.2 mils DFT)
 - c. Topcoat: F/C #999 Tuff-Boy Water-Base Dry Fog Flat (3.2 mils DFT)
 7. Painted Woodwork
 - a. Prime Coat: F/C #699 Waterborne 100% Acrylic Enamel Undercoater (1.6 mils DFT)
 - b. Intermediate Coat: F/C #600 Line 100% Acrylic Interior Semi-Gloss Latex Enamel (1.9 mils DFT)
 - c. Topcoat: F/C #600 Line 100% Acrylic Interior Semi-Gloss Latex Enamel (1.9 mils DFT)
 8. Concrete Garage Floor Stain & Sealer (Opaque Color)
 - a. Prime Coat: Rust-Oleum S6511 System Penetrating Prime & Sealer
 - b. Topcoat: Rust-Oleum 8000 System Overcrete S (Anti-Skid Safety Surface when used in conjunction with a broadcasted aggregate)
 9. Concrete Floor Sealer (Clear)
 - a. Prime Coat: F/C #1106 Tuff-Boy Clear Acrylic Waterproofing Sealer
 - b. Topcoat: F/C #1106 Tuff-Boy Clear Acrylic Waterproofing Sealer: Add Skid-Tex Slip Resistant to topcoat.
- C. Provide the following PPG Paints, Inc. paint systems for the various substrates, as indicated:
1. Gypsum Drywall (Semi-Gloss)
 - a. Prime Coat: PPG Pure Performance Zero VOC Interior Latex Primer, 9-900 (1.4 mils dry)
 - b. Intermediate Coat: PPG Pure Performance Zero VOC Interior Latex Semi-Gloss, 9-500 (1.4 mils dry)
 - c. Topcoat: PPG Pure Performance Zero VOC Interior Latex Semi-Gloss, 9-500 (1.4 mils dry)
 2. Gypsum Drywall(Egg Shell)
 - a. Prime Coat: PPG Pure Performance Zero VOC Interior Latex Primer, 9-900 (1.4 mils dry)
 - b. Intermediate Coat: PPG Pure Performance Zero VOC Interior Latex Eggshell, 9-300XI (1.4 mils dry)
 - c. Topcoat: PPG Pure Performance Zero VOC Interior Latex Eggshell, 9-300XI (1.4 mils dry)
 3. Gypsum Drywall (in wet areas)
 - a. Prime Coat: PPG Pure Performance Zero VOC Interior Latex Primer, 9-900 (1.4 mils dry)
 - b. Intermediate Coat: PPG Pitt Glaze Waterborne Acrylic Epoxy, 16-551 Series (2.0-3.0 mils dry)
 - c. Topcoat: PPG Pitt Glaze Waterborne Acrylic Epoxy, 16-551 Series (2.0-3.0 mils dry)
 4. Concrete Masonry Units (Enamel)
 - a. Prime Coat: PPG Speedhide Interior Exterior Latex Block Filler, 6-7 Series (7.4 mils dry)
 - b. Intermediate Coat: PPG Interior Exterior Semi-Gloss Acrylic Metal Finish, 7-374 (1.5 to 2.0 mils dry)
 - c. Topcoat: PPG Interior Exterior Semi-Gloss Acrylic Metal Finish, 7-374 (1.5 to 2.0 mils dry)

5. Ferrous and Zinc Coated Metal
 - a. Prime Coat: PPG Pitt-Tech DTM Acrylic Primer Finish, 90-712 (2.0 to 3.0 mils dry)
 - b. Intermediate Coat: PPG Interior Exterior Semi-Gloss Acrylic Metal Finish, 7-374 (1.5 to 2.0 mils dry)
 - c. Topcoat: PPG Interior Exterior Semi-Gloss Acrylic Metal Finish, 7-374 (1.5 to 2.0 mils dry)
 6. Exposed Structural steel and Roof Deck (shop primed steel)
 - a. Prime Coat: PPG Pitt-Tech DTM Acrylic Primer Finish, 90-712 (2.0 to 3.0 mils dry)-Spot prime if needed.
 - b. Intermediate Coat: PPG Super Tech WB Waterborne Acrylic Dry Fall, 6-725XI
 - c. Topcoat: PPG Super Tech WB Waterborne Acrylic Dry Fall, 6-725XI
 7. Painted Woodwork
 - a. Prime Coat: PPG Seal Grip Interior Acrylic Primer Finish, 17-951 (1.2 mils dry)
 - b. Intermediate Coat: PPG Interior Exterior Semi-Gloss Acrylic Metal Finish, 7-374 (1.5 to 2.0 mils dry)
 - c. Topcoat: PPG Interior Exterior Semi-Gloss Acrylic Metal Finish, 7-374 (1.5 to 2.0 mils dry)
 8. Concrete Garage Floor (Stain & Sealer Solvent Based-Opaque Color)
 - a. Prime Coat: PPG Color Seal Solvent Based Acrylic Concrete Stain, PP3249.
 - b. Topcoat: PPG Color Seal Solvent Based Acrylic Concrete Stain, PP3249; Anti Slip Additive to the topcoat. Note- Etch floor prior to application.
 9. Concrete Floor Sealer (Clear)
 - a. Prime Coat: PPG Perma Crete Plex Seal WB Waterborne Clear Acrylic Concrete Sealer, 4-6200.
 - b. Topcoat: PPG Perma Crete Plex Seal WB Waterborne Clear Acrylic Concrete Sealer, 4-6200; Anti Slip Additive to the topcoat. Note-New concrete must be etched prior to application.
- D. Provide the following Rust-Oleum paint systems for the various substrates, as indicated:
1. Gypsum Drywall (Semi-Gloss)
 - a. Prime Coat: Rust-Oleum Zinsser Dry Wall Primer (1.0-1.5 mils dry)
 - b. Intermediate Coat: Rust-Oleum Zinsser Perma White Interior Acrylic Semi-Gloss, (1.5-2.0 mils dry)
 - c. Topcoat: Rust-Oleum Zinsser Perma White Interior Acrylic Semi-Gloss, (1.5-2.0 mils dry)
 2. Gypsum Drywall(Egg Shell)
 - a. Prime Coat: Rust-Oleum Zinsser Dry Wall Primer (1.0-1.5 mils dry)
 - b. Intermediate Coat: Rust-Oleum Zinsser Perma White Interior Acrylic Satin, (1.5-2.0 mils dry)
 - c. Topcoat: Rust-Oleum Zinsser Perma White Interior Acrylic Satin, (1.5-2.0 mils dry)
 3. Gypsum Drywall (in wet areas)
 - a. Prime Coat: Rust-Oleum Zinsser Dry Wall Primer (1.0-1.5 mils dry)
 - b. Intermediate Coat: Rust-Oleum 5300 Series WB Epoxy (2.5-3.0 mils dry)
 - c. Topcoat: Rust-Oleum 5300 Series WB Epoxy (2.5-3.0 mils dry)

4. Concrete Masonry Units (Enamel)
 - a. Prime Coat: Rust-Oleum Zinsser Water Tite Flexible Primer & Finish (5.0-6.0 mils dry)
 - b. Intermediate Coat: Rust-Oleum Zinsser Perma White Interior Semi Gloss Acrylic (1.5-2.0 mils dry)
 - c. Topcoat: Rust-Oleum Zinsser Perma White Interior Semi Gloss Acrylic (1.5-2.0 mils dry)
 5. Ferrous and Zinc Coated Metal
 - a. Prime Coat: Rust-Oleum Universal Primer, (1.0-2.0 mils dry)
 - b. Intermediate Coat: Rust-Oleum Zinsser Perma White Interior Semi Gloss Acrylic (1.5-2.0 mils dry)
 - c. Topcoat: Rust-Oleum Zinsser Perma White Interior Semi Gloss Acrylic (1.5-2.0 mils dry)
 6. Exposed Structural steel and Roof Deck (shop primed steel)
 - a. Prime Coat: Rust-Oleum Universal Primer, (1.0-2.0 mils dry)-Spot prime if needed.
 - b. Intermediate Coat: Rust-Oleum 5100 Series Waterborne Acrylic Dry Fall Flat
 - c. Topcoat: Rust-Oleum 5100 Series Waterborne Acrylic Dry Fall Flat
 7. Painted Woodwork
 - a. Prime Coat: Rust-Oleum Zinsser Bulls Eye 123 Acrylic Primer (1.0-1.5 mils dry)
 - b. Intermediate Coat: Rust-Oleum Zinsser Perma White Interior Acrylic Semi Gloss, (1.5-2.0 mils dry)
 - c. Topcoat: Rust-Oleum Zinsser Perma White Interior Acrylic Semi Gloss, (1.5-2.0 mils dry)
 8. Concrete Garage Floor (Chip Resistant High Build Industrial Floor)
 - a. Prime Coat: Rust-Oleum Penetrating Prime & Seal (8 mils.)
 - b. Intermediate Coat: Rust-Oleum Over Flex E Epoxy/Broadcast Wedron 480 aggregate to rejection (20 mils.)
 - c. Seal Coat: Rust-Oleum 9800 Series Urethane (5 mils DFT.)
 - d. Topcoat: Rust-Oleum 9800 Series Urethane (5 mils DFT.)
 9. Concrete Floor Sealer (Clear)
 - a. Prime Coat: Rust-Oleum® Natural Look Concrete Sealer – Clear
 - b. Topcoat: Rust-Oleum® Natural Look Concrete Sealer – Clear; Slip Resistant Additive to the topcoat.
- E. Provide the following Sherwin-Williams paint systems for the various substrates, as indicated:
1. Gypsum Drywall (Semi-Gloss)
 - a. Prime Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28-2600 (1.0 mils dry)
 - b. Intermediate Coat: S-W ProMar 200 Zero VOC Interior Latex Semi-Gloss, B31-2600 (1.6 mils dry)
 - c. Topcoat: S-W Harmony Low Odor Interior Latex Semi-Gloss, B10 Series (1.6 mils dry)
 2. Gypsum Drywall(Egg Shell)
 - a. Prime Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28-2600 (1.0 mils dry)
 - b. Intermediate Coat: S-W ProMar 200 Zero VOC Interior Latex EgShel, B20-2600 (1.6 mils dry)
 - c. Topcoat: S-W ProMar 200 Zero VOC Interior Latex EgShel, B20-2600 (1.6 mils dry)

3. Gypsum Drywall (in wet areas)
 - a. Prime Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28-2600 (1.0 mils dry)
 - b. Intermediate Coat: S-W Waterbased Catalyzed Epoxy, B70W211/ B60V25 (2.5-3.0 mils dry)
 - c. Topcoat: S-W Waterbased Catalyzed Epoxy, B70W211/ B60V25 (2.5-3.0 mils dry)
4. Concrete Masonry Units (Enamel)
 - a. Prime Coat: S-W PrepRite Block Filler, B25W25 (8.0 mils dry)
 - b. Intermediate Coat: S-W ProMar 200 Zero VOC Interior Latex Semi-Gloss, B31-2600 (1.6 mils dry)
 - c. Topcoat: S-W ProMar 200 Zero VOC Interior Latex Semi-Gloss, B31-2600 (1.6 mils dry)
5. Ferrous and Zinc Coated Metal
 - a. Prime Coat: S-W ProCryl® Universal Primer, B66-310 Series (2.0-4.0 mils dry)
 - b. Intermediate Coat: S-W ProClassic Waterborne Acrylic Semi-Gloss, B31 Series (2.0-3.0 mils dry)
 - c. Topcoat: S-W ProClassic Waterborne Acrylic Semi-Gloss, B31 Series (2.0-3.0 mils dry)
6. Exposed Structural steel and Roof Deck (shop primed steel)
 - a. Prime Coat: S-W ProCryl® Universal Primer, B66-310 Series (2.0-4.0 mils dry)-Spot prime if needed.
 - b. Intermediate Coat: S-W Waterborne Acrylic Dry Fall, B42W2
 - c. Topcoat: S-W Waterborne Acrylic Dry Fall, B42W2
7. Painted Woodwork
 - a. Prime Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28-2600 (1.0 mils dry)
 - b. Intermediate Coat: S-W ProClassic Waterborne Acrylic Semi-Gloss, B31 Series (2.4-3.0 mils dry)
 - c. Topcoat: S-W ProClassic Waterborne Acrylic Semi-Gloss, B31 Series (2.4-3.0 mils dry)
8. Concrete Garage Floor (Chip Resistant High Build Industrial Floor)
 - a. Prime Coat: S-W 3579 Standard Primer (8 mils.)
 - b. Intermediate Coat: 3555 EPO-FLEX HD Epoxy/Broadcast 5310-7 aggregate to rejection (20 mils.)
 - c. Seal Coat: S-W 4638 HS Polyurethane Enamel (8 mils.)
 - d. Topcoat: S-W 4638 HS Polyurethane Enamel (8 mils.)
9. Concrete Floor Sealer (Clear)
 - a. Prime Coat: H&C Concrete Stain Solid Color Water Based - Clear
 - b. Topcoat: H&C Concrete Stain Solid Color Water Based - Clear; H&C SharkGrip Slip Resistant Additive to the topcoat. Note-New concrete must be etched prior to application.

END OF SECTION

SECTION 10 11 00

VISUAL DISPLAY UNITS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Markerboards.
2. Tackboards.

B. Related Sections:

1. Section 09 05 15 – Color Design (for color selections).

1.02 ACTION SUBMITTALS

A. Product Data: For manufacturer's technical data and installation instructions for each material and component parts, including data substantiating materials comply with requirements.

B. Shop Drawings: For visual display surfaces. Include plans, elevations, sections, details, and attachments to other work.

1. Show locations of panel joints.
2. Include sections of typical trim members.

C. Samples: 3 copies of full range of color samples for each exposed product and for each color and texture specified.

1. Furnish 12-inch square samples of sheet materials and 12-inch lengths of trim members for color verification after selections have been made.

1.03 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for surface-burning characteristics of fabrics.

B. Warranties: Sample of special warranties.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance Data: For visual display surfaces to include in maintenance manuals.

1.05 QUALITY ASSURANCE

A. Unless otherwise acceptable to Project Engineer / MDOT Architect, furnish all visual display boards by one manufacturer for entire project.

- B. Field Measurements: Take field measurements prior to preparation of Shop Drawings and fabrication where possible, to ensure proper fitting of Work. However, allow for trimming and fitting wherever taking of field measurements before fabrication might delay Work.
- C. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 50 or less.

1.06 WARRANTY

- A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer's standard form in which manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Surfaces lose original writing and erasing qualities.
 - b. Surfaces exhibit crazing, cracking, or flaking.
 - 2. Warranty Period: Life of the building.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by Claridge Products and Equipment, Inc., P.O. Box 910, Harrison, AR 72602. Tel. (870) 743-2200.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Best-Rite Manufacturing, Temple, TX, Tel. (800) 749-2258.
 - 2. Marsh Industries, Inc., New Philadelphia, OH, Tel. (800) 426-4244.
 - 3. PolyVision Corporation, Suwanee, GA, Tel. (800) 620-7659.
- C. Alternate Manufacturers: Products produced by other manufacturers that fully meet or exceed the specified requirements may be considered under provisions of Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.02 MATERIALS

- A. Markerboard: Equal to Claridge Series #LCS-2000-R type "A" factory built marker board with map rail with tan cork insert, jamb trim, and chalk trough with end closures. LCS = porcelain enamel liquid chalk surface on Duracore with 0.002 aluminum foil back approx. 1/2 inch thick overall, color No. 32 white.
 - 1. Extruded aluminum trim to have anodized satin finish. Include standard eraser and assorted LCS markers.
 - 2. Size: 4 feet by 6 feet.
 - 3. One unit required unless additional units are indicated on the Drawings.

- B. Tackboard: Equal to Claridge Series # 1 type "CO" factory built tackboard.
 - 1. Tackboard is Claridge 1/4-inch Cork on 1/4 inch Hardboard, color as selected by Project Engineer / MDOT Architect from manufacturer's standards.
 - 2. Size: 4 feet by 6 feet.
 - 3. One unit required unless additional units are indicated on the Drawings.

PART 3 - EXECUTION

3.01 EXAMINATION

Installer shall examine areas and conditions under which units are to be installed and notify Contractor in writing of 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.

3.02 INSTALLATION

- A. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display surfaces and wall surfaces.
- B. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation. Comply with Manufacturer's written installation instructions.
 - 1. If units are not shown on Drawings, install units in location(s) as directed by Project Engineer.

3.03 ADJUSTING AND CLEANING

- A. Verify accessories required for units are properly installed and operating units are adjusted and properly functioning. .
- B. Clean visual display surfaces according to manufacturer's written instructions. Attach one cleaning label to visual display surface in each room. Cover and protect visual display surfaces.

END OF SECTION

SECTION 10 14 00 SIGNAGE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Signage for room identification system.
 - 2. Wall mounted exterior sign.
 - 3. Truss emblem signage.
- B. Related Sections: Section 09 05 15 – Color Design (for color selection).

1.02 ACTION SUBMITTALS

- A. Product Data: Manufacturer's technical data and installation instructions for each type of signage required.
- B. Shop Drawings: For dimensional letter signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 3. Show message list, typestyles, graphic elements, and layout for each sign at least half size.
- C. Samples: Submit 3 samples of each color and finish of exposed materials and accessories required for specialty signs. Project Engineer / MDOT Architect's review of samples will be for color and texture only.
 - 1. When requested, furnish full-size samples of specialty sign materials.
- D. Sign Schedule: Use same designations (Room numbers) specified or indicated on Drawings or in a sign schedule.

1.03 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

1.04 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.05 QUALITY ASSURANCE

- A. Provide each type of sign as a complete unit produced by a single manufacturer including necessary mounting accessories, fittings and fastenings.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components correctly packed to prevent damage. Store in secure area out of weather. Handle per manufacturer's instructions.

1.07 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Completion.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications for interior and exterior signage are based on products manufactured by ASI Sign Systems, Inc., 3890 W. NW Hwy, Suite 102, Dallas, TX. 75220. Tel. (800) 274-7732. Truss emblem signage (exterior) is based on products manufactured by Mohawk Sign Systems, Inc., Schenectady, NY. Tel. (518) 370-3433.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Gemini Incorporated, Cannon Falls, MN. Tel. (800) 538-8377.
 - 2. Matthews International Corp., Pittsburgh, PA. Tel. (800) 628-8439.
 - 3. Mohawk Sign Systems, Inc., Schenectady, NY. Tel. (518) 370-3433.
 - 4. Scott Sign Systems, Inc., Sarasota, FL. Tel. (800) 237-9447.
- C. Alternate Manufacturers: Products produced by other manufacturers that fully meet or exceed the specified requirements may be considered under provisions of Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.02 PERFORMANCE REQUIREMENT SIGN SYSTEM

- A. Exterior Signage: Wall mounted LC Series, Helvetica and Helvetica Medium styles, size and location(s) as shown on Drawings. Text shall be center justified unless shown otherwise.
- B. Interior Signage: Wall or desktop mounted WS Series with rounded corners. Design so that paper insert can be installed from each end. Comply with 2010 ADA requirements.
- C. Truss Emblem Signage (Exterior): Wall mounted, Helvetica Medium styles, size as shown on Drawings.

2.03 COMPONENTS - EXTERIOR SIGNAGE

- A. Materials: Cast aluminum, projected mount with sleeve and stud.
- B. Finish: Baked enamel in manufacturer's standard color.

2.04 COMPONENTS - TRUSS EMBLEM SIGNAGE (EXTERIOR)

- A. Material: Emblem shall be made of (0.063) aluminum with a bright reflective paint or applied vinyl surface.
- B. Shape: Emblem shall be in the shape of an isosceles triangle measuring six (6) inches horizontally and three (3) inches vertically.
- C. Lettering: Emblem shall have letters printed in the center of the triangle based on the type of truss construction used in the building being identified by the emblem:
 - 1. "F" signifies floor with truss construction.
 - 2. "R" signifies roof with truss construction.
 - 3. "F/R" signifies both floor and roof with truss construction.
- D. Colors and Graphics:
 - 1. Text Style: Helvetica Medium.
 - 2. Boarder: 3/8 inch wide white boarder on all sides.
 - 3. Center Background Triangle Color: Red.
 - 4. Lettering: 1-1/4 inch tall lettering (F, R, or F/R) shall be white and centered on red background.
 - 5. Along base (6 inch length) of triangle centered on the white border include the following 1/4 inch tall all capital lettering in red:
 - a. Do Not Remove By Order Of the Local Fire Inspector.
- E. Accessories: Provide stainless steel mounting screws appropriate for surface to which sign will be mounted.
- F. See suggested layout at the end of this Section.

2.05 COMPONENTS – INTERIOR SIGNAGE

- A. Window Inserts: Laser printed paper insert with MDOT watermark will be furnished by Owner. Text will be left justified unless noted otherwise.
- B. Sign Face: Clear Acrylic, 0.080-inch thick, matte first surface.
- C. Adhesive: Pressure sensitive, adhesive film on second surface.
- D. Insert Guide Rails: 0.040-inch thick vinyl tape.
- E. Tactile Laminate: Polyamid Resin.
- F. Laminating Base: Acrylic, 0.080-inch thick.
- G. Fasteners: 0.030- inch thick, double-face tape.
- H. Stand: Clear Acrylic, 0.080-inch thick.

I. Sizes as Follows:

1. Type No. 1: 12 inches wide by 3 inches high.
2. Type No. 2: 6 inches wide by 9 inches high.
3. Type No. 3: 12 inches wide by 3 inches high. .

2.06 BRAILLE AND TACTILE COPY

- A. Comply with requirements of the Americans with Disabilities Act 2010. Tactile copy to be raised 1/32-inch minimum from sign first surface by manufacturer's photomechanical stratification processes. Translation of copy into Braille shall be the responsibility of the manufacturer.

2.07 FINISHES – INTERIOR SIGNAGE

- A. Color: Selected by Project Engineer / MDOT Architect from manufacturer's standard.
- B. Surface Texture: Matte.

2.08 FONT

- A. Font Type: Helvetica Medium, unless noted otherwise.

PART 3 - EXECUTION

3.01 EXANIMATION

- A. Contractor, with Installer present, shall examine the substrates and conditions under which the specialty signs are to be installed and notify the Project Engineer / MDOT Architect in writing of conditions detrimental to the proper and timely completion of the Work.
1. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

3.02 INSTALLATION – GENERAL

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions. Comply with ADA 2010 requirements.
1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
 3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

3.03 INSTALLATION – INTERIOR SIGNAGE

- A. Install signs using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install sign units and components at the locations shown or scheduled, securely mounted with concealed theft-resistant fasteners, unless otherwise indicated. Attach signs to substrates in accordance with the manufacturer's instructions, unless otherwise shown.
 - 2. Install level, plumb, and at the proper height. Cooperate with other trades for installation of sign units to finish surfaces. Repair or replace damaged units as directed by the Project Engineer / MDOT Architect.
 - 3. Position sign on wall surface 2 inches from strike side of doorframe. Tactile characters on signs shall be located 48 inches minimum above the finish floor or ground surface, measured from the baseline of the lowest tactile character and 60 inches maximum above the finish floor or ground surface, measured from baseline of the highest tactile character (comply with 2010 ADA requirements).
- B. Mounting Method-Double Sided Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear strips of tape symmetrically to face of substrate. Place sign in position, and push to engage adhesive tape strips.
- C. Mounting Method-Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.

3.04 INSTALLATION – EXTERIOR SIGNAGE

- A. Install signs using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
- B. Mounting Method - Projected Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - 1. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.

3.05 INSTALLATION – TRUSS EMBLEM SIGNAGE

- A. Install signs using mounting methods indicated and according to manufacturer's written instructions.
- B. Permanently affix emblem to the exterior of the building to the left of the main entrance door at a height of 5'-0" above the finish floor or grade.

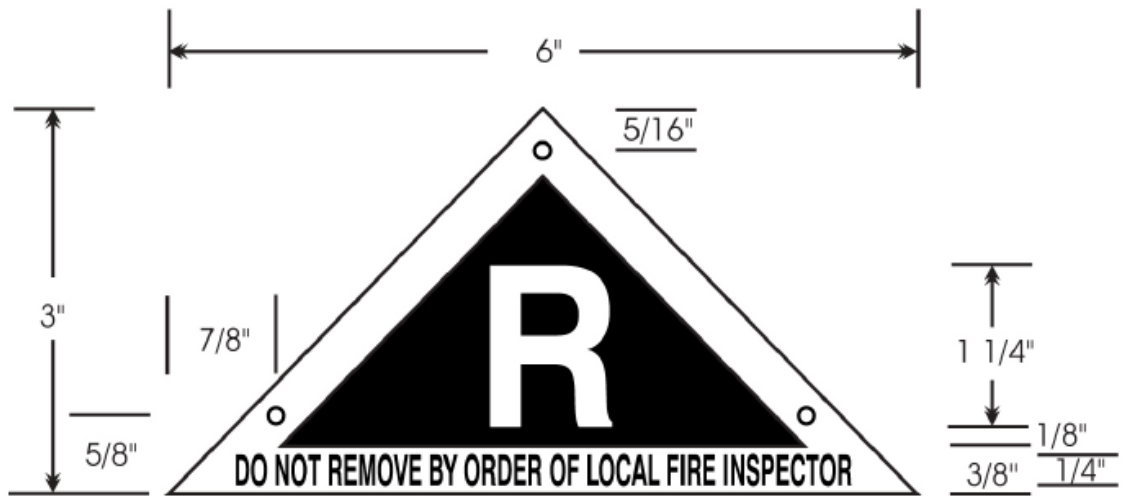
- C. Mounting Method-Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.

3.06 SCHEDULES – INTERIOR SIGNAGE

- A. Sign Type No. 1: Offices
Locker Room
Crew Room
Storage Room
- B. Sign Type No. 2: Toilet Rooms

3.07 SCHEDULES – EXTERIOR SIGNAGE

- A. Building Letters: Flat – Letter style will be determined by Project Engineer / MDOT Architect from all styles available.
 - 1. 15 inches high, 11 Letters: MAINTENANCE
- B. Truss Emblem Signage:



END OF SECTION

SECTION 10 21 15

SOLID PLASTIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Solid-plastic (polymer) toilet compartments, floor-mounted and overhead braced.
- B. Related Sections: Section 09 05 15 – Color Design (for color selected).

1.02 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's sample warranty, color charts and detailed technical data for materials, fabrication, and installation, including catalog cuts of anchors, hardware, fastenings, and accessories.
- B. Shop Drawings: Submit job-specific shop drawings for fabrication and erection of toilet compartment assemblies not fully described by product drawings, templates, and instructions for installation of anchorage devices built into other Work.

1.03 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.04 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1 for toilet compartments designated as accessible.
- 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 tolerances wherever taking of field measurements before fabrication might delay Work.
- D. Coordination: Furnish inserts and anchorage, which must be built into other work for installation of toilet partitions and related work; coordinate delivery with other work to avoid delay.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Upon receipt of toilet partitions and other materials, installer shall examine the shipment for damage and completeness. Materials shall be stored in a clean, dry place. Stack all materials to prevent damage.

1.06 WARRANTY

- A. Manufacturer: Furnish a written warranty covering all plastic components against breakage, warping, corrosion and delamination for a period of 25 years.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by Scranton Products Inc., 801 East Corey Street, Scranton, PA 18505. Tel. (800) 445-5148.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Bradley Corp / Mills Partitions, Menomonee Falls, WI. Tel (414) 354-0100.
 - 2. General Partitions Mfg. Corp., Erie, PA. (814) 833-1154.
 - 3. Knickerbocker Partition Corp, Freeport, NY. Tel. (516) 546-0550.
- C. Alternate Manufacturers: Products produced by other manufacturers that fully meet or exceed the specified requirements may be considered under provisions of Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.02 MATERIALS

- A. General: Provide materials that have been selected for surface flatness and smoothness. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discoloration, telegraphing of core material, or other imperfections on finished units are not acceptable.
- B. Doors, partitions, pilasters and urinal screens shall be fabricated from High Density Polyethylene (HDPE) material manufactured under high pressure forming a single component section which is waterproof, non- absorbent and has a self-lubricating surface that resists marring with pens, pencils or other writing utensils. All to arrive at job site with special protective plastic covering.
- C. Characteristics: Dual component compression molded High Density Polyethylene (HDPE) of solid virgin resin materials in colors that extend throughout the surface; doors, partitions and pilaster shall have (HDPE) as the core material).
 - 1. Doors, partitions, pilasters and urinal screens shall be a minimum of 1 inch thick and all edges machined to a radius of 0.250 inch and all exposed surfaces to be free of saw marks.
 - 2. Doors and dividing panels shall be 55 inches high and mounted 14 inches above the finish floor.
 - 3. Pilasters shall be 82 inches high and fastened into a 3-inch high stainless steel pilaster shoe with a stainless steel, torx head sex bolt.

4. Finish shall be similar and equal to standard color chart selections from Scranton Products. Color of doors and pilasters to be selected by the Project Engineer / MDOT Architect from Manufacturer's Classic, Mosaic or Designer color collections with orange peel texture.
5. Aluminum (heat sinc) edging strips to be fastened to the bottom edge of all doors and panels using vandal proof stainless steel fasteners.

2.03 HARDWARE

A. Door Hardware:

1. Hinges: Aluminum continuous for door height.
2. Each door shall be supplied with one coat bumper / hook made of chrome plated zamak. Each handicapped door to include one door pull and one wall stop.
3. Door Strike and Keeper: fabricated from heavy-duty aluminum extrusion (6463-T5 alloy).
 - a. Finish: Clear anodized finish.
 - b. Length of Strike" 6 inches.
 - c. Fasteners: Wrap around flange surface mounted and through bolted to pilaster with one-way sex bolts.
4. Door Latch: Housing: Fabricated from heavy-duty aluminum extrusion (6463-T5 alloy).
 - a. Finish: Clear anodized finish.
 - b. Fasteners: Surface mounted and through bolted to door with one-way sex bolts.
 - c. Slide Bolt and Button: Heavy aluminum with a black anodized finish.

B. Wall Brackets: Full-length continuous aluminum. Brackets shall be used for all panel to pilaster and pilasters to wall connections.

1. Attach brackets to adjacent wall construction with No. 14 by 1-1/2 inch stainless steel Phillips head screws.
2. Anchor screws directly behind the vertical edge of pilasters at 12-inch intervals along the full length of bracket and at each 12-inch interval alternately spaced between anchor connections.

C. Headrail: Heavy-duty extruded aluminum (6463-T5 alloy) with anti-grip design.

1. Finish: Clear anodized finish.
2. Fasteners: Fastened to the headrail bracket by a stainless steel, torx head sex bolt, and fastened to the tops of pilasters with stainless steel, tamper resistant torx screws.

D. Handrail Brackets: Headrail brackets shall be 16-gage stainless steel with a satin finish, and secured to the wall with #14 stainless steel screws.

E. Accessories: Furnish units with chromium-plated finish, unless otherwise indicated.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
- B. Clearances: Maximum 1/2 inch between pilasters and panels; 1 inch between panels and walls. Clearance at vertical edges of doors shall be uniform top to bottom and shall not exceed 1/4 inch.

3.02 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

3.03 CLEANING

- A. Clean exposed surfaces of partition systems using materials and methods recommended by manufacturer, and provide protection as necessary to prevent damage during remainder of construction period.

END OF SECTION

SECTION 10 22 14

CHAIN LINK PARTITIONS AND GATES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Chain link partitions, framing and gates. The Work includes, but is not limited to, posts, framing, chain link fabric, tie wire, tension wire, hardware and miscellaneous framing & supports.

1.02 REFERENCES

- A. ASTM- American Society for Testing and Materials:
 - 1. ASTM A123 – Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
 - 2. ASTM A153 – Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 3. ASTM A392 – Zinc-Coated Steel Chain-Link Fence Fabric.
 - 4. ASTM F567 – Standard Practice for Installation of Chain-Link Fence.
 - 5. ASTM F1083 – Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
 - 6. ASTM F1345 – Standard Specification for Zinc-5% Aluminum-Mischmetal Alloy- Coated Steel Chain-Link Fence Fabric.
- B. NPS – National Pipe Standards.
- C. CLFMI Product Manual – Chain Link Fence Manufacturers Institute.
- D. AASHTO – American Association of State Highway Transportation Officials.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Certification: Submit manufacturer's or fabricator's test results and other data certifying that all materials furnished for construction of chain link partitions comply with the requirements of the Drawings and Specifications. The Owner reserves the right to retest all materials.

1.04 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. AMICO (Alabama Metal Industries Corp.), Birmingham, AL. Tel. (800) 366-2642.
 - 2. Master-Halco, Anchor Fence Division, Edgewood, MD. Tel. (800) 229-5615.
 - 3. Southwest Wire, Inc., Norman, OK. Tel. (800) 348-9473.
- B. Alternate Manufacturers: Products produced by other manufacturers that fully meet or exceed the specified requirements may be considered under provisions of Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.02 CHAIN LINK FABRIC

- A. Provide chain link fabric for partitions and gates in configurations as shown on the Drawings and conforming with the following:
 - 1. Gage: 9.
 - 2. Mesh Size: 2 inches square.
 - 3. Height: As required by Drawings.
 - 4. Coating: Class C spelter coating.

2.03 FRAMING

- A. Metal posts shall be of the size, configuration and minimum weight per foot as specified herein and as shown on the Drawings. Round steel posts shall be galvanized steel pipe, coated inside and out, and shall comply with ASTM F 1083, Schedule 40.

2.04 FRAMING (OPTION)

- A. Post: Round steel posts meeting the following specifications will be acceptable alternates to those meeting the requirements of ASTM F 1083, Schedule 40.
- B. Pipe: Manufactured by cold rolling electric resistance welding of high strength steel having a minimum yield strength of 50,000 psi conforming to ASTM A 446 or A 569.
 - 1. The exterior surface of the pipe shall be triple coated with hot-dip galvanized zinc followed by a chromate conversion coating and urethane or polyurethane acrylic top coating.
 - 2. The interior surface of the pipe shall be given corrosion protection by zinc rich organic coating or hot-dipped galvanized zinc coating.

- C. Requirements: Pipe shall meet the following requirements for wall thickness and weight per linear foot:

Nominal PIPE Size (I.D. Inches)	Minimum Thickness (Inches)	Minimum Wt./Ft. (Pounds)
1-1/4	0.110	1.820
1-1/2	0.120	2.281
2	0.130	3.117
2-1/2	0.160	4.640

- D. Pipe Strength: The strength of the pipe shall be the product of the yield strength and the section modulus, and shall not be less than that of pipe equivalent diameter conforming to ASTM F 1083, Schedule 40.
- E. Protective Coating: Conform to the requirements of AASHO M 181 for grade 2 posts and rails with hot-dip galvanized zinc plus organic exterior coatings.

2.05 FABRIC FILLED GATES

- A. Gate frame shall be constructed from pipe complying with ASTM F 1083, Schedule 40 and to the design and dimensions as shown on the Drawings.
1. Connections shall be welded and watertight.
 2. Frame shall be hot dip galvanized after welding.

2.06 TENSION WIRE

- A. Tension wire shall be of the same material as the partition wire being used, shall be of good commercial quality, and shall meet the following requirements:
1. Base metal of zinc coated tension wire shall be steel wire having a minimum tensile strength of 60,000 psi.
 2. Spelter coating shall comply with AASHTO M 279, Class 1.

2.07 TIE WIRE

- A. Tie wire shall be of good commercial quality zinc coated steel of the size and spacing as shown on the Drawings. Spelter coating shall comply with AASHTO M 279, Class 1.

2.08 HARDWARE

- A. Provide industrial duty steel, malleable iron or ductile iron hardware galvanized in accordance with ASTM A153.
1. Provide hinges, drop rods and hold-open fittings at all gates.
 2. Provide with heavy-duty cantilever latch with padlock equal to Schlage 45-101.
 3. Provide anchors, sleeves and all required fasteners to secure the Work.

2.09 CONCRETE FOR ANCHORS AND FOOTINGS

- A. Concrete for anchors and footings shall conform to requirements of Section 03 30 00 Cast-in-Place Concrete.
- B. Foundation Tube Sleeve: AASHTO M-36, corrugated 16-gage steel, galvanized, depth as indicated.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General:
 - 1. Perform cutting, drilling and fitting required for installation.
 - a. Set Work accurately in location, alignment and elevation measured from established lines and levels.
 - b. Provide anchorage devices and fasteners where necessary for installation to other Work.
 - 2. The bottom of partitions shall not be more than one inch from the surface of finished floor slab.
 - 3. Attachment: Wire shall be stretched taut and firmly attached to posts and braces by methods and spacing as indicated. All wire shall be installed to the required elevation.
- B. Partition Posts: Install foundation tube and posts in accordance with manufacturer's instructions.
- C. Gate Frames: Provide gates and frames constructed of round tubular members continuously welded at all corners and intersections. Install gates plumb, level and secure for full opening without interference. Hang swing gates in hinges so they will remain motionless in any position.

END OF SECTION

SECTION 10 26 13

CORNER GUARDS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Vinyl / Acrylic surfaced mounted Corner Guards.

1.02 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's technical data and installation instructions for corner guards.
- B. Samples: Submit 3 samples of material finishes, profiles and colors for corner guards.

1.03 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.04 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products per ASTM E 84, NFPA 255, or UL 723 by UL or another qualified testing agency.

PART 2 - PRODUCTS

2.01 CORNER GUARDS

- A. Surface-Mounted, Resilient, Plastic Corner Guards: Assembly consisting of snap-on plastic cover installed over continuous retainer; including mounting hardware; fabricated with 90 degree turn to match wall condition. Install full height, unless height indicated otherwise on the Drawings, at all outside corners in corridors and elsewhere as shown on the Drawings.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Construction Specialties, Inc. Model SSM-20 or comparable product by one of the following:
 - a. Arden Architectural Specialties, Inc.
 - b. IPC Door and Wall Protection Systems; Division of InPro Corporation.
 - c. Korogard Wall Protection Systems; a division of RJF International Corporation.
 - 2. Cover: Extruded rigid plastic, minimum 0.078-inch wall thickness; in dimensions and profiles indicated on Drawings.
 - a. Color and Texture: As selected by Project Engineer / MDOT Architect from manufacturer's full range. Refer to Section 09 05 15 – Color Design (for color selected).
 - 3. Retainer: Minimum 0.060-inch- thick, one-piece, extruded aluminum.

4. Retainer Clips: Manufacturer's standard impact-absorbing clips.
5. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Install impact-resistant corner guards level, plumb, and true to line without distortions. Comply with manufacturer's written installation instructions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
 1. Install impact-resistant corner guards in locations and at mounting heights indicated on Drawings.
 2. Provide mounting hardware, anchors, and other accessories required for a complete installation.
- B. Immediately after completion of installation, clean plastic covers and accessories using a standard, ammonia-based, household cleaning agent.
- C. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION

SECTION 10 28 13 TOILET ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Mirrors
2. Toilet Paper Dispenser
3. Grab Bars
4. Towel Dispenser/Waste Receptacle
5. Clothes Hook
6. Mop Holder
7. Under Lavatory Guards (required where hot water line is exposed).

1.02 ACTION SUBMITTALS

- A. Product Data: Manufacturer's product and technical data indicating compliance with these specifications and shop drawings for the fabrication and installation of all toilet accessories. Show all anchorage and other necessary items including mounting heights.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
1. Identify locations using room designations indicated.
 2. Identify products using designations indicated.

1.03 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.04 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.05 QUALITY ASSURANCE

- A. Provide products of the same manufacturer for each type of accessory unit and for units exposed in the same areas, unless otherwise acceptable to the MDOT Architect. Stamped names or labels on exposed faces of units will not be permitted, except where otherwise indicated.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Upon receipt of toilet accessories and other materials, examine the shipment for damage and completeness. Materials shall be stored in a clean, dry place. Stack all materials to prevent damage.

1.07 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
1. Warranty Period: 15 years from date of Completion.

PART 2 - PRODUCTS

2.01 PUBLIC-USE WASHROOM ACCESSORIES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings (Bradley Washroom Accessories Division, P.O. Box 309, Menomonee Falls, WI 53051. Tel. (414) 354-0100) or comparable product by one of the following:
1. A & J Washroom Accessories, Inc., New Windsor, NY. Tel. (845) 562-3332.
 2. Bobrick Washroom Equipment, Inc., Jackson, TN. Tel. (731) 424-7000.
 3. Plumberex Specialty Prod., Inc. Palm Springs, CA. Tel. (800) 475-8629.
 4. TCI Products. Hillsboro, OR. Tel. (866) 533-4273.
 5. Truebro, Inc., Ellington, CT. Tel. (800) 340-5969.
- B. Mirrors: Provide 1/4 inch tempered glass mirrors with 3/4 inch stainless steel channel frame with mitered corners. Mirrors shall be 24 inches by 36 inches equal to Bradley model 781-24362. Locate at each toilet lavatory mounted in locations shown.
- C. Toilet Paper Dispenser: Provide surface mounted stainless steel multi-roll toilet tissue dispenser equal to Bradley model 5402. Locate at each toilet mounted in locations shown.
- D. Grab Bars: Provide 1-1/2 inch diameter horizontal 2 wall stainless steel grab bars with safety-grip non-slip finish and concealed mounting equal to Bradley model 8122. Locate at toilets where indicated at heights shown. Contractor shall provide at each water closet one 36-inch horizontal grab bar one 42-inch horizontal grab bar and one 18-inch vertical grab bar; installation must meet all ADA 2010 requirements.
- E. Towel Dispenser/Waste Receptacle: Provide surface mounted stainless steel towel dispenser/waste receptacle equal to Bradley model 237. Locate at each area with lavatory/sink where shown and at height shown.
- F. Clothes Hook: Provide surface mounted stainless steel hook equal to Bradley model 9135 at each Toilet Room, unless coat hooks are provided with toilet partition doors.
- G. Mop Provide surfaced mounted stainless steel mop and broom holder equal to Bradley model 9933. One piece construction with welded gusset and hooks. Holder consists of spring activated rubber cams on plated steel retainers. Unit measures 14 inches high by 34 inches long, with 4 hooks and 3 holders. Shelf projects 8 inches. Locate at each service sink where shown and at height shown or if not shown then per the Project Engineer's instructions.

H. Under Lavatory Guard:

1. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping, and allow service access without removing coverings.
2. Material and Finish: Antimicrobial, molded-plastic, white.

2.02 FABRICATION

- A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which toilet accessories are to be installed.
1. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Installation General: Comply with all ADA requirements including proper mounting heights.
- B. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
1. Use concealed fastenings wherever possible.
 2. Provide theft-resistant fasteners for all accessory mountings.
 3. Install concealed mounting devices and fasteners fabricated of the same material as the accessories, or of galvanized steel, as recommended by manufacturer.
 4. Install exposed mounting devices and fasteners finished to match the accessories.
- C. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

END OF SECTION

SECTION 10 43 15

DEFIBRILLATORS AND CABINETS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Automated external defibrillator, including cabinet, accessories and mounting brackets.

1.02 ACTION SUBMITTALS

- A. Product Data: Manufacturer's technical data and installation instructions.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product manufactured / distributed by (J.L. Industries, Inc., 4450 W. 78th Street Circle, Bloomington, MN 55435. Tel. (612) 835-6850) or comparable product by one of the following:

1. Philips Healthcare, Andover, MA. Tel. (866) 333-4246.
2. Physio-Control, Inc., Redmond, WA. Tel. (800) 442-1142.

- B. Alternate Manufacturers: Products produced by other manufacturers that fully meet or exceed the specified requirements may be considered under provisions of Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.02 AUTOMATED EXTERNAL DEFIBRILLATOR

- A. Defibrillator: Provide Defibrillator for location(s) as indicated on the Drawings, equal to Medtronic LIFEPAK® CR "plus".
- B. Cabinets: Provide cabinet equal to J.L. Industries 1437F12 stainless steel semi-recessed type cabinet complying with ADA requirements. Cabinet shall accommodate the Medtronic LIFEPAK® CR "plus" Defibrillator. Provide complete unit(s) with Commander Alarm and Saf-T-Lok™ options.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which automated external defibrillator(s) are to be installed. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Installation General: Comply with all ADA 2010 requirements including proper mounting heights.
- B. 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 governing authorities.
- C. Securely fasten mounting brackets to structure, square and plumb, to comply with manufacturer's instructions.
- D. Defibrillator unit(s) shall be mounted in exposed locations as indicated on the Drawings, or if not indicated, as directed by the Project Engineer/ MDOT Architect. A minimum of one unit is required.
- E. Check cabinet(s) for scratched, nicked, and other surface defects. Cabinet(s) with these conditions shall be repaired or replaced.

3.03 CLEANING AND PROTECTION:

- A. At completion of installation, clean surfaces in accordance with manufacturer's instructions.
- B. Protect unit from damage until acceptance by Owner.

END OF SECTION

SECTION 10 44 16 FIRE EXTINGUISHERS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Portable multi-purpose, dry-chemical and class K wet chemical fire extinguishers including cabinets, accessories and mounting brackets.

1.02 ACTION SUBMITTALS

- A. Product Data: Manufacturer's technical data and installation instructions for all portable fire extinguishers required.

1.03 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.04 QUALITY ASSURANCE

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
- C. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by J.L. Industries, Inc., 4450 W. 78th Street Circle, Bloomington, MN 55435. Tel. (612) 835-6850.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Amerex Corp., Trussville, AL. Tel. (205) 655-3271.
 - 2. Larsen's Mfg. Co., Minneapolis, MN. Tel. (612) 571-1181.
 - 3. Potter-Roemer, Santa Ana, CA. Tel. (800) 366-3473.
- C. Alternate Manufacturers: Products produced by other manufacturers that fully meet or exceed the specified requirements may be considered under provisions of Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.02 FIRE EXTINGUISHERS

- A. Provide fire extinguishers for each location indicated, in colors and finishes that comply with requirements of governing authorities.

- B. Multi-Purpose Dry Chemical for Cabinet and Wall Mounting: Equal to J.L. Industries Cosmic 10E, UL rated 4A-80BC, 10 lb. nominal capacity.
- C. Class K Wet Chemical for Cabinet Mounting: Equal to J.L. Industries Saturn 15, UL rated 2-A: 1-B: C: K, 6 liters nominal capacity. Locate in Crew Room.

2.03 MOUNTING BRACKETS

- A. Mounting Brackets: Provide manufacturer's bracket designed to prevent accidental dislodgment of extinguisher, of proper size for type and capacity of extinguisher indicated, in manufacturer's standard plated finish.

2.04 EXTINGUISHER CABINETS

- A. Equal to J.L. Industries Cosmopolitan semi-recessed model 1032F17 with ADAC option. Cabinet shall accommodate the Cosmic 10E extinguisher. Provide black die-cut letters, vertical.
 - 1. Cabinets are required at drywall partitions.
- B. Equal to J.L. Industries Cosmopolitan stainless steel cabinet with return trim, rolled edge semi-recessed model 2032F17 including ADAC option with flush pull handle. Cabinet shall accommodate the Saturn 15 extinguisher. Provide black die-cut letters, vertical.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install items included in this section in locations and at mounting heights indicated, or if not indicated, at heights to comply with ADA and applicable regulations of governing authorities.
- B. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- C. Securely fasten mounting brackets to structure, square and plumb, to comply with manufacturer's instructions.
- D. Fire extinguisher units shall be mounted in exposed locations indicated, or if not indicated, in a manner such that no point in the building will be further than 75 feet from an extinguisher. Provide one unit with cabinet in Admin. Corridor, 3 wall mounted in Shop Service Bay, one wall mounted in the Shop Storage Room, one wall mounted in the Mezzanine Storage, 4 wall mounted at Equipment Shed. Units shall be required within 20 feet of all Mechanical Rooms and exits. Type K unit shall be required in Crew Room - one unit with cabinet.

END OF SECTION

SECTION 10 51 13 METAL LOCKERS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Locker units with hinged doors, metal bases, tops, filler panels, closed bases, finished end panels, accessories, and hardware.

1.02 REFERENCES

- A. ANSI/ASTM A446 – Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- B. ANSI/ASTM A526 – Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.

1.03 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's installation instructions and product data on locker types, sizes and accessories.
- B. Shop Drawings: Include plans, elevations, sections, details, attachments to other work, and locker identification system and numbering sequence.
- C. Samples: Furnish 3 samples of materials, texture, color and finishes available for Project Engineer / MDOT Architect's selection.

1.04 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by Penco Products, Inc., 99 Brower Ave, Oaks, PA 19456. Tel. (800) 562-1000.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Art Metal Products, Deerfield, FL. Tel. (800) 252-5633.
 - 2. Lyon Metal Products, Aurora, IL. Tel. (800) 323-0082.
 - 3. Republic Storage System Co, Inc., Canton, OH. Tel. (800) 477-1255.
- C. Alternate Manufacturers: Products produced by other manufacturers that fully meet or exceed the specified requirements may be considered under provisions of Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

- A. Accessibility Requirements: For lockers indicated to be accessible, comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC A117.1.

2.03 SELECTED LOCKER UNITS

- A. Vanguard Model 6175V Single Tier Locker with standard louvered doors. Size: 72 inches overall height by 15 inches width by 21 inches depth. Provide closed bases and finished end panels.

2.04 MATERIALS

- A. All parts shall be made from prime grade mild cold rolled sheet steel free from surface imperfection, and capable of taking a high grade enamel finish.

2.05 ACCESSORIES

- A. Each locker shall have chrome plated zinc alloy die-cast case and door handle, door latch channel assembly, polished aluminum number plate (2-1/4 inches wide x 1 inch high with 3/8 inch high black etched numerals), hat shelf approximately 9 inches below top of locker and coat rod.
- B. Continuous slope top hood with slope top fillers fit on top of flat locker tops. All hoods are to be cut to length during installation, intermediate splices, ends, rear supports required to complete installation.
- C. Vertical fillers to fill gaps and provide continuous row appearance are required.

2.06 FINISHES

- A. Chemically pretreat metal with a six stage cleaning phosphatizing and metal preparation process. Finish coat shall be hot airless electrostatically applied baked on enamel.
- B. Paint locker bodies and doors in contrasting colors as selected by the Project Engineer / MDOT Architect from manufacturer's standard range of 17 colors. Refer to Section 09 05 15-Color Design.

2.07 FABRICATION

- A. Fabricate metal lockers square, rigid, without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install metal lockers at location show on Drawings in accordance with manufacturer's instructions for plumb, level, and flush installation.
- B. Secure lockers with anchor devices to suit substrate materials. Minimum pullout force: 100 lbs. Bolt adjoining lockers units together to provide rigid installation.
- C. Install locker bases, end panels, filler panels and accessories.

3.02 ADJUSTING

- A. Adjust locker doors and latches to operate without binding. Verify that latches are operating satisfactorily.

3.03 TOUCH-UP PAINT

- A. Touch-up all marred finished with factory supplied paint. Color shall match finished product.

3.04 CLEANING

- A. Clean locker interiors and locker exterior surfaces. Comply with manufacturer's written instructions.

END OF SECTION

SECTION 10 56 13 METAL STORAGE SHELVING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Metal storage shelving, and safety cabinets as indicated on the Drawings.

1.02 ACTION SUBMITTALS

- A. Product Data: Manufacturer's technical data and installation instructions for each material and component part, including data substantiating that materials comply with requirements.
- B. Color Charts: Furnish three (3 copies) for each exposed product.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Lyon Metal Products, Aurora, IL. Tel. (603) 892-8941.
 - 2. Eagle Manufacturing Company, Wellsburg, WV. Tel. (304) 737-3171.
 - 3. Penco Products Inc., Oaks, PA. Tel. (610) 666-0500.
 - 4. Stanley Storage Systems, Allentown, PA. Tel. (800) 523-9462.
- B. Substitutions that fully meet or exceed the specified requirements may be considered under provisions of Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.02 STORAGE SHELVING

- A. Metal Storage Shelving: Equal to Penco Products Open Clipper Heavy Duty Steel Shelving Unit Model No. 1H7026, 36 inches wide, 18 inches deep, and 87 inches high with 6 shelves.
- B. Finish: Manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
 - 1. Color will be selected from standard color chart by Project Engineer / MDOT Architect. Refer to Section 09 05 15 – Color Design for color selected.

2.03 SAFETY CABINET

- A. Safety Cabinet: Equal to Eagle Manufacturing 90 Gallon Tower™ Safety Cabinet model 1992LEGS. Cabinets shall meet OSHA, NFPA Code 30 and FM approval.
 - 1. Shelves: 2 shelves 30 inches deep.
 - 2. Legs: 4 inches high.
 - 3. Finish Color: Yellow.
 - 4. Dimensions: 43 inches wide by 34 inches deep by 69 inches high.
 - 5. Door Style: 2 manual close.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install units plumb and level, in locations and with mountings as indicated.
- B. Securely attach all components together in accordance with manufacturer's installation instructions.
 - 1. Securely fasten units to adjacent units and to wall as required so that units will not move or fall.

3.02 CLEANING AND PROTECTION

- A. At completion of installation, clean surfaces in accordance with manufacturer's instructions.
- B. Protect units from damage until acceptance by Owner.

END OF SECTION

SECTION 10 73 16 CANOPIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Extruded aluminum cantilever bracket support canopies as shown on the Drawings and specified herein.
- B. Related Sections:
 - 1. Section 07 92 00 – Joint Sealants.
 - 2. Section 09 05 15 – Color Design.
 - 3. Section 13 34 18 - Metal Building-Equipment Shed.
 - 4. Section 13 34 19 – Metal Building Systems-Shop.

1.02 ACTION SUBMITTALS

- A. Product Data: Furnish manufacturer's standard literature and specifications for canopies.
- B. Shop Drawings: Showing fabrication and installation of canopies including plans, elevations and details of components and attachments to other units of work. Indicate materials, profiles of each metalwork member and fitting, joinery, finishes, fasteners, anchorage and accessory items.
- C. Samples: Samples for initial selection purposes furnish three (3) required, in form of manufacturer's color charts consisting of actual units or sections of units showing full range of colors and other finish characteristics available for each item indicated below:
 - 1. Include 6-inch long samples of linear shapes.
 - 2. Include 6-inch square samples of plates.
 - 3. Include full-size samples of castings and forgings.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Store materials in clean, dry location, away from polyethylene sheeting in a manner that permits air circulation within covering. Handle metalwork on site to a minimum; exercise care to avoid damaging metal finishes.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Installed products shall comply with the 2012 International Building Code, include structural computations, material properties, and other information needed for structural analysis which has been prepared by, or under the supervision of, a qualified professional engineer registered in the State of Mississippi.

2.02 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by Mapes Canopies, LLC, 7748 North 56th Street Lincoln, NE 68514 Tel.(888) 273-1132
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Architectural Covers & Enclosures, LLC, Cordova, TN. Tel. (901) 355-2180.
 - 2. Dittmer Arch. Alum., Winter Springs, FL. Tel (800) 822-1755.
 - 3. Peachtree Protective Covers, Inc., Hiram, GA. Tel. (800) 341-3325.
- C. Substitutions that fully meet or exceed the specified requirements may be considered under provisions of Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.03 MATERIALS

- A. Canopy decking and fascia shall be extruded aluminum, alloy 6063-T6, in profile and thickness shown in current Mapes brochures. .
 - 1. Fasteners shall be stainless steel or cadmium plated as provided by the manufacturer.
- B. Roof deck shall be Flat Soffit Super Lumideck
 - 1. Deck sections shall be designed to the proper length to withstand the design load as determined by the local code.
- C. Cantilever supported brackets shall be standard finish.
- D. Water drainage shall be accomplished as a spill out on the front corners.

2.04 MANUFACTURED UNITS

- A. Equal to all weather aluminum cantilever bracket support canopy with 3 Inches extruded Flat Soffit Super Lumideck 0.078 decking members and style "J", 1/8 inch thick by 8 inches high heavy extruded aluminum, fascia.

2.05 FINISHES

- A. Standard Finish: Clear Anodized.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of metalwork. Do not delay job progress; allow for adjustments and fitting where taking of field measurements before fabrication might delay work.

B. Installation:

1. Installation shall comply with manufacturer's instructions.
2. Contractor: Coordinate with metal building manufacturer to provide secondary framing as required to support canopies.
3. Installer: Erection shall be performed by the manufacturer or manufacturer's approved installer.
4. Care: Extreme care shall be taken to prevent damage or scratching.
 - a. Workmanship must be of the very best with neat miters and fitted joints.

3.02 REPAIR AND PROTECTION

A. Protect existing materials from damage during the installation process.

1. When installation is complete, repair or replace damaged items.
2. Replacement items are to match the original.

3.03 CLEAN-UP

A. After work is complete, remove waste materials and dispose off the owner's property.

END OF SECTION

SECTION 11 31 15

RESIDENTIAL APPLIANCES AND EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Electric Range.
2. Refrigerator.
3. Microwave.
4. Overhead Exhaust Hood
5. Ice Machine.

1.02 ACTION SUBMITTALS

- A. Product Data: Manufacturer's brochures, technical data, installation, maintenance and operating instructions for each item and component part specified, including data substantiating that materials comply with requirements.

1.03 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. General Electric Company (GE), Louisville, KY. Tel. (800) 626-2000.
2. Ice-O-Matic, Denver, CO. Tel. (303) 371-3737.
3. Magic Chef Co., Cleveland, TN. Tel. (423) 472-3371.
4. Manitowoc Ice, Inc., Manitowoc, WI. Tel. (800) 545-5720.
5. Scotsman Ice System, Vernon Hills, IL. Tel. (847) 215-4500
6. Sears Brands LLC (Kenmore). Hoffman Estates, IL. Tel. (847) 286-2994.
7. Whirlpool Corporation, Benton, MI, Tel. (800) 253-1301.

- B. Substitutions shall fully comply with specified requirements and Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.02 APPLIANCES

- A. Electric Range: 30 inch drop-in electric range equal to GE® Model JD630SFSS, stainless steel, Cooktop Burner radiant smoothtop, cooktop surface gray patterned ceramic glass, self-clean oven, with Optional Backguard JXS32SS. Approx. Dimensions (HxWxD) 27 inches by 31-1/4 inches by 28-1/2 inches.
- B. Refrigerator: 23.2 cu. ft. capacity Side-By-Side with Dispenser equal to GE® Model GSE23GSKSS with factory-installed icemaker, Stainless steel. Approx. Dimensions (HxWxD) 69-1/2 inches by 32-3/4 inches by 33-1/4 inches.
- C. Microwave: 2.2 cu. ft. oven capacity, 1100 watts countertop type, equal to GE® Model PEB7226SFSS, stainless steel, with GE Deluxe built-in trim kit Model JX7230SFSS. Approx. Dimensions (HxWxD) 14 inches by 24-1/8 inches by 19-3/4 inches.
- D. Overhead Exhaust Hood: 30" Under the Cabinet Hood equal to GE® Model JVX5300SJSS, stainless steel, complete with 120V, 2.5 amp power/rating, convertible venting type with rear exhaust and optional damper accessory JXDA22, cooktop lighting, removable grease filter, single mesh and carbon, with optional remote control. Fan and light controls shall be ADA compliant. Approx. Dimensions (HxWxD) 5-1/2 inches by 29-7/8 inches by 20 inches.
- E. Ice Machine: Equal to Model ICE0500T with IFQ1 water filter system by Ice-O-Matic. Power supply shall be 115/60/1. Ice Storage Bin Model B55 – 530 lbs. Bin storage capacity. Furnish seven year parts and labor warranty on evaporator

PART 3 - EXECUTION

3.01 PREPARATION AND COORDINATION

- A. Verify and provide all plumbing and electrical hook-ups, drains and electrical outlets required for proper operation by the appliances specified prior to rough-in. Coordinate with Electrical and Plumbing subcontractors.

3.02 INSTALLATION, GENERAL

- A. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.
- B. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.
- C. Range Anti-Tip Device: Install at each range according to manufacturer's written instructions.
- D. Utilities: Comply with plumbing and electrical requirements.

3.03 INSTALLATION

- A. Install units plumb and level, in locations and with mountings as shown. Securely attach to supporting structure with concealed fasteners, and in accordance with manufacturer's installation instructions.
- B. Remove shipping packaging and install components in accordance with manufacturer's instructions.

3.04 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
 - 1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
 - 2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: After installation, start units to confirm proper operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.

- C. Prepare test and inspection reports.

3.05 CLEANING AND PROTECTION

- A. At completion of installation, clean surfaces in accordance with manufacturer's instructions. Protect units from damage until acceptance by Owner.

END OF SECTION

SECTION 12 21 14

HORIZONTAL LOUVER BLINDS - METAL

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Horizontal louver blinds with aluminum slats at office area windows.

1.02 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's specifications and installation instructions for each type of blind unit required.
 - 1. Include methods of installation for each type of opening and supporting structure.
 - 2. Transmit copy of instructions and recommendations to the installer.
- B. Samples: Submit (3 copies) samples of each exposed metal finish, cords, tapes and tassels required. Architect's review of samples will be for design, color, and finish only.
 - 1. Compliance with all other requirements is the exclusive responsibility of the Contractor.

1.03 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.04 QUALITY ASSURANCE

- A. Provide each blind as a complete unit produced by one manufacturer, including hardware, accessory items, mounting brackets, and fastenings.
 - 1. Unless otherwise acceptable to the Project Engineer / MDOT Architect, furnish all blind units by one manufacturer for the entire project.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by Hunter Douglas, Inc., 2 Park Way, Upper Saddle River, NJ 07458. Tel. (800) 727-8953.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Levolor Home Fashions Contract Division, High Point, NC. Tel. (336) 812-8181.
 - 2. Springs Window Fashions Division, Inc., Montgomery, PA. Tel. (570) 547-6671.
- C. Alternate Manufacturers: Products produced by other manufacturers that fully meet or exceed the specified requirements may be considered under provisions of Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.02 HORIZONTAL LOUVER BLINDS

- A. Manufacturer: Hunter Douglas Commercial Lightlines Aluminum Blinds 1" de-Light Model DL88.
1. Color to be selected by the Project Engineer / MDOT Architect from manufacturers' full line of standard colors.
 2. Refer to Section 09 05 15 – Color Design for color selected.

2.03 MATERIALS AND COMPONENTS

- A. Product Safety Standard: Fabricate horizontal louver blinds to comply with WCMA A 100.1 including requirements for corded, flexible, looped devices; lead content of components; and warning labels.
- B. Standard head rail, channel-shaped section fabricated from minimum 0.040 inch thick aluminum.
1. Increase metal thickness as recommended by the manufacturer for large blind units. Cross-brace for extra rigidity.
 2. Furnish complete with tilting mechanism, top and end brace, top cradle, cord lock, and accessory items required for the type of blind and installation indicated.
- C. Bottom Rail: Standard tubular steel bottom rail designed to withstand twisting or sagging.
1. Contour top surface to match slat curvature, with flat or slightly curved bottom.
 2. Close ends with manufacturer's standard metal or plastic end caps of the same color as rail.
 3. Finish rails the same color as slats, unless otherwise indicated.
- D. Slats: Standard, spring tempered aluminum slats not less than 0.008 inches thick.
1. Provide 1 inch narrow slats, with other components sized to suit.
- E. Braided Ladders: Standard polyester support cords with integrally braided ladder rungs.
1. Provide cord size and rung spacing as required for each type of blind shown.
- F. Tilter: Standard enclosed, lubricated, tilting mechanism which will tilt and securely hold the tilting rod, slats and bottom rail at any set angle.
1. Furnish wand (or rod) type tilter consisting of standard tilter mechanism adopted for rotating wand operation.
 2. Furnish manufacturer's standard plastic or aluminum rod of proper length to suit blind installation.
- G. Cords: Standard braided polyester cord, sized to suit blind type, equipped with soft-molded plastic rubber or composition tassels securely attached to each cord end.
1. Cord Locks: Provide manufacturer's standard cord locks for each type of blind.
 2. Cord Equalizers: Nylon, self-aligning type, designed to maintain horizontal blind position.

- H. Hardware: Furnish standard brackets, supports and internal reinforcement as required to suit blind type and size.
 - 1. Finish exposed hardware and accessories to match rail color.
- I. Finish: Prime aluminum slats with chromate conversion coating, followed by manufacturer's standard glass-smooth, baked-on synthetic resin enamel finish.
 - 1. Refer to Section 09 05 15 – Color Design for color selection.

2.04 FABRICATION AND OPERATION

- A. Prior to fabrication, verify actual opening dimensions by accurate site measurements.
 - 1. Adjust blind dimensions for proper fit in all openings.
 - 2. Fabricate components of blinds from non-corrosive, non-staining, non-fading materials which are completely compatible with each other, and which do not require lubrication during normal expected life.
- B. Fabricate blind units to completely fill the openings as indicated, from head to sill and jamb to jamb.
 - 1. Space supporting tapes or cords in accordance with manufacturer's standards, unless otherwise indicated.
 - 2. Space louver blades (slats) to provide overlap for light exclusion when in the fully closed position.
- C. Equip blind units, unless otherwise indicated, for the following operation:
 - 1. Full-tilting operation with slats rotating approximately 180 degrees.
 - a. Place tilt operation controls on left-hand side of blind units.
 - 2. Full-Height raising, to manufacturer's minimum stacking dimension with lifting cord locks for stopping blinds at any point of ascending or descending travel.
 - a. Place pull cords on right-hand side of blind units.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install horizontal louver blinds level and plumb, aligned and centered on openings, and aligned with adjacent units according to manufacturer's written instructions.
 - 1. Locate so exterior slat edges are not closer than 1 inch from interior faces of glass and not closer than 1/2 inch from interior faces of glazing frames through full operating ranges of blinds.
 - 2. Install mounting and intermediate brackets to prevent deflection of headrails.
 - 3. Install with clearances that prevent interference with adjacent blinds, adjacent construction, and operating hardware of glazed openings, other window treatments, and similar building components and furnishings.

3.03 ADJUSTING AND CLEANING

- A. Adjust horizontal louver blinds to operate free of binding or malfunction through full operating ranges.
- B. Clean horizontal louver blind surfaces after installation according to manufacturer's written instructions.

END OF SECTION

SECTION 12 48 43 FLOOR MATS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Metal-rails, tapered (3 sides) Aluminum-frame, surfaced mounted with square end vinyl adjacent to door opening, removable, exterior carpeted floor roll-up mats located at Exterior Building Entrances where indicated.
- B. Related Sections: Section 09 05 15 – Color Design (for color selection).

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM)
- B. The Aluminum Association
- C. The Carpet and Rug Institute (CRI)
- D. The National Floor Safety Institute (NFSI)

1.03 ACTION SUBMITTALS

- A. Product Data: For manufacturers' product and technical data indicating compliance with these specifications and recommended maintenance practices.
- B. Shop Drawings: Materials description, component dimensions and details. Show plan view that clearly indicates traffic direction and size of mat.
- C. Samples: Submit 3 samples of manufacturer's full range of available colors and finishes for materials exposed to view.

1.04 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.05 QUALITY ASSURANCE

- A. Single Source: All floor mats required by this Section shall be products of only one manufacturer.
- B. Manufacturer: Company regularly engaged in producing types of floor mats required by this Section and with minimum 10 years documented satisfactory experience
- C. Slip Resistance: Comply with ASTM D-2047-96, Coefficient of Friction, minimum 0.60 for accessible routes.
- D. Utilize superior structural aluminum alloy 6063-T6 for rail components.

PART 2 - PRODUCTS

2.01 ENTRANCE FLOOR MATS AND FRAMES, GENERAL

- A. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1.

2.02 ACCEPTABLE MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Arden Architectural Specialties, Inc., Saint Paul, MN. Tel. (651) 631-1607.
 2. C/S Group, Muncy, PA. Tel. (888) 834-4455. (Basis-of-Design)
 3. J. L. Industries, Inc. Bloomington, MN. Tel. (612) 835-6850.,
 4. Musson Rubber Company, Akron, OH. Tel. (330) 773-7651.

- B. Substitutions shall fully comply with specified requirements and Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.03 ROLL-UP RAIL MATS

- A. Roll-up, Aluminum-Rail Hinged Mats: Equal to C/S Group Surface-Mounted Floor Mat, Model M2 Pedimat AA.
 1. Carpet Tread Inserts: .EC-Exterior Carpet shall be solution dyed polypropylene fibers with 50/50 blend of 600/12-denier multi filament and 595/D1 monofilament, available in one of 4 standard colors as offered by manufacturer. Color selected by Project Engineer / MDOT Architect. The texturized fibers have ultraviolet blockers and color as an integral part of the filament. Each carpet fiber and monofilament shall be fusion-bonded to a rigid two-ply backing to prevent fraying and supplied in continuous splice-free lengths. (Waterproof fibers do not get soggy, rot, fade or stain.) Carpet weight shall be 32-oz./yd².
 2. Rails: Extruded aluminum 6063-T6 as selected by Project Engineer / MDOT Architect from full range of manufacturer's anodized colors.
 3. Surface-Mounted Frames: Tapered Aluminum (3 sides) with mitered corners. Color as selected by Project Engineer / MDOT Architect from full range of manufacturer's anodized colors. Square end vinyl one side at entrance (notch in field as required to fit).
 4. Mat Size: 6 feet wide by 5 feet deep (traffic direction)

2.04 FABRICATION

- A. Floor Mats: Shop fabricate units to greatest extent possible in sizes indicated. Unless otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install surface-type units to comply with manufacturer's written instructions at locations indicated; coordinate with entrance locations and traffic patterns.
 - 1. Install mats after Final Cleaning of Project Floor.

3.02 CLEANING AND PROTECTION

- A. At Project Completion, clean surfaces in accordance with manufacturer's instructions. Protect units from damage until acceptance by Owner.

END OF SECTION

SECTION 13 34 18

METAL BUILDING-EQUIPMENT SHED

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Building Type-Equipment Shed: The building is a single-story, single-span, rigid-frame-type pre-engineered metal building of the nominal length, width eave height, and roof pitch indicated on the Drawings.
2. Exterior Walls: Field assembled, un-insulated panels attached to framing.
3. Roof system: Standing-seam roof (with thermal insulation blankets at enclosed bay), concealed clips and factory-applied sealant.
4. Components and Accessories: Manufacturer's standard building components and accessories may be used, provided components, accessories, and complete structure conform to design indicated and specified requirements.

B. Related sections:

1. Plywood wainscot is specified in Section 06 10 00.
2. Personnel doors and frames and finish hardware are specified in Sections 08 11 13 and 08 71 00.
3. Overhead service doors, including operators, are specified in Section 08 33 23.
4. Colors are specified in Section 09 05 15 - Color Design.
5. Painting for ferrous metal exposed to view is specified in Section 09 90 00 - Painting and Coating.
6. Canopies are specified in Section 10 73 16.

1.02 STRUCTURAL FRAMING AND ROOF AND SIDING PANELS

- A. Design anchor bolts, structural members, and exterior covering for applicable loads and combinations of loads in accordance with the MBMA's "Design Practices Manual" and in accordance with structural loading indicated on Drawing Sheet S101.
- B. Structural Steel: Comply with AISC's "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings" for design requirements and allowable stresses.
- C. Light Gage Steel: Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members" and "Design of Light Gage Steel Diaphragms" for design requirements and allowable stresses.
- D. Welded Connections: Comply with AWS's "Standard Code for Arc and Gas Welding in Building Construction" for welding procedures.
- E. Metal Roofing: Comply with SMACNA Architectural Sheet Metal Manual.

1.03 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's sample warranty and product information for building components, accessories and color chart.
- B. Shop Drawings: Submit Shop Drawings for anchor bolts, structural framing system, roofing and siding panels, and components and accessories not fully detailed or dimensioned in manufacturer's product data.
 - 1. Structural Framing: Furnish erection drawings. Include fabrication and assembly details. Show anchor bolts' settings and sidewall, end-wall, and roof framing.
 - 2. Wall Panels: Provide panel layouts and details of edge conditions, joints, corners, custom profiles, supports, anchorage, trim, flashing, closures, and special details.
 - 3. Roof Panels and Sheet Metal Accessories: 1/4-inch-scale layouts and 1-1/2-inch-scale details of accessories; show profiles, methods of joining to system components and dissimilar building materials, flashing of each condition for roof penetrations, and anchorage.
- C. Certification prepared, signed, and sealed by a Professional Engineer registered in the State of Mississippi, verifying that anchor bolts, structural framing and covering panels meet structural loading requirements as indicated on Drawing Sheet S101 and codes (IBC 2012), including design calculations.
- D. Installer certificates signed by Contractor certifying that welders comply with requirements specified under "Quality Assurance" article.
- E. Submit sample copies of the Paint Finish Guarantee and Weather Tightness Warranty prior to fabrication and installation for MDOT Architect's approval. DO NOT start roofing installation without MDOT Architect's approval of Guarantee and Warranty. Refer to Division 00 Sections for State of Mississippi requirements.

1.04 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Executed copies of Paint Finish Guarantee and Weather Tightness Warranty.

1.05 EXTRA MATERIALS

- A. Furnish 5 percent excess over required amount of nuts, bolts, screws, washers, and other required fasteners for each building. Pack in cartons labeled to identify contents and store on site where directed.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide buildings manufactured by a firm with ten (10) years' experience in manufacturing buildings similar to those indicated.
 - 1. The manufacturer shall be IAS Accredited (Class MB).
 - 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

- B. Erector Qualifications: An experienced erector, with five (5) years minimum experience, who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3, "Structural Welding Code - Sheet Steel."
- D. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings," for design requirements and allowable stresses.
- E. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.
- F. Preinstallation Conference: Conduct conference at Project site.

1.07 WARRANTY

- A. Special Warranty on Metal 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. Finish Warranty Period: Twenty-five (25) years from date of Completion.
- B. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels:
 - 1. The entire installation (sub-framing, clips, panels, fasteners, rakes, eaves, ridge/valley flashing conditions, penetrations, roof to wall conditions as well as all materials specified as supplied by the manufacturer) shall be guaranteed weather tight for a minimum of twenty (20) YEARS.
 - 2. This warranty shall be identified as neither Non-Depreciating, Non-prorated nor have exclusions that identify, valleys, curbs, and flashings.
 - 3. Provide written warranty, signed by the manufacturer and his authorized installer / dealer, agreeing to replace / repair defective materials and workmanship with NO COST (NDL) to the Owner during the warranty period.
 - 4. Warranty period begins at the Date of Completion as determined by MDOT.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by Kirby Building Systems, Starkville, MS. Tel.: (662) 323-8021.
- B. Comparable product by one of the following manufacturers are acceptable:
 - 1. ACI Building Systems, Inc., Batesville, MS Tel. 662-563-4574.
 - 2. Ceco Building Division, Columbus, Tel. (662) 328-6722.
 - 3. MBCI, Hernando, MS. Tel. (800) 206-6224
 - 4. VP Buildings; a United Dominion Company. Memphis, TN. Tel. (901) 748-8000.

- C. Substitutions that fully meet or exceed the specified requirements may be considered under provisions of Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.02 METAL BUILDING SYSTEM PERFORMANCE

- A. Delegated Design: Design metal building system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Metal building systems shall be designed according to procedures in MBMA's "Metal Building Systems Manual."
 1. Design Loads: As indicated on Drawing Sheet S101.
 2. Design Loads: As required by MBMA's "Metal Building Systems Manual" and ASCE/SEI 7.
 3. Deflection Limits: Design metal building system assemblies to withstand design loads.
 4. Drift Limits: Engineer building structure to withstand design loads with drift limits.
 5. Metal panel assemblies shall withstand the effects of gravity loads and loads and stresses within limits and under conditions indicated according to ASTM E 1592.
- C. Seismic Performance: Metal building systems shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- D. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering 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.
- E. Air Infiltration for Metal Roof and Wall Panels: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of roof area when tested according to ASTM E 1680 at negative test-pressure difference of 1.57 lbf/sq. ft.
- F. Water Penetration for Metal Roof and Wall Panels: No water penetration when tested according to ASTM E 1646 at test-pressure difference of 2.86 lbf/sq. ft.
- G. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for Class 90.

2.03 STRUCTURAL-STEEL FRAMING

- A. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse frames; rafters, rake, and canopy support beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.
 1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly.
 2. Frame Configuration: Single gable.

3. Exterior Column Type: Tapered.
 4. Rafter Type: Tapered.
- B. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly.
 - C. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet, prepainted with coil coating.
 - D. Bolts: Provide plain-finish bolts for structural-framing components that are primed or finish painted. Provide zinc-plated or hot-dip galvanized bolts for structural-framing components that are galvanized.
 - E. Finish: Factory primed. Apply specified primer immediately after cleaning and pretreating.

2.04 METAL ROOF AND SIDING PANELS

- A. Standing-Seam Metal Roof Panels: Equal to Ceko Double-Lok Standing Seam Panel, 3 inches high with 24 inches wide coverage, 24 gage, Galvalume® with Galvalume® Plus finish.
- B. Wall Panel: Equal to Morin; a Kingspan Group Company, Exposed fastener panel, type C-37-7/8 metal wall panel, 7/8 inch deep with 37-5/16 inches wide coverage, 24-gage, Galvalume® with Galvalume® Plus finish.

2.05 THERMAL INSULATION (Metal Building)

- A. Glass-fiber blanket: Comply with ASTM C 167, 0.8 lb. per cubic foot density, 4 inches thickness, R 13, with UL flame spread classification of 25 or less, and 2-inch wide continuous vapor tight edge tabs.
- B. Vapor Barrier: Facing shall be equal to Lamtec Corporation model WMP-50. Facing shall be composed of 0.0015 inch white polypropylene film, 5 by 5 tri-directional scrim reinforcing layer, and 0.0005 inch metallized polyester film backing layer. The facing shall have a water vapor transmission rate of 0.02 US perm (ASTM E96, Procedure A), a beach puncture of 125 scale units and a mullen burst of 120 psi. Tensile strength shall be 65 lbs/inch width in the machine direction and 60 lbs/inch width in the cross-machine direction.
- C. Retainer Strips: 26 gage (0.0179-inch) formed galvanized steel retainer clips colored to match insulation facing.

2.06 ACCESSORIES

- A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.
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.
- B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
- C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.
- D. Flashing and Trim: Formed from 24 gage nominal-thickness, zinc-coated steel sheet (galvanized G-90) or aluminum-zinc alloy-coated steel sheet prepainted with coil coating (Kynar 500 with 70 percent PVDF); finished to match adjacent metal panels, unless indicated otherwise.
- E. Gutters: Formed from 24 gage nominal-thickness, zinc-coated (galvanized G-90) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating (Kynar 500 with 70 percent PVDF); finished to match roof fascia and rake trim. Box-shaped profile, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 20'-0" long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."
1. Gutter Supports: Fabricated from same material and finish as gutters
 - a. Provide supports spaced at maximum of 4'-0" on center.
 2. Strainers: Aluminum wire ball type at outlets.
- F. Downspouts: Formed from 24 gage nominal-thickness (smooth, not corrugated), zinc-coated (galvanized G90) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating (Kynar 500 with 70 percent PVDF). Fabricate in full-length long sections (rectangular-shaped), complete with formed elbows and offsets.
1. Mounting Straps: Fabricated from same material and finish as gutters.
 - a. Straps shall be spaced 5'-0" on center maximum (minimum of 3 required per downspout).
 - b. Strap edges shall be rolled or smooth.
- G. Fasteners: Exposed fasteners shall be color matched to the material being anchored.

2.07 FABRICATION

- A. General: Design components and field connections required for erection to permit easy assembly.
 - 1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
 - 2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.
- B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.
- C. Primary Framing: Shop fabricate framing components to size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
- D. Secondary Framing: Shop fabricate framing components to size and section by roll-forming or break-forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.
- E. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

PART 3 - EXECUTION

3.01 ERECTION OF STRUCTURAL FRAMING

- A. Erect metal building system according to manufacturer's written erection instructions and erection drawings.
- B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.
- C. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.
- D. Base and Bearing Plates: Clean concrete-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. 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.
 - 3. 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.

- E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
1. Level and plumb individual members of structure.
 2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.
- F. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.
1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for bolt type and joint type specified.
 - a. Joint Type: Snug tightened or pretensioned.
- G. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.
1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
 2. Locate and space wall girts to suit openings such as doors and windows.
 3. Locate canopy framing as indicated.
 4. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, and other penetrations of roof and walls.
- H. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.
1. Tighten rod and cable bracing to avoid sag.
 2. Locate interior end-bay bracing only where indicated.
- I. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.
- J. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.

3.02 METAL PANEL INSTALLATION, GENERAL

- A. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.
 - a. Field cutting of metal panels by torch is not permitted.
 2. Install metal panels perpendicular to structural supports unless otherwise indicated.
 3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.

4. Locate and space fastenings in uniform vertical and horizontal alignment.
 5. Locate metal panel splices over, but not attached to, structural supports with end laps in alignment.
 6. Lap metal flashing over metal panels to allow moisture to run over and off the material.
- B. Lap-Seam Metal Panels: Install screw fasteners using power tools with controlled torque adjusted to compress EPDM washers tightly without damage to washers, screw threads, or metal panels. Install screws in predrilled holes.
1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.
- D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants recommended by metal panel manufacturer.
1. Seal metal panel end laps with double beads of tape or sealant the full width of panel. Seal side joints where recommended by metal panel manufacturer.
 2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 "Joint Sealants."

3.03 METAL ROOF PANEL INSTALLATION

- A. General: Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.
1. Install ridge caps as metal roof panel work proceeds.
 2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.
- B. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint, at location and spacing and with fasteners recommended by manufacturer.
1. Install clips to supports with self-drilling or self-tapping fasteners.
 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
 3. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so that clip, metal roof panel, and factory-applied sealant are completely engaged.
 4. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction. Predrill panels for fasteners.
 5. Provide metal closures at rake edges and each side of ridge caps.

- C. Metal Fascia Panels: Align bottom of metal panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws. Flash and seal metal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

3.04 METAL WALL PANEL INSTALLATION

- A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing.
2. Shim or otherwise plumb substrates receiving metal wall panels.
3. When two rows of metal panels are required, lap panels 4 inches minimum.
4. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.
5. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Predrill panels.
6. Flash and seal metal wall panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
7. Install screw fasteners in predrilled holes.
8. Install flashing and trim as metal wall panel work proceeds.
9. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated; or, if not indicated, as necessary for waterproofing.
10. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws.
11. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

- B. Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer.

3.05 THERMAL INSULATION INSTALLATION

- A. General: Install insulation concurrently with metal panel installation, in thickness indicated to cover entire surface, according to manufacturer's written instructions.

1. Set vapor-retarder-faced units with vapor retarder toward warm side of construction unless otherwise indicated.
2. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to the surrounding construction to ensure airtight installation.
3. Install factory-laminated, vapor-retarder-faced blankets straight and true in one-piece lengths, with both sets of facing tabs sealed, to provide a complete vapor retarder.

- B. Blanket Roof Insulation (at Enclosed Bay): Comply with the following installation method:
1. Over-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Install layer of filler insulation over first layer to fill space formed by metal roof panel standoffs. Hold in place by panels fastened to standoffs.
 - a. Thermal Spacer Blocks: Where metal roof panels attach directly to purlins, install thermal spacer blocks.
 2. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.
- C. Blanket Wall Insulation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Hold in place by metal wall panels fastened to secondary framing.
1. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.

3.06 DOOR AND FRAME INSTALLATION

- A. General: Install doors and frames plumb, rigid, properly aligned, and securely fastened in place according to manufacturers' written instructions. Coordinate installation with wall flashings and other components. Seal perimeter of each door frame with elastomeric sealant used for metal wall panels.
- B. Personnel Doors and Frames: Install doors and frames according to SDI A250.8.
- C. Field Glazing: Comply with installation requirements in Section 08 80 00 "Glazing."
- D. Door Hardware: Mount units at heights indicated in DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
1. Install surface-mounted items after finishes have been completed on substrates involved.
 2. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 3. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
 4. Set thresholds for exterior doors in full bed of butyl-rubber sealant complying with requirements specified in Section 07 92 00 "Joint Sealants."

3.07 WINDOW INSTALLATION

- A. General: Install windows plumb, rigid, properly aligned, without warp or rack of frames or sash, and securely fasten in place according to manufacturer's written instructions. Coordinate installation with wall flashings and other components. Seal perimeter of each window frame with elastomeric sealant used for metal wall panels.
1. Separate dissimilar materials from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified in AAMA/WDMA/CSA 101/I.S.2/A440.

- B. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.
- C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- D. Mount screens directly to frames with tapped screw clips.
- E. Field Glazing: Comply with installation requirements in Section 08 80 00 "Glazing."

3.08 ACCESSORY INSTALLATION

- A. General: 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 roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 - 2. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 - 3. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.
- B. 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 excessive oil-canning, 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 to result in waterproof and weather-resistant performance.
 - 2. 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 or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- C. Gutters: Join sections with riveted-and-soldered or lapped-and-sealed joints. Attach gutters to eave with gutter hangers spaced as required for gutter size, but not more than 36 inches on center using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

- D. Downspouts: Join sections with 1-1/2-inch 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 on center in between.

- 1. Provide elbows at base of downspouts to direct water away from building.

3.09 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

- B. Tests and Inspections:

- 1. High-Strength, Field-Bolted Connections: Connections shall be tested and inspected during installation according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 - 2. Welded Connections: In addition to visual inspection, field-welded connections shall be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at inspector's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.

- C. Product will be considered defective if it does not pass tests and inspections.

- D. Prepare test and inspection reports.

3.10 CLEANING AND TOUCH-UP

- A. Clean component surfaces. Touch up abrasions, marks, skips, or other defects to shop-primed surfaces with same material as shop primer.

END OF SECTION

SECTION 13 34 19

METAL BUILDING SYSTEMS-SHOP

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Building Type: The building is a single-story, single-span, rigid-frame-type pre-engineered metal building of the nominal length, width eave height, and roof pitch indicated on the Drawings.
2. Exterior Walls: Field assembled, un-insulated panels attached to Insulated Barrier Wall System.
3. Roof system: Standing-seam insulated panel roof with concealed clips and factory-applied sealant.
4. Components and Accessories: Manufacturer's standard building components and accessories may be used, provided components, accessories, and complete structure conform to design indicated and specified requirements.

B. Related sections:

1. Plywood wainscot is specified in Section 06 10 00.
2. Cellulose thermal insulation is specified in Section 07 21 28.
3. Personnel doors and frames and finish hardware are specified in Sections 08 11 13 and 08 71 00.
4. Overhead service doors, including operators, are specified in Sections 08 33 23.
5. Colors are specified in Section 09 05 15 - Color Design.
6. Painting for ferrous metal exposed to view is specified in Section 09 90 00 - Painting and Coating.
7. Canopies are specified in Section 10 73 16.

1.02 STRUCTURAL FRAMING AND ROOF AND SIDING PANELS

- A. Design anchor bolts, structural members, and exterior covering for applicable loads and combinations of loads in accordance with the MBMA's "Design Practices Manual" and in accordance with structural loading indicated on Drawing Sheet S101.
- B. Structural Steel: Comply with AISC's "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings" for design requirements and allowable stresses.
- C. Light Gage Steel: Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members" and "Design of Light Gage Steel Diaphragms" for design requirements and allowable stresses.
- D. Welded Connections: Comply with AWS's "Standard Code for Arc and Gas Welding in Building Construction" for welding procedures.
- E. Metal Roofing: Comply with SMACNA Architectural Sheet Metal Manual.

1.03 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's sample warranty and product information for building components, accessories and color chart.
- B. Shop Drawings: Submit Shop Drawings for anchor bolts, structural framing system, roofing and siding panels, and components and accessories not fully detailed or dimensioned in manufacturer's product data.
 - 1. Structural Framing: Furnish erection drawings. Include fabrication and assembly details. Show anchor bolts' settings and sidewall, end-wall, and roof framing.
 - 2. Wall Panels: Provide panel layouts and details of edge conditions, joints, corners, custom profiles, supports, anchorage, trim, flashing, closures, and special details.
 - 3. Roof Panels and Sheet Metal Accessories: 1/4-inch-scale layouts and 1-1/2-inch-scale details of accessories; show profiles, methods of joining to system components and dissimilar building materials, flashing of each condition for roof penetrations, and anchorage.
- C. Certification prepared, signed, and sealed by a Professional Engineer registered in the State of Mississippi, verifying that anchor bolts, structural framing and covering panels meet structural loading requirements as indicated on Drawing Sheet S101 and codes (IBC 2012), including design calculations.
- D. Installer certificates signed by Contractor certifying that welders comply with requirements specified under "Quality Assurance" article.
- E. Submit sample copies of the Paint Finish Guarantee and Weather Tightness Warranty prior to fabrication and installation for MDOT Architect's approval. DO NOT start roofing installation without MDOT Architect's approval of Guarantee and Warranty. Refer to Division 00 Sections for State of Mississippi requirements.

1.04 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Executed copies of Paint Finish Guarantee and Weather Tightness Warranty.

1.05 EXTRA MATERIALS

- A. Furnish 5 percent excess over required amount of nuts, bolts, screws, washers, and other required fasteners for each building. Pack in cartons labeled to identify contents and store on site where directed.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide buildings manufactured by a firm with 10 years' experience in manufacturing buildings similar to those indicated.
 - 1. The manufacturer shall be IAS Accredited (Class MB).
 - 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

- B. Erector Qualifications: An experienced erector, with five (5) years minimum experience, who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3, "Structural Welding Code - Sheet Steel."
- D. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings," for design requirements and allowable stresses.
- E. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.
- F. Preinstallation Conference: Conduct conference at Project site.

1.07 WARRANTY

- A. Special Warranty on Metal 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. Finish Warranty Period: Twenty-five (25) years from date of Completion.
- B. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels:
 - 1. The entire installation (sub-framing, clips, panels, fasteners, rakes, eaves, ridge/valley flashing conditions, penetrations, roof to wall conditions as well as all materials specified as supplied by the manufacturer) shall be guaranteed weather tight for a minimum of twenty (20) YEARS.
 - 2. This warranty shall be identified as neither Non-Depreciating, Non-prorated nor have exclusions that identify, valleys, curbs, and flashings.
 - 3. Provide written warranty, signed by the manufacturer and his authorized installer / dealer, agreeing to replace / repair defective materials and workmanship with NO COST (NDL) to the Owner during the warranty period.
 - 4. Warranty period begins at the Date of Completion as determined by MDOT

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by Kirby Building Systems, Starkville, MS. Tel.: (662) 323-8021.
- B. Comparable product by one of the following manufacturers are acceptable:
 - 1. ACI Building Systems, Inc., Batesville, MS Tel. (662) 563-4574.
 - 2. Ceco Building Division, Columbus, MS. Tel. (662) 328-6722.
 - 3. MBCI, Hernando, MS. Tel. (800) 206-6224
 - 4. VP Buildings; a United Dominion Company. Memphis, TN. Tel. (901) 748-8000.

- C. Substitutions that fully meet or exceed the specified requirements may be considered under provisions of Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.02 METAL BUILDING SYSTEM PERFORMANCE

- A. Delegated Design: Design metal building system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Metal building systems shall be designed according to procedures in MBMA's "Metal Building Systems Manual."
 - 1. Design Loads: As indicated on Drawing Sheet S101.
 - 2. Design Loads: As required by MBMA's "Metal Building Systems Manual" and ASCE/SEI 7.
 - 3. Deflection Limits: Design metal building system assemblies to withstand design loads.
 - 4. Drift Limits: Engineer building structure to withstand design loads with drift limits.
 - 5. Metal panel assemblies shall withstand the effects of gravity loads and loads and stresses within limits and under conditions indicated according to ASTM E 1592.
- C. Seismic Performance: Metal building systems shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- D. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering 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.
- E. Air Infiltration for Metal Roof and Wall Panels:
 - 1. Insulated Roof Panels: Air leakage through assembly of not more than 0.003 cfm/sq. ft. of roof area when tested according to ASTM E 1680 at negative test-pressure difference of 1.57 lbf/sq. ft.
 - 2. Insulated Barrier Wall System: Air leakage through assembly of not more than 0.001 cfm/sq. ft. at 20 psf air pressure differential when tested according to ASTM E E283.
- F. Water Penetration for Metal Roof and Wall Panels: There shall be no uncontrolled water leakage at pressures of up to 20 psf when tested in accordance with ASTM E331 and ASTM E1646. Tested assembly must include endlap and sidelap conditions.
- G. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for Class 90.
- H. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

- I. Energy Performance: Provide roof panels that are listed on the DOE's ENERGY STAR Roof Products Qualified Product List for low-slope roof products. The panel shall provide a nominal R-value of 7.2 [hr·ft²· deg F/Btu] per inch thickness when tested in accordance with ASTM C 518 at 75 deg F mean temperature and 8.0 [hr·ft²· deg F/Btu] per inch thickness when tested in accordance with ASTM C 518 at 35 deg F mean temperature.

2.03 STRUCTURAL-STEEL FRAMING

- A. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse frames; rafters, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.
 1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly.
 2. Frame Configuration: Single slope
 3. Exterior Column Type: Uniform depth 10 inches (straight).
 4. Rafter Type: Tapered.
- B. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly.
- C. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet, prepainted with coil coating.
- D. Bolts: Provide plain-finish bolts for structural-framing components that are primed or finish painted. Provide zinc-plated or hot-dip galvanized bolts for structural-framing components that are galvanized.
- E. Finish: Factory primed. Apply specified primer immediately after cleaning and pretreating.

2.04 METAL ROOF AND SIDING PANELS

- A. Standing-Seam Insulated Metal Roof Panels: Equal to Kingspan Insulated Panels's KingZip formed as an insulated panel system with the following properties:
 1. Panel Thickness: Three (3) inches.
 2. R-Values 7.2 [hr·ft²·deg F/Btu] per inch thickness when tested in accordance with ASTM C 518 at 75 deg F mean temperature.
 3. Panel Width: Forty-two (42) inches.
 4. Panel Lengths: As indicated on Drawings.
 5. Insulation Material: Non-CFC foamed-in-place closed cell Polyurethane foam cured to achieve a minimum density of 2.4 pcf as determined by ASTM D 1622
 6. Joint Configuration: Standing seam with thermally broken Concealed Clips.
 7. Panel Exterior Face: 24 gage Galvalume®
 8. Panel Interior Face: 26 gage Galvalume®
 9. Exterior Profile: 2 inches high standing seam, non-embossed (smooth) between seams.

10. Coating: Galvalume® Plus.
11. Accessories: Fasteners, Sealants, Standard and Custom Trim as required for a complete system.

2.05 INSULATED BARRIER WALL SYSTEM

- A. Insulated metal panel barrier system equal to Kingspan Insulated Panels Karrier Series with the following properties:

1. Panel Thickness: 2-1/2 inches
2. R-Values: 7.2 [hr·ft²· deg F/Btu] per inch thickness when tested in accordance with ASTM C 518 at 75 deg F mean temperature.
3. Panel Width: Forty-two (42) inches.
4. Panel Lengths: As indicated on drawings
5. Insulation Material: Non-CFC foamed-in-place closed cell Polyurethane foam cured to achieve a minimum density of 2.4 pcf as determined by ASTM D 1622
6. Joint Configuration: Thermally broken tongue and groove joints oriented vertically
7. Panel Exterior Face: 24 gage, Shadowline profile, smooth finish
8. Panel Interior Face: 24 gage, Shadowline profile, smooth finish
9. Coating: Fluoropolymer two-coat design series color system with 70 percent PVDF
10. Color: Standard colors from manufacturer's full range of colors to be selected by Project Engineer / MDOT Architect
11. Integral Furring: equal to Karrier Rail. Provide 16 gage flat rail integrated into the panel joint where exterior cladding is vertical. Provide 16 gage "hat channel" profile with 2 inches bearing surface integrated into the panel joint where exterior cladding is horizontal.
12. Accessories: Fasteners, Sealants, Standard and Custom Trim as required for a complete system.

2.06 EXTERIOR CLADDING METAL PANELS

- A. Metal Panel Type 1 equal to Morin; a Kingspan Group Company, Exposed fastener panel:

1. Profile: C-37-7/8
2. Thickness: 7/8 inch
3. Panel width: 37- 5/16 inches
4. Gage: 24 Ga minimum
5. Panel Joint: Lap joint with staggered vertical locations
6. Finish: Galvalume® Plus.
7. Texture: Smooth
8. Structural Performance: Maximum deflection of L/180 based on structural loads indicated on Drawing S101
9. Water penetration: Wall panels when tested shall have no water leakage at 6 pounds per square foot when tested as per ASTM E331.
10. Air infiltration: maximum air leakage of 0.01 cfm per square feet of fixed wall area at a minimum static air-pressure differential of 1.57 foot pounds per square foot when tested as per ASTM E283
11. Accessories: Closed Cell Closure strips, Fasteners, Sealants, Standard and Custom Trim as required for a complete system. Note inside corner, outside corner and field trim locations on elevations.

- B. Metal Panel Type 2 equal to Morin; a Kingspan Group Company, Concealed fastener panel:
1. Profile: F-12
 2. Thickness: 1-1/2 inches
 3. Panel width: 12 inches
 4. Gage: 20 Ga minimum
 5. Panel Joint: Tongue and groove interlock joint
 6. Panel Length: Vertical panels to be continuous. Flush joints with backer plate where required at horizontal panels. Where joints are required, stagger location so no joints are in alignment across three panels.
 7. Finish: 1.0 mil. Fluoropolymer (PVDF) Two Coat system: 0.2 mil primer with 0.8 mil Kynar 500 (70 percent PVDF) MICA color coat.
 8. Color: Blue Gray
 9. Texture: Smooth
 10. Structural Performance: Maximum deflection of L/180 based on structural loads indicated on Drawing S101
 11. Water penetration: Wall panels when tested shall have no water leakage at 6 pounds per square foot when tested as per ASTM E331.
 12. Air infiltration: maximum air leakage of 0.01 cfm per square feet of fixed wall area at a minimum static air-pressure differential of 1.57 foot pounds per square foot when tested as per ASTM E283
 13. Accessories: Closed Cell Closure strips, Fasteners, Sealants, Standard and Custom Trim as required for a complete system. Note inside corner, outside corner and field trim locations on elevations.

2.07 ACCESSORIES

- A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.
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.
- B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
- C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.
- D. Flashing and Trim: Formed from 24 gage nominal-thickness, zinc-coated steel sheet (galvanized G-90) or aluminum-zinc alloy-coated steel sheet pre-painted with coil coating (Kynar 500 with 70 percent PVDF); finished to match adjacent metal panels, unless indicated otherwise.

- E. Gutters: Formed from 24 gage nominal-thickness, zinc-coated (galvanized G-90) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating (Kynar 500 with 70 percent PVDF); finished to match roof fascia and rake trim. Box-shaped profile, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 20'-0" long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."
1. Gutter Supports: Fabricated from same material and finish as gutters
 - a. Provide supports spaced at maximum of 4'-0" on center.
 2. Strainers: Aluminum wire ball type at outlets.
- F. Downspouts: Formed from 24 gage nominal-thickness (smooth, not corrugated), zinc-coated (galvanized G90) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating (Kynar 500 with 70 percent PVDF). Fabricate in full-length long sections (rectangular-shaped), complete with formed elbows and offsets.
1. Mounting Straps: Fabricated from same material and finish as gutters.
 - a. Straps shall be spaced 5'-0" on center maximum (minimum of 3 required per downspout).
 - b. Strap edges shall be rolled or smooth.
- G. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.
- H. Fasteners: Exposed fasteners shall be color matched to the material being anchored.

2.08 FABRICATION

- A. General: Design components and field connections required for erection to permit easy assembly.
1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
 2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.
- B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.
- C. Primary Framing: Shop fabricate framing components to size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
- D. Secondary Framing: Shop fabricate framing components to size and section by roll-forming or break-forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.
- E. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

PART 3 - EXECUTION

3.01 ERECTION OF STRUCTURAL FRAMING

- A. Erect metal building system according to manufacturer's written erection instructions and erection drawings.
- B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.
- C. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.
- D. Base and Bearing Plates: Clean concrete-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. 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.
 - 3. 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.
- E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.
- F. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.
 - 1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for bolt type and joint type specified.
 - a. Joint Type: Snug tightened or pre-tensioned.
- G. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.
 - 1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
 - 2. Locate and space wall girts to suit openings such as doors and windows.
 - 3. Locate canopy framing as indicated.
 - 4. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.

- H. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.
 - 1. Tighten rod and cable bracing to avoid sag.
 - 2. Locate interior end-bay bracing only where indicated.
 - 3. Diagonal rod or cable bracing at roof.
 - 4. Portal Frame bracing at walls.
- I. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.
- J. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.

3.02 METAL ROOF AND WALL PANEL INSTALLATION, GENERAL

- A. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.
 - a. Field cutting of metal panels by torch is not permitted.
 - 2. Refer to building elevations and details for exterior cladding wall panel orientation. Install Insulated barrier wall system panels vertically across metal building girts.
 - 3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
 - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 5. Locate metal panel splices over, but not attached to, structural supports with end laps in alignment.
 - 6. Lap metal flashing over metal panels to allow moisture to run over and off the material. Stagger lap joints so no two joints align across three panels.
- B. Lap-Seam Metal Panels: Install screw fasteners using power tools with controlled torque adjusted to compress EPDM washers tightly without damage to washers, screw threads, or metal panels. Install screws in predrilled holes.
 - 1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

- D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants recommended by metal panel manufacturer.
1. Seal metal panel end laps with double beads of tape or sealant the full width of panel. Seal side joints where recommended by metal panel manufacturer.
 2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 "Joint Sealants."

3.03 METAL ROOF PANEL INSTALLATION

- A. General: Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.
1. Install ridge caps as metal roof panel work proceeds.
 2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.
- B. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint, at location and spacing and with fasteners recommended by manufacturer.
1. Remove protective film before installation, or immediately thereafter to prevent sunlight damage.
 2. Install clips to supports with self-drilling or self-tapping fasteners.
 3. Install pressure plates at locations indicated in manufacturer's written installation instructions.
 4. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so that clip, metal roof panel, and factory-applied sealant are completely engaged.
 5. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction. Predrill panels for fasteners.
 6. Provide metal closures at rake edges and each side of ridge caps.
 7. As each panel is installed, crimp hidden clip assembly prior to placement of next panel.
- C. Metal Fascia Panels: Align bottom of metal panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws. Flash and seal metal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

3.04 INSULATED BARRIER WALL SYSTEM

- A. Installation shall be in accordance with manufacturer's installation guidelines and recommendations.
- B. Install panels plumb, level, and true-to-line to dimensions and layout indicated on approved shop drawings.
- C. Cut panels prior to installing, where indicated on shop drawings, using a power circular saw with fine tooth carbide tip blade per manufacturer's instructions. Personnel should wear respiratory and eye protection devices.

- D. Butyl Weather Barrier Sealant: Apply non-skinning butyl sealant as shown on shop drawings and manufacturer's installation instructions as necessary to establish the vapor barrier for the panels. Use non-skinning butyl tube sealant only for tight metal-to-metal contact. Do not use non-skinning butyl tube sealant to bridge gaps.
- E. Place panel fasteners through pre-punched holes in attachment clips, concealed within the joint of the panel. Secure units to the structural supports. Space clips as recommended by manufacturer or otherwise indicated on the approved shop drawings.

3.05 EXTERIOR CLADDING METAL WALL PANEL INSTALLATION

- A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing.
 - 2. Shim or otherwise plumb substrates receiving metal wall panels.
 - 3. When two rows of metal panels are required, lap panels complying with manufacturer's recommendation with **4 inches** minimum.
 - 4. Where joints occur at the ends of panels, stagger joints so that no two joints align within three panels.
 - 5. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Predrill panels.
 - 6. Flash and seal metal wall panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
 - 7. Install screw fasteners in predrilled holes.
 - 8. Install flashing and trim as metal wall panel work proceeds.
 - 9. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated; or, if not indicated, as necessary for waterproofing.
 - 10. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws.
 - 11. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.
- B. Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer.

3.06 DOOR AND FRAME INSTALLATION

- A. General: Install doors and frames plumb, rigid, properly aligned, and securely fastened in place according to manufacturers' written instructions. Coordinate installation with wall flashings and other components. Seal perimeter of each door frame with elastomeric sealant used for metal wall panels.
- B. Personnel Doors and Frames: Install doors and frames according to SDI A250.8.
- C. Field Glazing: Comply with installation requirements in Section 08 80 00 "Glazing."

D. Door Hardware: Mount units at heights indicated in DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

1. Install surface-mounted items after finishes have been completed on substrates involved.
2. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
3. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
4. Set thresholds for exterior doors in full bed of butyl-rubber sealant complying with requirements specified in Section 07 92 00 "Joint Sealants."

3.07 WINDOW INSTALLATION

A. General: Install windows plumb, rigid, properly aligned, without warp or rack of frames or sash, and securely fasten in place according to manufacturer's written instructions. Coordinate installation with wall flashings and other components. Seal perimeter of each window frame with elastomeric sealant used for metal wall panels.

1. Separate dissimilar materials from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified in AAMA/WDMA/CSA 101/I.S.2/A440.

B. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.

C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

D. Field Glazing: Comply with installation requirements in Section 08 80 00 "Glazing."

3.08 General: 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 roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
2. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
3. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.

- B. 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 excessive oil-canning, 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 to result in waterproof and weather-resistant performance.
 2. 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 or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- C. Gutters: Join sections with riveted-and-soldered or lapped-and-sealed joints. Attach gutters to eave with gutter hangers spaced as required for gutter size, but not more than 36 inches on center using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
- D. Downspouts: Join sections with 1-1/2-inch 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 on center in between.
1. Provide elbows at base of downspouts to direct water away from building.
- E. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.

3.09 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Tests and Inspections:
 - 1. High-Strength, Field-Bolted Connections: Connections shall be tested and inspected during installation according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 - 2. Welded Connections: In addition to visual inspection, field-welded connections shall be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at inspector's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
- C. Product will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION

SECTION 13 34 26

SELF-SUPPORTING METAL ROOF STRUCTURE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Building Type: The building is a single-story, single-span, barrel-vaulted, self-supporting roof structure with one end enclosed.
2. Exterior Walls: Concrete wall supporting the ends of the metal roof and one end wall.
3. Roof system: Self-supporting arch roof.
4. Components and Accessories: Manufacturer's standard building components and accessories may be used, provided components, accessories, and complete structure conform to design indicated and specified requirements.

1.02 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's product information for building components, and accessories.

B. Shop Drawings:

1. Provide shop drawings for anchor bolts, roofing panels system, and components and accessories not fully detailed or dimensioned in manufacturer's product data.
2. Sheet Metal Accessories and Roofing: 1/4-inch-scale layouts and 1-1/2-inch-scale details of accessories; show profiles, methods of joining to system components and dissimilar building materials, flashing of each condition for roof penetrations, and anchorage.

C. Certification: Prepared, signed, and sealed by a Professional Engineer registered in the State of Mississippi, verifying that anchor bolts, structural framing and covering panels meet loading requirements and codes (IBC 2012), including design calculations.

D. Installer Certificates: signed by the manufacturer that the installer is qualified for erection of the manufacturer's product.

1.03 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Executed copies Weather Tightness Warranty.

1.04 EXTRA MATERIALS

A. Furnish 5 percent excess over required amount of nuts, bolts, screws, washers, and other required fasteners for each building. Pack in cartons labeled to identify contents and store on site where directed.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide buildings manufactured by a firm with ten (10) years experience in manufacturing buildings similar to the one indicated.
 - 1. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Erector Qualifications: An experienced erector, with five (5) years minimum experience, who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and is certified by the building manufacturer as qualified for erection of the manufacturer's products.

1.06 WARRANTY

- A. Installer:
 - 1. Provide a 5 year watertight warranty on the roof system.
 - 2. Warranty period begins at the Date of Completion as determined by MDOT.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Comparable product by one of the following manufacturers are acceptable:
 - 1. EXPRESS STEEL, Lebanon, Tennessee, phone (615) 443-0070.
 - 2. MIRACLE STEEL, Watertown, South Dakota, phone (605) 886-7885.
 - 3. SteelMaster Buildings, LLC, Virginia Beach, VA. Phone (800) 341-7007.
 - 4. WEDCOR, Denver, Colorado, phone (303) 759-3200.
- B. Substitutions shall fully comply with specified requirements in Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.02 MATERIALS

- A. Self-supporting arch roof sections and end wall section shall be 18 gauge G-90 galvanized steel meeting ASTM 526-85 and shall meet or exceed minimum live loads, dead loads, and wind loads as noted on Drawings.
 - 1. Self-supporting arch roof sections shall be erected as per manufacturer's recommendations. Completed arch roof shall have a clear height of at least 23 feet above top of footings at center span.
- B. Bolts: Provide zinc- or cadmium-plated bolts when structural framing components are in direct contact with roofing and siding panels. In other cases provide shop-painted bolts.

- C. Shop Painting: Clean surfaces of loose mill scale, rust, dirt, oil, grease, and other matter. Follow procedures of SSPC-SP3 for power-tool cleaning, SSPC-SP7 for brush-off blast cleaning, and SSPC-SP1 for solvent cleaning.
1. Prime framing members with rust-inhibitive primer.
 2. Prime galvanized members after phosphoric acid pretreatment with zinc dust-zinc oxide primer.

PART 3 - EXECUTION

3.01 ERECTION

- A. Erect according to manufacturer's recommendations and approved shop drawings true to line, plumb, level, rigid, and secure. Level bases to true even plane with full bearing to supporting structures, set with double-nutted anchor bolts.
- B. Wall Sheets: Apply elastomeric sealant continuously between metal base channel and concrete and where necessary for waterproofing. Apply sealant and back up in accordance with the sealant manufacturer's recommendations. Shim up from concrete shelf 1/2 inch for wall panels, and remove shims after panels have been securely fastened.
1. Align bottom of wall panels and fasten according to manufacturers recommendations.
 2. Install screw fasteners with power tools having controlled torque to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
- C. Roofing: Comply with manufacturers standard instructions and conform to standards set forth in the Architectural Sheet Metal Manual published by SMACNA, in order to achieve a watertight installation.
1. Install panels in such a manner that horizontal lines are true and level and vertical lines are plumb.
 2. Attach panels using manufacturer's standard fasteners, spaced in accordance with approved shop drawings.
 3. Install sealants for preformed roofing panels as specified on shop drawings.
 4. Do not traffic on completed roof. If required, provide cushioned walk boards.
 5. Protect installed roof panels and trim from damage caused by adjacent construction until completion of installation.
 6. Remove and replace any panels or components which are damaged beyond successful repair.

3.02 CLEANING AND TOUCH-UP

- A. Clean component surfaces. Touch up abrasions, marks, skips, or other defects to shop-primed surfaces with same material as shop primer.

END OF SECTION

SECTION 14 45 00 VEHICLE LIFTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes: Vehicle lifts including safety equipment, controls and accessories.
- B. Related Sections:
 - 1. Division 22 Section – “General-Service Compressed-Air Piping”.
 - 2. Division 26 Section – “General Electrical Requirements”.

1.02 REFERENCES

- A. ALI: Automotive Lift Institute.
- B. ANSI/ALI/ALCTV: Safety Requirements for the Construction, Testing, and Validation of Automotive Lifts.

1.03 ACTION 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 manual.
 - 4. Operations and maintenance manual.
 - 5. Safety manual.
- B. Shop Drawings: Template drawings and load reactions for lift application.

1.04 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.
- B. Executed warranty.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Factory trained authorized company.
 - 2. Company insured for completed operations of installing lifts.

- B. In addition to the other requirements outlined herein, lifts, shall comply with applicable requirements of ANSI standards. "Safety Requirements for the Construction, Care and Use of Automotive Lifts" as published by the American National Standards Institute. The lift company Quality Management System shall be ISO9001 certified.

1.07 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 absolute limits.

1.08 WARRANTY

- A. Contractor/manufacturer/installer has responsibility for a one year Corrective Period for work of this Section from date of Completion against deficiencies as stated in the manufacturer's standard warranty.
- B. Contractor/manufacturer/installer shall promptly and without inconvenience and cost to Owner correct said deficiencies: Failure due to defective materials and workmanship.
- C. Contractor/manufacturer/installer shall be notified immediately of defective products, and be given a reasonable opportunity to inspect the goods prior to return. Manufacturer will not assume responsibility, or compensation, for unauthorized repairs or labor.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by Rotary Lift., a Dover Company, 2700 Lanier Drive, Madison, IN 47250. Tel. (800) 640-5438.
- B. Equivalent products by the following manufacturers are acceptable:
 1. Challenger Lifts, Inc., Louisville, KY. Tel: (800) 648-5438.
 2. Mohawk Lifts, Amsterdam, NY. Tel: (800) 833-2006.
- C. Alternate Manufacturers: Products produced by other manufacturers that fully meet or exceed the specified requirements may be considered under provisions of Section 01 25 00-Product Procedures and Section 01 60 00-Product Requirements.

2.02 VEHICLE SERVICE LIFT

- A. 18,000 Lb Four Post Surface Mounted Drive on General Service Lift Sm18l / Sm18el Series
 1. Capacity: 18,000 lbs. (9,000 lbs. per runway).
 2. SM18L / SM18EL Series Single Point Manual Controls - Pneumatic (100 psi - 120 psi Air Required) Lock Release Electric Power Unit, UL201 Compliant, Over Hydraulic Cylinder Drive: (Models Bio-Fluid Compatible)
 - a. 2hp 208-230V 1 phase Motor 60Hz.
 3. Minimum Bay Requirements: SM18L; floor space 16 feet by 27 feet.

4. Rise: 68 inches (from floor to top of runway).
5. Overall Length: SM18L; 275-3/16 inches (ramp to runway).
6. Overall Width: 137-3/4 inches.
7. Inside of Columns: 121-1/2 inches.
8. Between Front and Rear Columns: SM18L; 212 inches.
9. Height of Columns: 77-3/4 inches.
10. Width of Runways: 22 inches.
11. Height of Runways: 7-1/2 inches.
12. Width Between Runways: 43 to 46 inches.
13. Maximum Wheelbase: SM18L; 194 inches.
14. Finishes: Blue, Standard RAL5005.
15. Accessories:
 - a. RJ9000: Rolling Jacks 9000 lbs. capacity (ea.) (100 psi minimum - 120 psi maximum required). Two required.
 - b. Internal Air Line Kit (100 psi minimum - 120 psi maximum required).
16. Lift shall be 3rd party certified by ETL testing laboratory and labeled with the ETL/Automotive Lift Institute (ALI) label that affirms the lifts meet conformance to all applicable provisions of American National Standard ANSI/ALI ALCTV-2006 and in compliance with IBC 2012

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until supporting structures have been properly prepared. If supporting structure preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION

- A. Install in accordance with manufacturer instructions.

3.03 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lifts. Include a review of emergency systems and emergency procedures to be followed at time of operational failure and other building emergencies.
- B. Check operation of lifts with Owner's personnel present and before date of Substantial Completion. Determine that operating systems and devices are functioning properly.
- C. Check operation of lifts with Owner's personnel present not more than one month before end of warranty period. Determine that operating systems and devices are functioning properly.

3.04 PROTECTION

- A. Protect installed products until completion of project. Touch-up, repair or replace damaged products before Date of Completion.

END OF SECTION

SECTION 21 10 00

WATER-BASED FIRE SUPPRESSION SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Wet-Pipe Sprinkler System(s): Automatic sprinklers attached to piping containing water that is connected to water supply. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included if indicated.

1.02 REFERENCES

A. American Society of Civil Engineers (ASCE)

1. ASCE 7-10, 2010 Edition – Minimum Design Loads for Buildings and Other Structures

B. American National Standards Institute (ANSI)

1. ANSI/AWWA C-151/A21.51, 2009 Edition – Ductile-Iron Pipe, Centrifugally Cast
2. ANSI/AWWA C-110/A21.10, 2008 Edition – Ductile-Iron and Gray-Iron Fittings
3. ANSI/AWWA C-111/A21.51, 2006 Edition – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

C. FM Global (FM):

1. Approval Guide, Latest Edition
2. FM Data Sheet 2-8N, installation of Sprinkler Systems
3. FM Data Sheet 2-2, installation of Suppression Mode Sprinklers
4. FM Data Sheet 8-9, General Storage

D. National Fire Protection Association (NFPA):

1. NFPA 13, 2010 Edition – Installation of Sprinkler Systems
2. NFPA 20, Installation of Fire Pumps
3. NFPA 24, 2010 Edition – Standard for the Installation of Private Fire Service and their Appurtenances.
4. NFPA 25, 2010 Edition – Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
5. NFPA 291, 2010 Edition – Recommended Practice for Fire Flow Testing and Marking of Hydrants.

E. Underwriters Laboratory (UL):

1. UL Fire Protection Directory – Latest Edition.

1.03 SUBMITTALS

- A. Submittal Procedures: Provide Submittals complete, accurate, and in full compliance with Division 00 Section "General Requirements" and the following for proper and timely approval:
1. Furnish Drawings accurately to scale on sheets of uniform size and include all necessary data, as required by NFPA 13, 2010 section 22.1.3.
 2. Provide Submittals to authorities having jurisdiction (AHJ) per their requirements. Obtain reviews and approvals as required by AHJ's.
 3. Submit electronic sets of detailed shop drawings, seismic calculations, hydraulic calculations, and material data sheets for the complete sprinkler system to Owner's Insurance Underwriter's Engineers, for approval. Provide all data required by NFPA and the authorities having jurisdiction in electronic form via Owner's PMW.
 4. Respond in writing to submittal package review comments within 15 days of receipt. Include with re-submittals an item by item response letter from the Contractor. Additionally changes or additions to the drawings must be clearly indicated by a change/revision delta and clouded.
 5. Approval of submittals by authorities having jurisdiction MDOT is required prior to beginning fabrication and installation.
 6. Final system acceptance shall be based upon final inspection and tests and approval by MDOT and the authority having jurisdiction.
 7. Maintain two copies of approved documents on job site.
- B. Product Data: For sprinkler components proposed (including but not limited to: new equipment, piping, hangers, valves, etc).
- C. Shop Drawings: Include the following::
1. Narrative description of the building and fire sprinkler systems, located on the first sheet of the shop drawings, including at a minimum the following information:
 - a. Total square footage of the building.
 - b. Confirmation that the building is provided with sprinkler coverage throughout facility.
 - c. Number of sprinkler system risers.
 - d. Size (pipe diameter) of each sprinkler riser.
 - e. Size (pipe diameter) of underground lead in supplying the risers.
 - f. Types of system(s); grid, tree, loop, etc.
 - g. Size and type of mains and branch lines for each system (i.e. "System one consists of 6 inch sch. 10 supply main, 4 inch sch. 10 front main, 3 inch sch. 10 rear main and 2 inch sch. 40 branch lines").
 - h. Scope of work for the Project.
 2. Site plan with flow and test hydrants identified. Include the underground piping from the base of riser to the water test hydrants and the elevation of the test hydrant relative to the base of riser.
 3. Hydraulic placard data for new and existing systems.
 4. Ceiling elevations and elevation/section views of areas being affected by the Project. Provide additional elevation views where needed to show bulkheads and soffits for clarity.
 5. Full height cross section of areas of the building affected by the Project.
 6. Identification of room uses. Include any exterior pre-fabricated mechanical equipment room and trash compactors and drive through pharmacy canopies.

7. Installation detail of the dry sprinklers and temperature of enclosures to verify the selected length of the dry heads.
 8. Make, model and location of any backflow prevention device that services the fire sprinkler systems. Devices must comply with the requirements of this specification.
 9. Identification of the ASCE 7-10 seismic design category (obtained from Drawings).
 10. When required by ASCE 7-10, seismic bracing is to be in accordance with the specifications, ASCE 7-10 and NFPA 13
 - a. Provide seismic separation assemblies per NFPA 13, and indicate the method used and its location.
 - b. Flex fittings are to be located where required.
 - c. Show the location of seismic components including (but not limited to) bracing (longitudinal, lateral, 4-way, etc.), and restraints.
 - d. Show branch line vertical piping restraints.
 - e. Indicate by note gap requirements between the fire service lead-in stub up and concrete floor and where piping penetrates walls.
 - f. Include seismic calculations.
 11. Location of valves, including pressure relief valves.
 12. Note indicating control valves shall be accessible and provided with a tamper switch, and locked open.
 13. Interior and exterior wall penetration detail, including methods of sealing penetration (for fire proofing, weather proofing, etc.) and escutcheons.
- D. Engineering Calculations: Provide hydraulic calculations for all new and existing systems.
- E. Project Closeout Submittals:
1. Maintenance Data: Provide one set of components of system, servicing requirements, inspection data, and owner's manuals.
 2. Training Requirements: Provide operational training to Owner. Include system control operation, fire pump (if provided) manual and abort functions, trouble procedures, auxiliary functions and emergency procedures. Provide one set of operations and maintenance literature and instructions provided by the manufacturer for installed equipment and devices along with a current copy of NFPA 25.
 3. Contractors Material Test Certificates: Provide one set of completed Underground, Aboveground, and Fire Pump (if provided) Contractor's Material Test Certificates.
 4. As-Built Shop Drawings: Provide two sets of as-built shop drawings indicating installed location of components, including (but not limited to) all piping, sprinklers, hangers, valving, inspector's test stations, auxiliary drains, and hose stations. As-built drawings must include all corrections noted during the site observation process and reflect all revisions, addenda, and construction change directives implemented on the project. Approved as-built drawings are required for Project Closeout.
 5. Contractor's Record Letter of Conformance for Fire Suppression: Upon satisfactory Fire Protection Site Observation (FP Observation), complete the Record Letter of Conformance (form provided at the end of this specification), obtaining all signatures (subcontractor and Contractor) and submit original for payment per Contract Documents.

6. At Project completion, present as-built drawings to the MDOT enclosed in a plastic pipe tube (fixed cap at one end and a threaded-cap on the other end) for storage permanently mounted in the riser room wall.
7. Installers Warranty Information and Certificate.

1.04 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed.
 1. Provide a sprinkler cabinet(s) containing spare sprinklers, wrenches and equipment in accordance with NFPA. The stock of spare sprinklers shall include all types and ratings installed but not less than a total of six. Permanently mount cabinet in the sprinkler riser room.

1.05 DESIGN REQUIREMENTS - GENERAL

- A. Provide a complete fire sprinkler system throughout the building covering all areas as required herein and by local jurisdictions, including but not limited to internal and external canopies, attic spaces, loading docks, and complete in all respects and in complete operating condition including underground connection to water main with all necessary controlling equipment.
- B. The sprinkler system shall be hydraulically designed and installed in accordance with the referenced editions of NFPA standards and all State and Local Ordinances. The minimum requirements for all components, materials, and methods shall be in accordance with NFPA and as listed by Underwriter's Laboratories, Inc. or FM Global, and the requirements of the Owner, prior to the start of work.
- C. Include design, hydraulic calculations, piping layout drawings, details and other drawings necessary for fabrication and installation of the fire protection system, and required changes or revisions thereof necessary to obtain approval from Telgian and authority having jurisdiction.
- D. No extra charges will be allowed for changes to drawings, piping, etc., required to conform to NFPA Standards, the Owner requirements, authority having jurisdiction requirements, MDOT requirements or with conflict with other trades.
- E. Any deviations from the specifications need to be approved by the Owner (MDOT Manager of Architecture and Engineering Services). Documentation of the allowable deviations will need to be provided in the submittals.
- F. Hydraulic Calculations
 1. Perform hydraulic calculations beyond the sprinkler system riser to the water flow test calculated effective point.
 2. Provide water flow test information with static, residual and pitot pressure readings in accordance with NFPA 291 recommended procedures. Provide the location and elevation of the static and residual hydrants. Provide the time and date of test. Compile flow test results on the preliminary and final drawings submitted to the Owner's underwriter for approval. If required, calculate available water flow and residual pressure at base of riser.
 3. Conduct flow tests within six months prior to design submittal.

4. The minimum available flow and pressure at the base of the riser for sprinkler system design shall be provided so that a fire pump is not required. The typical volume and pressure required at the base of the fire sprinkler riser to accomplish this is 600 gpm at 35-psi residual pressure. Values shall be verified based on fire sprinkler water demand for the specific site.
 5. Include check valve, and back flow prevention devices (as required by state or local authorities) in calculation for wet sprinkler system. An allowance for friction head losses through these devices must be made in hydraulic calculations.
 6. Select the hydraulically most demanding area in accordance with NFPA. For grid style pipe arrangement, provide information to demonstrate the peaking of the demand when compared to areas immediately adjacent along the same branch lines.
 7. The Contractor shall verify with the water purveyor that the water system can provide required fire sprinkler water demand (600 gpm minimum) with a minimum duration of 60 minutes.
 8. Provide a 10 percent safety factor including hose streams in all calculations. Safety factor is calculated based on reducing the supply curve (static and residual pressures) by 10 percent of the static pressure.
- G. Provide either a backflow prevention valve in water supply line or check valve in system riser. Backflow prevention design must meet the requirements of the local authorities having jurisdiction, water purveyor, and Contract Documents. Verify backflow prevention valve meets current jurisdictional requirements. If no backflow prevention valve is required, verify each riser is provided with a swing check valve. Retrofit if necessary.
- H. Provide each sprinkler system with fire department connection with check valve and ball drip. The fire department connection shall be easily accessible and clearly labeled.
- I. The fire department connection location shall be approved by the authority having jurisdiction. Hose threads shall be the same as those of the public fire department.

1.06 DESIGN REQUIREMENTS, BUILDING

- A. Complete design including seismic bracing shall comply with NFPA 13 and State and Local building codes.
- B. Conceal all piping including piping for auxiliary drains above ceilings and in walls of finished areas or where subject to view by customers. Piping may be exposed in dock and backroom storage areas.
- C. Base sprinkler system design density on Ordinary Hazard Group II occupancy for all areas unless noted otherwise in contract documents. Minimum design density for standard sprinklers shall be 0.20 gpm per square foot over the hydraulically most remote 1500 square feet. If extended coverage heads are used, the minimum design density shall be 0.20 gpm per square foot over the hydraulically most remote 2000 square feet. In either case, provide a hose stream allowance of 250 gpm.
- D. Where storage and display exceeds a height of 12 feet, the sprinkler system design density shall be at least 0.39 gpm per square foot over the most remote 2000 square feet based on storage of Class IV commodity to a height up to 15 feet.

- E. Provide each riser with two pressure indicating gauges, one on the system side and one on the supply side of each system. Provide each riser with an inside control valve and main drain. Route piping from the main drain connection to direct water discharge outside the building.
- F. If overhead doors open in horizontal position, provide sprinklers below door when the door is in a horizontal position. Install a k-factor sprinkler head consistent with roof level sprinklers. Sprinklers shall be listed and approved for this hazard area.
- G. Where quick response sprinklers are installed, all sprinklers within a compartment (Refer to NFPA 13 definition of a compartment) shall be quick-response.
- H. Anti-freeze systems shall not be used.
- I. Interior areas subject to freezing temperatures shall be protected by dry pendent sprinklers.
 - 1. Interior dry pipe systems shall not be used except in areas that are subject to freezing, such as concealed combustible spaces.
 - 2. Dry pipe systems: dry-pendent sprinklers supplied from wet pipe systems. Where structure of building does not provide sufficient installation space for dry pendent sprinklers, use dry-sidewall sprinklers. Any other alternate must be approved by Owner (MDOT Architecture and Engineering Services). All requests shall be in writing with sufficient documentation provided. Requests should be through the RFI process. Written documentation of the allowable deviations will need to be provided in submittal information.
- J. Where exterior areas are subject to freezing temperatures and require fire sprinkler protection, they shall be protected by dry sidewall sprinklers.
 - 1. Where exterior areas are protected by fire sprinklers, utilize dry sidewall brass heads below exterior ceilings, with matching polished brass escutcheon plates. Dry sidewall brass sprinklers shall be used to protect as much of the exterior canopy as possible, complying with all requirements of NFPA 13. Supply dry sidewall sprinklers from wet type system with piping concealed in stud walls inside the building. If necessary, "build out" stud walls to conceal dry sidewall sprinklers on the interior of the store.
 - 2. Provide protection under exterior canopies including, but not limited to sidewalk, entrance and pick-up canopies.
 - 3. Base under canopy sprinkler system design density on Ordinary Hazard Group II occupancy.
 - 4. The valves, compressor, trim and the water supply pipe shall be protected against freezing. Valve rooms shall be lighted and heated. Heat tape shall not be used. Coordinate location, support, access, and electrical needs with all parties. If any equipment (i.e. valves, air compressors, etc.) are located above a ceiling, or elevated more than 7 feet above finish floor, an access ladder shall be provided and permanently mounted to facilitate inspection and testing. location of all equipment and access (i.e. ladders, platforms, etc.) shall be approved by Owner.

1.07 QUALITY ASSURANCE

- A. Fire suppression system installer and their employees shall maintain all jurisdictional (local, state and federal) licenses, registrations, and certifications for the design, fabrication and installation of systems required by Contract Documents.
- B. Qualifications (Installer): Company specializing in performing work of this Section with minimum three years experience and a minimum of a NICET Certified Engineering Technician (Level III) Fire Sprinkler Designer on staff responsible for project.
- C. Qualifications (Welder): Company specializing in performing work of this Section with minimum three years experience and a minimum of a NICET Certified Engineering Technician (Level III) Fire Sprinkler Designer on staff responsible for project.
- D. Provide certificate of compliance from Authorities Having Jurisdiction indicating approval of field acceptance tests.

1.08 WARRANTY

- A. Workmanship and Material Warranty: Standard form in which fire suppression system installer agrees to repair or replace components of fire suppression system that fail for any cause, other than misuse within specified warranty period.
 - 1. Installation shall be warranted to be in accordance with plans and specifications, as approved by the Owner's insurance broker.
 - 2. Warranty Period: One year from date outlined in General Conditions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials, devices and equipment shall be new and listed by U.L. and/or approved by Factory Mutual (FM) for use in fire protection systems.

2.02 FIRE PROTECTION – BELOW GROUND – PIPE, FITTINGS AND CONNECTIONS

- A. Exterior:
 - 1. Piping and fitting to be bituminous seal coated.
 - 2. Ductile Iron Pipe: ANSI A21.51; AWWA C151; Class 50.
 - 3. Ductile Iron Mechanical Joint Fittings: ANSI 21.10; AWWA C110.
 - 4. Mechanical Joints: Rubber gaskets ANSI 21.51; AWWA C111.

2.03 FIRE PROTECTION – ABOVE GROUND – PIPE, FITTINGS AND CONNECTIONS

- A. Wet Pipe Systems:
 - 1. Pipe: Schedule 40 black steel pipe or Schedule 10 (lightwall or thinwall FM approved)

2. Fittings and Connections: Butt welded or seamless, jointed with cast iron or malleable iron, flanged fittings, standard weight malleable iron fittings or by means of grooved type couplings and matching fittings, and have a minimum working pressure of 175 psig.
 - a. Threaded fittings allowable on use with Schedule 40 steel pipe only, do not use on Schedule 10 or lightwall pipe.
3. Mechanical tees and strap-o-let type bolt-on and gasketed fitted fittings, shall not be used.

2.04 SPRINKLERS

- A. Provide white polyester coated sprinklers with matching semi-recessed escutcheons. Sprinklers shall be rated at 155 degrees F quick response throughout finished areas receiving a lay-in or gypsum ceiling except when near heat source, then high temperature rated sprinklers shall be provided.
- B. Sprinkler escutcheon plates and recessed fittings shall be part of a listed and approved sprinkler assembly.
- C. Flexible Piping Systems: At Contractor's option, UL listed and FM approved flexible piping connections to sprinklers may be used for both suspended and sheetrock ceilings when suitable for their intended use.
 1. Description: Fully welded (non-mechanical fittings), braided, leak-tested sprinkler drop with a minimum internal corrugated hose diameter of 1 inch, lengths of 2 ft to 6 ft., and a one-piece multi-port ceiling bracket with removable attachment hub and self-securing integrated snap-on clip-ends for attachment to ceiling grid without the need for a screw fastener.
 2. Acceptable Products:
 - a. FlexHead Industries, Inc; FlexHead Series 2000; (800) 829-6975.
 - b. Victaulic Company; VicFlex; (610) 559-3300.

2.05 VALVES

- A. Control Valves: Provide each individual water control valve for each system, either an interior valve or an exterior wall mounted valve. OS&Y and Butterfly valves are acceptable.
 1. Gate Valves shall be O.S.&Y type, iron body, bronze mounted, double disc parallel seat type, UL/FM psi non-shock.
- B. Check Valves: Provide flanged, iron body, bronze mounted swing check valve, with rubber faced disc, and 175 psi cold water working pressure.
 1. Acceptable Manufacturers:
 - a. Mueller Industries, Inc.
 - b. Clow Valve Company
 - c. Keystone Valves, a division of Tyco/Flow Control
- C. Angle and Globe Valves: Shall be bronze, threaded valves.

- D. Backflow Prevention Device: Provide backflow prevention device for the water supply system as required by the authority having jurisdiction and water providers.
 - 1. Acceptable Manufacturers:
 - a. FEBCO, a subsidiary of Watts Water Technologies, Inc.
 - b. Ames fire and Waterworks, a subsidiary of Watts Water Technologies, Inc.
 - c. Watts Water Technologies, Inc.
 - E. Valves on Underground Piping: Conform to the American Water Works Association requirements for working pressure of 175 psi. Provide underground valves with approved locking type post indicators
- 2.06 VALVE PITS
- A. When required, construct valve pits in accordance with the local governing authority.
 - B. Provide galvanized, traffic type, gratings and covers when located in drive aisles or parking lots.
- 2.07 MAINTENANCE AIR COMPRESSORS
- A. Subject to compliance with requirements, provide tank mounted UL Listed or FM approved air compressor system.
 - 1. Provide electric, air-cooled, oil-less compressor.
 - 2. Power: 240 volt, three phase, 60 Hz. Hard wire per NEC and manufacturer's requirements.
- 2.08 ALARM SYSTEM
- A. Acceptable Manufacturers:
 - 1. Potter Electric Signal Company.
 - 2. Grinnell Fire Protection; a Tyco International Company.
 - B. Sprinkler alarm system shall consist of the following Basis-of-Design equipment:
 - 1. Water Flow Indicator: Grinnell Fire Protection, a Tyco International Company; Autocall Type WF-5.
 - 2. Vane Type Waterflow Alarm Switch with Retard: Potter Electric Signal Company; VSR series
 - 3. High/Low Pressure Switches (if required): Potter Electric Signal Company; PS40A
 - 4. Outside Screw and Yoke Valve Supervisory Switch: Potter Electric Signal Company; OSYSU series
 - 5. Control Valve Supervisory Switch: Potter Electric Signal Company; PCVS series
 - C. Water Flow Indicator (Type WF-5 or VSR): Contains two sets of normally open 120 volt contacts. One set of contacts shall activate fire alarm system. The other set of contacts shall activate a 120 volt outside horn-strobe or bell.
 - D. Provide sprinkler alarm system wiring in accordance with the electrical section of the specifications.

- E. Owner's Central Station Alarm Monitoring: Include the following conditions to be alarmed and monitored:
 - 1. Supervisory air pressure on dry-pipe systems.
 - 2. Sprinkler system water flow.
 - 3. Valve Supervision for all system valves including but not limited to supply mains, pits, branch and OS & Y valves.

- F. Alarm System Equipment: Refer to Division 28 Section "Fire Alarm/Security System" for the following:
 - 1. Alarm Horn

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Fabricate and install system and equipment in accordance with NFPA 13 and manufacturer's instructions.
- B. Welding of pipe shall be in accordance with NFPA 13.

3.02 INSTALLATION, GENERAL

- A. Coordinate system components (i.e. piping, sprinklers, valves, supports, bracing, electrical equipment, etc.) with all trades. No additional payments will be made to correct conflicts arising from lack of coordination.
- B. Piping extending from the main building into the prefabricated mechanical center shall be installed and insulated as indicated in Division 23 Section "HVAC Insulation" and in accordance with Drawings.
- C. Owner does not require fire sprinkler protection inside or below Pharmacy drive through canopies if they are constructed of non-combustible or limited combustible construction, as defined by NFPA 13. Verify construction and materials, as well as jurisdictional requirements. Meet the more restrictive of the jurisdictional and Owner requirements.
- D. Install electrical equipment in conformance with the latest edition of the National Electric Code (NEC) and authorities having jurisdiction.

3.03 PIPING AND SYSTEM COMPONENT INSTALLATION, SUPPORT AND BRACING

- A. Locate the main riser for system as shown on Drawings.
- B. Pipe hanger and support devices shall be per NFPA 13. Support vertical piping at each floor.
- C. Support piping larger than 4 inch by a minimum of two joists, with pipe support centered between joists and hanger spacing of 6-foot maximum. Attach hangers to the top cord of joists/joist girder within 6-inches of panel points.

- D. Install horizontal runs for mains and branches as close as practical to the bottom cord of roof joists taking into account allowance for system piping drainage.
- E. Do not install pipes less than 7.5-feet above finished floor.
- F. Where pipe is exposed to elements and subject to moisture exposure, paint exposed pipe threads to prevent corrosion. Remove cutting oil and grease prior to painting. Reference Division 09 Section "Painting" for guidance on paint type and application.
- G. Design and install seismic-restraint for sprinkler systems per the adopted Building Code and NFPA 13.
- H. Arrange system for flushing as required by NFPA standards.
- I. Install auxiliary drains where needed to remove water from low points in piping. Show water discharge point on the Submittal Drawings and take into account pedestrian sidewalks and walk ways, traffic flow. Confirm proper water discharge and drainage so that no immediate or long term damage will be caused when operating these drains.
- J. Keep interior of pipe free from dirt and other foreign material as installation progresses. Plug open ends when work is stopped. Join lengths with couplings in accordance with pipe manufacturer's instructions.
- K. Provide underground piping, system components and pipe restraints per NFPA 24. Support barrel of pipe for entire length on compacted bedding. Excavate for couplings, fittings and valves.
- L. For underground pipe, provide concrete thrust blocks as required by NFPA 24. Place concrete between undisturbed soil and fittings. Do not cover coupling flanges or other joints with concrete. Do not use retaining type clamps.

3.04 SPRINKLERS

- A. Sprinklers installed above high temperature areas (such as ovens) shall be rated at 286-degrees F.
- B. Provide sprinklers in electrical rooms.
- C. Install recessed white heads and concealed piping in all areas with ceiling or soffit height less than 7 feet. See Drawings for additional information.
- D. Protect sprinklers installed below 10 feet above finished floor, such as in backrooms and under stairwells, or in any other accessible area where they might receive mechanical damage with head guards.
- E. Install sprinklers to protect concealed areas containing combustible construction, such as covered canopy, store facade and roof deck supports.
- F. Install sprinklers above and below stairways if open or accessible. The area beneath a stairway is considered accessible unless it is completely enclosed noncombustible construction with drywall and no access doors are provided.

- G. Align and install sprinklers in straight lines in both directions in coordination with lighting and air conditioning ceiling fixtures, and with the grid ceiling where they occur, subject to approval of the Owner before installation.

3.05 VALVES, DRAINS AND INSPECTORS TEST CONNECTIONS

- A. Valve Supervision: Install tamper switches and lock valves open with unbreakable locks and sturdy chain.
- B. Coordinate with the electrical trades for installation of electric sprinkler operated flow and alarm bell, if required. Verify during bid period which system is required so there will be no additional cost to the Owner.
- C. Provide necessary system interfaces and related fire sprinkler system devices for alarm notification for sprinkler system water flow or discharge to the Fire Alarm Panel.
- D. Provide shut off valve with tamper switch and water flow indicator for branch line to refrigeration equipment center when refrigeration equipment center is indicated on plans.
- E. Provide a sprinkler system test connection for each system. Locate the test connection at the sprinkler riser, easily accessible and arranged to discharge outside the building.
- F. Arrange main drains, inspectors test connections, backflow preventer assemblies, to discharge outside the building. Show the water discharge point on the submittal drawings and take into account pedestrian sidewalks and walk ways, traffic flow. Confirm proper water discharge and drainage so that no immediate or long term damage will be caused when operating these drains.

3.06 SIGNS AND IDENTIFICATION

- A. Provide red enamel steel identification signs on all alarm, control, dry, drain and test valves, etc., to identify their purpose and function as required by NFPA or authority having jurisdiction. Provide lettering size and style selected by the Owner and from NFPA suggested styles.
- B. Post a suitable sign adjacent to supply valves giving adequate instructions in the operation.

3.07 CUTTING AND PATCHING:

- A. Except as otherwise specified, perform cutting and patching provide openings with lintel and supports as required for installation of fire suppression system including paving, floors and walls. Patch with the same materials, workmanship and finish matching surrounding construction. Trim rings are to be provided (coordinate finish of trim rings with Owner).
- B. Seal pipe penetrations through fire rated walls or floors to achieve fire resistance equivalent to fire separation required. Provide wall plates at all penetrations.

3.08 TESTING AND COMMISSIONING:

- A. General: Schedule, coordinate, and conduct tests required by Authorities Having Jurisdiction . Modify, replace or retest as required by Authorities Having Jurisdiction.
- B. Flush, test, and inspect sprinkler system according to NFPA 13 "Systems Acceptance" Chapter. Test the systems, including the underground water mains, and the aboveground piping and components to assure that equipment and components function as intended. Pressure test the systems in accordance with NFPA 13 and NFPA 24. Have available copies of as-built drawings. Perform tests in such a manner as to prevent water damage or staining of building and property.
 - 1. Under Ground Fire Protection Piping:
 - a. Test per NFPA 24.
 - b. Flush underground mains and lead-in connections thoroughly to remove foreign material before connection is made to above ground system piping. Minimum flow rate shall not be less than the maximum water flow demand rate of the system and not less than necessary to provide a velocity of 10 feet per second. Continue flushing for sufficient time to ensure thorough cleaning. Provide proper disposal of water from flushing operation.
 - c. Perform Hydrostatic tests per NFPA 24.
 - 2. Above Ground Fire Protection Piping:
 - a. Test per NFPA 13.
 - b. Inspect welds and verify welder's qualifications per Authorities Having Jurisdiction.
 - c. Perform Hydrostatic tests per NFPA 13.
 - d. Furnish water for tests. Repair any leaks or cracks developing as a result of these tests to the satisfaction of the Telgian.
 - e. In addition to the hydrostatic test, conduct an air pressure leakage test at 40 psi for 24 hours on dry-pipe systems.
 - 3. Backflow Prevention Assembly Forward Flow Test.
 - 4. Operation of control valves and flowing of inspector's test connections to verify operation of alarm devices including alarm switches. After operation of control valves has been completed, assure that control valves are in the open position.
 - 5. Main Drain flow test.

3.09 COMPLETION:

- A. Remove all debris, materials and equipment from the premises upon completion of work. Piping to be cleaned, ready for painting. Repair any areas damaged or stained as a result of the testing.
- B. System shall be fully operational two weeks prior to fixture date as established by the Owner's Representative.

CONTRACTOR'S RECORD LETTER OF CONFORMANCE

SECTION 21 10 00 FIRE SUPPRESSION

Project Location: _____

Date: _____

(City & State)

Project Number: _____

Statement of Conformance:

This Record Letter of Conformance is provided as a Record Document. The undersigned hereby declares that the fire sprinkler system(s) including fire pump(s) and water storage tanks (hereafter referred to as the "Systems") is installed and is in general conformance with the Contract Documents and shop drawings and submitted product data. The "Systems" have been provided and placed in operational condition in accordance with the manufacturer's published instructions and the Contract Documents. To be accepted, all signatures must be original ink signatures (copies are not allowed).

FIRE SPRINKLER SUBCONTRACTOR:

(Subcontractor Signature)

_____ Phone Number: () _____
(Subcontractor name and address)

CONTRACTOR:

(Contractor Signature)

_____ Phone Number: () _____
(Contractor name and address)

END OF SECTION

SECTION 22 05 00

COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.01 DEFINITIONS

- A. Owner supplied / Contractor installed.
 - 1. The Owner will provide equipment and the Contractor will install.
 - 2. Comply with requirements in Division 00 Section "General Conditions".
- B. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- C. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- D. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- E. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- F. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.02 SUBMITTALS

- A. See Section 01 33 00 Submittal Procedures, for submittal requirements.
- B. Identification by specification section and article under which equipment or material is described, and by name, number and intended use as designated by contract drawings and specifications.
- C. When more than one item of equipment is covered by a single drawing or catalog cut, each project equipment item must be separately identified thereon with clear delineation as to which model or catalog number or performance data applies to each project item.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Include manufacturer's model number or catalog number, size and other data as requested.
- F. Project Record Documents: Organize each maintenance manual with index and thumb-tab marker for each section of information; bind in 2-inch 3-ring, vinyl-covered binder, with pockets for folded sheets, properly labeled on spine and face of binder.

1.03 QUALITY ASSURANCE

- A. Compatibility: Provide products which are compatible with other products of the plumbing work, and with other work requiring interface with the plumbing work. Provide products with the proper or correct power characteristics, fuel-burning characteristics and similar adaptations for this project. Coordinate the selections from among options (if any) for compatibility of products.

1.04 PERFORMANCE REQUIREMENTS

- A. General Outline: The facilities and systems of the plumbing work include all Division 22 Sections.
- B. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.05 COORDINATION OF PLUMBING WORK

- A. Arrange plumbing work in a neat, well organized manner, with piping and similar services running parallel with primary lines of the building.
- B. Give right-of-way to piping which may slope for drainage.
- C. Locate operating and control equipment properly to provide easy access, and arrange entire plumbing work with adequate access for operation and maintenance.
- D. Strictly adhere to invert elevations for all underground piping. Pitch piping evenly between pipe junctions and where indicated on the drawings. Piping, not installed at invert elevations indicated on the drawings, shall be removed and re-laid at Contractor's expense.

PART 2 - PRODUCTS

2.01 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Protect products against dirt, water, chemical and mechanical damage. Do not install damaged products.
- B. Deliver products to site in factory fabricated containers, with the manufacturer's label clearly visible. Handle carefully to avoid damage to components, enclosure and finish, and in strict accordance with manufacturer's instructions.
- C. Store products in clean dry place in original containers, protected from weather and construction debris and traffic.

2.02 JOINING MATERIALS

- A. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

- B. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- C. Brazing Filler Metals: AWS A5.8, BCuP Series or BAg1, unless otherwise indicated.

2.03 DILELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg. F.
- D. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg. F.
- E. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg. F.

2.04 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
- D. PVC Pipe: ASTM D 1785, Schedule 40.

2.05 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: Polished chrome-plated with set screw.
- D. Split-Casting not acceptable.

2.06 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 2. Design Mix: 5000-psi, 28-day compressive strength.
 3. Packaging: Premixed and factory packaged

PART 3 - EXECUTION**3.01 PIPING SYSTEMS – COMMON REQUIREMENTS**

- A. Install piping according to the following requirements and Division 22 Sections specifying piping systems:
1. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
 2. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
 3. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
 4. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
 5. Install piping to permit valve servicing.
 6. Install piping at indicated slopes.
 7. Install piping free of sags and bends.
 8. Install fittings for changes in direction and branch connections.
 9. Install piping to allow application of insulation.
 10. Select system components with pressure rating equal to or greater than system operating pressure.
 11. Install escutcheons for penetrations of walls, ceilings, and floors.
 12. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor.
 13. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and plumbing sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing plumbing sleeve seals.
 - a. Install steel pipe for sleeves smaller than 6 inches in diameter.
 - b. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
 - c. Plumbing Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble plumbing sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
 14. Verify final equipment locations for roughing-in.
 15. Pipe Sleeves:
 - a. For pipes passing through brick or concrete walls, or concrete floor slabs, provide steel pipe sleeves, two (2) sizes larger than the pipe for which they are intended. Coordinate setting of sleeves as construction progresses. Set sleeves flush with finished line of walls and floors.
 - b. Caulk sleeves through foundation walls to make them watertight.

3.02 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 - D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
 - E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
 - F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
 - G. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - 1. Comply with ASTM F 402, for safe-handling practice of cleaners, primers, and solvent cements.
 - 2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
 - 3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
 - 4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
 - 5. PVC Non-pressure Piping: Join according to ASTM D 2855.
 - 6. PVC to ABS Non-pressure Transition Fittings: Join according to ASTM D 3138 Appendix.
 - H. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
 - 1. Plain-End Pipe and Fittings: Use butt fusion.
 - 2. Plain-End Pipe and Socket Fittings: Use socket fusion.
- 3.03 PIPING CONNECTIONS
- A. Make connections according to the following, unless otherwise indicated:
 - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - 2. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.
- 3.04 EQUIPMENT INSTALLATIONS – COMMON REQUIREMENTS
- A. Install equipment to allow maximum possible headroom unless specific mounting heights are indicated.

- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations. Install equipment to allow right of way for piping installed at required slope.

3.05 INSTALLATION OF EQUIPMENT AND PIPING

- A. Follow manufacturer's suggested procedure for protection of equipment which will be idle for an extended period of time prior to start-up
- B. Mount and align equipment in strict accordance with manufacturer's recommendations and in accordance with procedures described below. In case of conflict, these procedures govern. Where structural or miscellaneous steel is not drilled, drill in field as directed.
- C. Lubricate all equipment as required and in accordance with manufacturer's recommendations. Furnish required lubricants.
- D. Neatly cut all openings in roof decks as needed for equipment and pipe penetrations. Coordinate with General for sealing all plumbing roof penetrations.
- E. Suspended Equipment and Piping:
 - 1. Provide structural steel and steel rod hangers.
 - 2. For suspension from structural steel, use beam or channel clamps with locking clips.
 - 3. Do not support plumbing components from ceiling grids.
 - 4. Do not suspend hangers from roof decks.
 - 5. Suspend from roof trusses and joists/joist girders only at panel points, at top cord only, unless otherwise indicated.
 - 6. Provide additional supports wherever needed, and structural steel members attached to building frame to provide additional points of support where required. Do no drilling of building structural and miscellaneous steel, except as directed or indicated.
- F. Equipment Set on Structural Steel: For bolting equipment directly to structural steel, provide machine bolts, lock washers and nuts.
- G. Floor-Mounted Equipment: Set and level equipment on foundation. Grout in place, using non-ferrous grout. Provide wedges and shims for leveling.
- H. Accurately align equipment prior to operation.

3.06 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
 - 1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
 - 2. 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 the base.
 - 3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
 - 4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 5. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
 - 7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement steel and/or mesh.

3.07 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor plumbing materials and equipment.
- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

3.08 TRIMMING

- A. Inspect pipe supports, in occupied and equipment spaces for sharp angles which protrude into path of occupants and may cause injury. Trim such protrusions or cover with suitable spongy material to prevent such injuries.

3.09 SYSTEM TESTS

- A. Perform all system tests in the presence of Owner Representative. Notify Owner Representative of all system's tests at least 48 hours in advance.

END OF SECTION

SECTION 22 05 53

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.

1.02 SUBMITTALS

- A. See Section 01 33 00 Submittal Procedures, for submittal requirements.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Product Data: Provide manufacturers catalog literature for each product required.
- D. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

PART 2 - PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Instrumentation: Tags.
- B. Major Control Components: Nameplates.
- C. Piping: Tags.
- D. Small-sized Equipment: Tags.
- E. Tanks: Nameplates.
- F. Valves: Tags and ceiling tacks where located above lay-in ceiling.

2.02 NAMEPLATES

- A. Manufacturers:
 - 1. Kolbi Pipe Marker Co.; www.kolbipipemarkers.com.
 - 2. Seton Identification Products; www.seton.com.
 - 3. Brady Corporation; www.bradycorp.com.
 - 4. Substitutions: See Section 01 25 00 Substitution Procedures.
- B. Description: Laminated three-layer plastic with engraved letters.

2.03 TAGS

- A. Manufacturers:
 - 1. Kolbi Pipe Marker Co.; www.kolbipipemarkers.com.
 - 2. Seton Identification Products; www.seton.com.
 - 3. Brady Corporation; www.bradycorp.com.
 - 4. Substitutions: See Section 01 25 00 Substitution Procedures.

- B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
 - C. Chart: Typewritten letter size list in anodized aluminum frame.
- 2.04 PIPE MARKERS
- A. Manufacturers:
 - 1. Brady Corporation; www.bradycorp.com.
 - 2. Kolbi Pipe Marker Co.; www.kolbipipemarkers.com.
 - 3. Seton Identification Products; www.seton.com.
 - 4. Substitutions: See Section 01 25 00 Substitution Procedures.
 - B. Comply with ASME A13.1.
 - C. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 09 90 00 Painting and Coating.

3.02 INSTALLATION

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- F. Identify pumps, heat transfer equipment, and tanks with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.

END OF SECTION

SECTION 22 07 00 PLUMBING INSULATION

PART 1 - GENERAL

1.01 SUBMITTALS

- A. See Section 01 33 00 Submittal Procedures, for submittal requirements.
- B. Product Data: For each type of product indicated.

1.02 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

PART 2 - PRODUCTS

2.01 FLEXIBLE ELASTOMERIC INSULATION

- A. Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
 - 1. Products:
 - a. Armacell, LLC; Armaflex II
 - b. Rubatex; R-180-FS
 - c. K-Flex: Insul-Tube
- B. Insulation shall be listed and labeled per ASTM E 84 for plenum installations employing slip on techniques.
- C. Do not use split-tube longitudinal seams.

2.02 INSULATION FOR HANDICAP ACCESSIBLE FIXTURES

- A. Handicap Lavatory P-Trap and Angle Stop Assembly Insulation:
 - 1. Basis of Design: Brocar; Trap Wrap Protective Kit 500R.
 - 2. Truebro Lav Guards
 - 3. McGure Pro Wrap PW2000
 - 4. Provide smooth abrasion resistant exterior cover with minimum 1/8-inch wall over cushioned foam insert. Provide fasteners out of sight.

2.03 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
- B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
- C. Joint Adhesive:
 - 1. Basis of Design: Armstrong #520
 - 2. Rubatex #373 adhesive.
 - 3. Armaflex #520
 - 4. Cover exterior exposed pipe insulation with a vinyl wrap.
 - 5. Refer to standard Drawings for additional information.

PART 3 - EXECUTION

3.01 PREPARATION AND INSPECTION

- A. Examine areas and conditions under which mechanical insulation is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.
- B. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

3.02 PENETRATIONS

- A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

END OF SECTION

SECTION 22 07 19

PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.
- B. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus; 2010.
- C. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2007e1.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2010b.
- E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2010.
- F. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.
- G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.02 SUBMITTALS

- A. See Section 01 33 00 Submittal Procedures, for submittal requirements.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.04 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours

PART 2 - PRODUCTS

2.01 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

- A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, NFPA 255, or UL 723.

2.02 GLASS FIBER

A. Manufacturers:

1. Knauf Insulation; www.knaufusa.com.
2. Johns Manville Corporation; www.jm.com.
3. Owens Corning Corp: www.owenscorning.com.
4. Substitutions: See Section 01 25 00 Substitution Procedures.

B. Insulation: ASTM C547; rigid molded, noncombustible with self-sealing lap.

1. 'K' ('Ksi') value: ASTM C177, 0.24 at 75 degrees F (0.035 at 24 degrees C).
2. Maximum service temperature: 850 degrees F (454 degrees C).
3. Maximum moisture absorption: 0.2 percent by volume.

C. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches (0.029 ng/Pa s m)

2.03 JACKETS

A. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.

1. Thickness: 0.016 inch sheet.
2. Finish: Smooth.
3. Joining: Longitudinal slip joints and 2 inch laps.
4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- E. Glass fiber insulated pipes conveying fluids below ambient temperature:
 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 2. Insulate fittings with flexible insulation. Finish with PVC fitting covers.

- F. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- G. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- H. Glass fiber insulated pipes conveying fluids above ambient temperature:
 - 1. Provide standard jackets, with vapor barrier, factory-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- I. Inserts and Shields:
 - 1. Application: Piping 1-1/2 inches (40 mm) diameter or larger.
 - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 - 3. Insert location: Between support shield and piping and under the finish jacket.
 - 4. Insert configuration: Minimum 6 inches (150 mm) long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 - 5. Insert material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- J. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.
- K. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 7 feet above finished floor): Finish with aluminum jacket.

END OF SECTION

SECTION 22 10 06

PLUMBING PIPING SPECIALTIES

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.
- B. ASME A112.6.4 - Roof, Deck, and Balcony Drains; The American Society of Mechanical Engineers; 2003.
- C. ASSE 1011 - Hose Connection Vacuum Breakers; American Society of Sanitary Engineering; 2004 (ANSI/ASSE 1011).
- D. ASSE 1012 - Backflow Preventer with Intermediate Atmospheric Vent; American Society of Sanitary Engineering; 2002 (ANSI/ASSE 1012).
- E. ASSE 1013 - Reduced Pressure Principle Backflow Preventers and Reduced Pressure Fire Protection Principle Backflow Preventers; American Society of Sanitary Engineering; 2005.
- F. ASSE 1019 - Vacuum Breaker Wall Hydrants, Freeze Resistant Automatic Draining Type; American Society of Sanitary Engineering; 2004, and Errata 2005 (ANSI/ASSE 1019).
- G. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections; 2009.
- H. ASTM C478M - Standard Specification for Precast Reinforced Concrete Manhole Sections [Metric]; 2009.
- I. DIN 19580 - Drainage Channels for Vehicular and Pedestrian Areas - Durability, Mass per Unit Area and Evaluation of Conformity; 2005.
- J. PDI-WH 201 - Water Hammer Arresters; Plumbing and Drainage Institute; 2006

1.02 SUBMITTALS

- A. See Section 01 33 00 Submittal Procedures, for submittal requirements.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 - PRODUCTS

2.01 HOSE BIBBS

A. Interior Hose Bibbs:

1. Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, chrome plated where exposed with handwheel, integral vacuum breaker in conformance with ASSE 1011.

B. Interior Mixing Type Hose Bibbs:

1. Bronze or brass, wall mounted, double service faucet with hose thread spout, integral stops, chrome plated where exposed with handwheels, and vacuum breaker in conformance with ASSE 1011.

2.02 HYDRANTS

A. Wall Hydrants:

1. ASSE 1019; freeze resistant, self-draining type with chrome plated wall plate hose thread spout, handwheel, and integral vacuum breaker.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

END OF SECTION

SECTION 22 11 00 FACILITY WATER DISTRIBUTION

PART 1 - GENERAL

1.01 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.
- C. Operation and maintenance data.
- D. Substitutions: See Section 01 25 00 Substitution Procedures

1.02 QUALITY ASSURANCE

- A. NSF Compliance:
 - 1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components.
 - 2. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9."

PART 2 - PRODUCTS

2.01 WATER PIPING

- A. Interior Above Floor: Type "L" hard drawn copper tubing, with wrought copper bronze fittings and 95/5 tin/antimony or 94/6 tin/silver solder.
- B. Interior Under Floor: Type "K" soft copper tubing of one continuous piece, where possible, with wrought copper fittings and 15 percent silver alloy brazed joints.
- C. Copper, Pressure-Seal Fittings (Contractor Option to Solder-Joint Fittings):
 - 1. Products:
 - a. Elkhart Products Corporation; Xpress.
 - b. Viega, LLC; ProPress.
 - c. NIBCO, Inc.
 - 2. NPS 2 (DN 50) and Smaller: Wrought-copper fitting with EPDM O-ring seal in each end.
 - 3. NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Bronze fitting with stainless-steel grip ring and EPDM O-ring seal in each end.

2.02 WATER METER

- A. Supply water meter meeting requirements of local water utility if meter is not supplied by local water utility. Submit Change Order Request for material costs associated with water meter.

2.03 VALVES

- A. Manufacturers: Provide the Basis of Design products by the Wm. Powell Co. or comparable products by one of the following:
 - 1. Cincinnati Valve Co, Lunkenheimer Valves
 - 2. Walworth Co.

- B. Basis of Design Product:
 - 1. Ball: Wm. Powell Co.; Figure 4201T
 - 2. Check: Wm. Powell Co.; Figure 1825.

2.04 HOSE BIBBS

- A. Manufacturers: Provide the Basis of Design products by the Woodford Manufacturing Co. or comparable products by one of the following:
 - 1. Jay R. Smith Co. Division of Smith Industries, Inc.
 - 2. Zurn Plumbing Products Group

- B. Basis of Design Product:
 - 1. Interior Hose Bibbs (HB): Woodford Manufacturing Co.; Model 24P-CH, chrome-plated brass.
 - 2. Yard Hydrants, When Used Inside Building: Woodford Manufacturing Co.; Model R34.
 - 3. Exterior Hose Bibbs (WB): Woodford Manufacturing Co.; Model B-65 wall hydrant with chrome finish on brass casting. Conceal within interior partitions.

2.05 BACKFLOW PREVENTERS

- A. Manufacturers: Provide the Basis of Design product by the Watts Regulator Co. or a comparable product by one of the following:
 - 1. Zurn Plumbing Products Group
 - 2. Ames Fire and Waterworks

- B. Basis of Design Product:
 - 1. Backflow Preventer for Interior Hose Bibbs Including Prep Room Hose Bibb Connections: Watts Regulator Co.; #9D.
 - 2. Backflow Preventer for Coffee Machines, Ice Machines, Seafood Steamer and Water Machine: Watts Regulator Co.; No. #SD3.
 - 3. Reduced Pressure Principle Backflow Preventer for carbonators (such as soda fountain) (ASSE 1013): Watts Regulator Co.; No. 009-QT. Copper shall not be used downstream from the backflow.

2.06 FLOW RESTRICTOR

- A. Basis of Design Product: American Standard; 2591.017, 0.5 gpm flow restrictor/aerator.
 - 1. T & S, B-0199-01
 - 2. Kohler 1002019

2.07 THERMOMETERS

- A. Liquid filled with 2-inch scale divisions, 40 to 240 degrees F range, installed in threaded well in water line.

2.08 WATER HAMMER ARRESTORS (WHA)

- A. Manufacturers: Provide the Basis of Design product by the Sioux Chief Manufacturing Company, Inc. or a comparable product by one of the following:

- 1. Jay R. Smith Co. Division of Smith Industries, Inc.
- 2. Zurn Plumbing Products Group
- 3. Apollo Valves

- B. Basis of Design Product: Sioux Chief Manufacturing Company, Inc.; 650/660 Series Piston Type, Copper.

2.09 VACUUM BREAKERS

- A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:

- 1. Manufacturers:
 - a. Watts Industries, Inc.; Water Products Div.
 - b. Zurn Plumbing Products Group; Wilkins Div.
 - c. Apollo Valves
- 2. Standard: ASSE 1001.
- 3. Size: NPS 1/4 to NPS 3, as required to match connected piping.
- 4. Body: Bronze.
- 5. Inlet and Outlet Connections: Threaded.

- B. Hose-Connection Vacuum Breakers:

- 1. Manufacturers:
 - a. Watts Industries, Inc.; Water Products Div.
 - b. Woodford Manufacturing Company.
 - c. Zurn Plumbing Products Group.
- 2. Standard: ASSE 1001.
- 3. Body: Bronze, non-removable, with manual drain.
- 4. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.

2.10 WATER PRESSURE-REDUCING VALVES

- A. General: Provide water pressure regulators where necessary to limit the incoming water pressure to 80 psi inside the building.

- B. Water Regulators:

- 1. Basis of Design Product: Watts No. LFU5B-Z3.
- 2. Manufacturers:
 - a. Honeywell Water Controls.
 - b. Watts Industries, Inc.
 - c. Zurn Plumbing Products Group.
- 3. Standard: ASSE 1003.
- 4. Pressure Rating: Initial working pressure of 150 psig (1035 kPa)

2.11 BALANCING VALVES

A. Memory-Stop Balancing Valves:

1. Manufacturers:
 - a. Crane Co.; Crane Valve Group.
 - b. NIBCO INC.
 - c. Honeywell Water Controls.
2. Standard: MSS SP-110 for two-piece, copper-alloy ball valves.
3. Pressure Rating: 400-psig minimum CWP.
4. Size: NPS 2 or smaller.
5. Body: Copper alloy.
6. Port: Standard or full port.
7. Ball: Chrome-plated brass.
8. Seats and Seals: Replaceable.
9. End Connections: Solder joint or threaded.
10. Handle: Vinyl-covered steel with memory-setting device.

2.12 THERMOSTATIC MIXING VALVES

A. (TMV) Point of use Water-Temperature Limiting Devices for Public Hand Washing Lavatories:

1. Manufacturers: Provide the Basis of Design product by Symmons Industries, Inc. or a comparable product by one of the following:
 - a. Honeywell Water Controls.
 - b. Watts Industries, Inc.; Water Products Div.
 - c. Zurn Plumbing Products Group; Wilkins Div.
2. Basis of Design Product: Symmons Industries, Inc.; 5-210-CK Maxline thermostatic mixing valve.
3. Size: 3/8 inch compression inlets/outlet and integral checks.
4. Body: Brass with dual stainless steel strainers.
5. Adjustment: Vandal-resistant cap/temperature adjustment handle.
6. Finish: Rough brass.
7. Certification: Dual certified to ASSE 1017/1070. (.5 - 5 GPM)
8. Pressure Rating: 125 psig.
9. Accessories: Check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.

2.13 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig minimum CWP.
3. Size: NPS 3/4.
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

2.14 TRAP-SEAL PRIMER VALVES

- A. Manufacturers: Provide the Basis of Design product by Sioux Chief Manufacturing Company, Inc., or a comparable product by one of the following:
 - 1. MIFAB, Inc.
 - 2. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
- B. Basis of Design Product: Sioux Chief Manufacturing Company, Inc.; TP 695-01
- C. Standard: ASSE 1018.
- D. Pressure Rating: 125 psig minimum.
- E. Body: Heavy Zamace
- F. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
- G. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
- H. Performance: Trap prime up to eight drains.

PART 3 - EXECUTION

3.01 GENERAL

- A. Appropriate compression shutoff valve and ground joint unions shall be used at each fixture and piece of equipment to facilitate removal of equipment.
- B. Adapters used for screwed valves and any connection to steel shall be insulated to prevent electrolysis.
- C. Use dielectric unions where dissimilar metals are joined together.

3.02 INSTALLATION

- A. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.
 - 1. Locate backflow preventers in same room as connected equipment or system.
 - 2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application.
 - 3. Do not install bypass piping around backflow preventers.
- B. Install water regulators with inlet and outlet shutoff valves. Install pressure gages on inlet and outlet.
- C. Install balancing valves in locations where they can easily be adjusted.

- D. Install Owner supplied immersion temperature sensor for connection to the environmental control system.
- E. Install temperature-actuated water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.
 - 1. Install thermometers and water regulators if specified.
 - 2. Install cabinet-type units recessed in or surface mounted on wall as specified.
- F. Install water hammer arresters in water piping according to PDI-WH 201.
- G. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.
- H. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties.
- I. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
 - 1. Intermediate atmospheric-vent backflow preventers.
 - 2. Reduced-pressure-principle backflow preventers.
 - 3. Double-check backflow-prevention assemblies.
 - 4. Water pressure-reducing valves.
 - 5. Primary, thermostatic, water mixing valves.
 - 6. Supply-type, trap-seal primer valves.
- J. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Division 22 Section "Common Work Results for Plumbing."

3.03 EXCAVATION

- A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving."
- B. Remove excavating debris, materials and equipment promptly from the premises upon completion.

3.04 TESTING

- A. The entire water distribution system shall be tested and proven tight under air or water pressure of fifty percent more than the maximum pressure of each system but in no case less than 100 pounds.
- B. Combination domestic and sprinkler service piping shall be tested and proven under a water pressure of 200 psi. for two hours.
- C. Test temperature at sink locations to comply with 110 degrees F delivered temperature.
- D. Perform systems tests in the presence of the Plumbing Inspector and Owner. Notify Owner of systems tests at least 48 hours in advance.

- E. Test each reduced-pressure-principle backflow preventer according to authorities having jurisdiction and the device's reference standard.

3.05 ADJUSTING

- A. Set field-adjustable pressure set points of water pressure-reducing valves.
- B. Set field-adjustable flow of balancing valves.
- C. Set field-adjustable temperature set points of temperature-actuated water mixing valves.

3.06 FLUSHING AND CLEANING

- A. Upon completion of testing, flush all domestic water piping until water shows no discoloration. Clean all valves, strainers, etc.
- B. After flushing and cleaning, disinfect pipe by the use of chlorine or chlorine compounds in amounts to produce a concentration of 50 parts per million. At the end of six (6) hours, flush all piping until chlorine residual is less the two (2) parts per million.
 - 1. Provide any additional system cleaning and disinfecting as required by state or local codes.
- C. Prepare and submit reports of purging and disinfecting activities.

3.07 PIPING INSTALLATION

- A. Basic piping installation requirements are specified in Division 22 Section "Common Work Results for Plumbing."
- B. Install under-building-slab copper tubing according to CDA's "Copper Tube Handbook."
- C. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Sleeves and mechanical sleeve seals are specified in Division 22 Section "Common Work Results for Plumbing."
- D. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance.
- E. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.
- F. Rough-in domestic water piping for water-meter installation according to utility company's requirements.
- G. Install water meter if meter is not installed by local water utility. Submit Change Order Request for labor costs associated with water meter installation.

3.08 JOINT CONSTRUCTION

- A. Basic piping joint construction requirements are specified in Division 22 Section "Common Work Results for Plumbing."

- B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.
 - C. Copper-Tubing, Pressure-Sealed Joints (Contractor Option to Solder-Joint Fittings): Use proprietary crimping tool and procedure recommended by copper, pressure-seal-fitting manufacturer. Install per ASTM B16.18 or ASTM B16.22
 - 1. Mechanically formed tee-drill fittings are only acceptable where new piping is connected to existing piping.
 - D. Extruded-Tee Connections: Form tee in copper tube according to ASTM F 2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.
- 3.09 ROUGHING-IN FOR WATER METERS
- A. Rough-in domestic water piping for water meter installation according to utility company's requirements.
 - B. Where irrigation systems are provided, provide and coordinate the installation of a deduct meter with the local authority having jurisdiction. Refer to Drawings for location.
- 3.10 HANGER AND SUPPORT INSTALLATION
- A. Seismic-restraint devices are specified in Division 20 Section "Vibration and Seismic Controls for Facility Services."
 - B. Pipe hanger and support devices are specified in Division 20 Section "Hangers and Supports for Facility Services." Install the following:
 - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 2. Individual, Straight, Horizontal Piping Runs: According to the following:
 - a. 100-feet (30.5-m) and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100-feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100-feet: MSS Type 49, spring cushion rolls, if indicated.
 - 3. Multiple, Straight, Horizontal Piping Runs 100-feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - 4. Base of Vertical Piping: MSS Type 52, spring hangers.
 - C. Support vertical piping and tubing at base and at each floor.
 - D. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8-inch.
 - E. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/4 and Smaller: 84 inches with 3/8-inch rod.
 - 2. NPS 1-1/2: 108 inches with 3/8-inch rod.
 - 3. NPS 2: 10-foot with 3/8-inch rod.
 - 4. NPS 2-1/2: 11-foot with 1/2-inch rod.
 - 5. NPS 3 and NPS 3-1/2: 12-foot with 1/2-inch rod.
 - 6. NPS 4 and NPS 5: 12-foot with 5/8-inch rod.
 - 7. NPS 6: 12-foot with 3/4-inch rod.

- F. Install supports for vertical steel piping every 15 feet.
- G. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
 - 2. NPS 1-1/4: 72 inches with 3/8-inch rod.
 - 3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
 - 4. NPS 2-1/2: 108 inches with 1/2-inch rod.
 - 5. NPS 3 to NPS 5: 10-foot with 1/2-inch rod.
 - 6. NPS 6: 10-foot with 5/8-inch rod.
- H. Install supports for vertical copper tubing every 10 feet.
- I. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.11 CONNECTIONS

- A. General: Install piping to all mechanical equipment and all food preparation equipment requiring water, including equipment supplied by Owner and equipment supplied and installed by Owner.
- B. Install piping adjacent to equipment and machines to allow service and maintenance.
- C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
- D. Connect domestic water piping to water-service piping with shutoff valve, and extend and connect to the following:
 - 1. Booster Pumps: Cold-water suction and discharge piping.
 - 2. Water Heaters: Cold-water supply and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
 - 3. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code.
 - 4. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.12 FIELD QUALITY CONTROL

- A. Inspect domestic water piping as follows:
 - 1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
 - 2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
 - a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.

- b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
 3. Re-inspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for re-inspection.
 4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- B. Test domestic water piping as follows:
1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
 2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 4. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
 5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
 6. Prepare reports for tests and required corrective action.

END OF SECTION

SECTION 22 13 00

FACILITY SANITARY SEWERAGE

PART 1 - GENERAL

1.01 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding 10-foot head of water (30 kPa) minimum working pressure, unless otherwise indicated.

1.02 SUBMITTALS

- A. See Section 01 33 00 Submittal Procedures.
- B. Shop Drawings for Grease Interceptor. Submit to local officials having jurisdiction for approval prior to purchase.
- C. Field quality-control inspection and test reports.

1.03 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping; and "NSF-drain" for plastic drain piping.

PART 2 - PRODUCTS

2.01 SANITARY PIPING AND VENT PIPING

- A. Copper Piping:
 - 1. Drain Connection, Trap and First 20 Feet of Piping Downstream From Fixtures Discharging 140 Degree F. (60 Degree C.) or Hotter Water: Type "L" hard drawn copper tubing, with wrought copper bronze fittings and 95/5 tin/antimony or 94/6 tin/silver solder for drain lines and fittings.
 - 2. Other Piping 2-1/2 inches (63.5 mm) and Under: Type "M" copper ASTM B88.62.
- B. Plastic Piping:
 - 1. Polyvinyl chloride (PVC), schedule 40 DWV. ASTM D-2665
 - a. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste, and vent patterns.
 - 2. ABS Pipe: ASTM D 2661, Schedule 40, solid wall.
 - a. ABS Socket Fittings: ASTM D 2661, made to ASTM D 3311, drain, waste, and vent patterns.
 - 3. Protect plastic piping above slab in stock rooms from damage with guards or concrete curbs.
- C. Collect vent piping where practical so roof will be pierced a minimum number of times. Vent sizes and heights above roof per governing codes. Vents piercing roofs flashed per roofing manufacturer's requirements. Provide wire basket strainer in top of all vents.

2.02 DRAINS

A. Manufacturers:

1. Sioux Chief Manufacturing Company, Inc.
2. Watts Regulator Company; A Division of Watts Water Technologies, Inc.
3. Zurn Industries, Inc.

B. FD1 - Light Duty Floor Drain: PVC body, with 6-inch (152-mm) round nickel bronze adjustable strainer.

1. Basis of Design: Sioux Chief Manufacturing Company, Inc.; Finish Line, adjustable drainage system, 832-36PNR.

C. FS1 - Light Duty Floor Drain: 16 gauge, Type 304 Stainless Steel with anchor tabs and slotted stainless steel ADA compliant grate.

1. Basis of Design: MIFAB Model P2120.

D. Sewer Gas and Sewage Back-Up Protection: Equal to Proset Systems Trap Guard. To be used in lieu of trap primer.

2.03 CLEANOUTS (CO)

A. Manufacturers:

1. Sioux Chief Manufacturing Company, Inc.
2. Watts Regulator Company; A Division of Watts Water Technologies, Inc.
3. Zurn Industries, Inc.

B. General: Floor cleanouts, regardless of what size piping they are installed in shall be 4-inch.

C. Finished Floors: 4-inch adjustable cleanout with nickel-bronze top.

1. Basis of Design: Sioux Chief Manufacturing Company, Inc.; Finish Line, adjustable drainage system 834-4PNR.

D. Unfinished Concrete Floor: 4-inch adjustable cleanout with 6-1/2 inch heavy-duty ductile-iron ring and cover with polypro cleanout plug and 4-inch PVC pipe connection.

1. Basis of Design: Sioux Chief Manufacturing Company, Inc.; 834-4PiR.

E. Wall Cleanouts: 4-inch cleanout cover kit, with brass plug and stainless steel polished top.

1. Basis of Design: Sioux Chief Manufacturing Company, Inc.; 873 series.

F. Exterior Cleanouts: 4-inch adjustable heavy duty cleanout in concrete pad at grade with 6-1/2 inch heavy-duty all ductile-iron ring and cover with polypro cleanout plug and 4-inch PVC pipe connection.

1. Basis of Design: Sioux Chief Manufacturing Company, Inc.: 834-4PiR.

PART 3 - EXECUTION

3.01 PIPING INSTALLATION

A. General:

1. Collect vent piping where practical so roof will be pierced a minimum number of times without increasing depth of wall. Vent sizes and heights above roof per governing codes. Vents piercing roofs flashed per roof manufacturer's recommended details. Provide wire basket strainer in top of all vents.
2. Do not run sanitary vent piping in return air shaft wall. If no other option is available, cast iron, steel, or copper vent piping may be run in return air shaft wall upon approval of the Owner.

B. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.

C. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Sleeves and mechanical sleeve seals are specified in Division 22 Section "Common Work Results for Plumbing."

D. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Wall penetration systems are specified in Division 22 Section "Common Work Results for Plumbing."

E. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

F. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

G. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

H. Install ABS soil and waste drainage and vent piping according to ASTM D 2661.

I. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.

- J. Install underground PVC soil and waste drainage piping according to ASTM D 2321.
- K. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- L. Install grease interceptor outside, underground as indicated on the on the Drawings.

3.02 JOINT CONSTRUCTION

- A. Basic piping joint construction requirements are specified in other Division 22 Section.
- B. Cast-Iron, Soil-Piping Joints: Make joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
 - 1. Gasketed Joints: Make with rubber gasket matching class of pipe and fittings.
 - 2. Hubless Joints: Make with rubber gasket and sleeve or clamp.
- C. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.
- D. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.

3.03 VALVE INSTALLATION

- A. Shutoff Valves: Install shutoff valve on each sewage pump discharge.
 - 1. Use gate or full-port ball valve for piping NPS 2 and smaller.
 - 2. Use gate valve for piping NPS 2-1/2 and larger.
- B. Check Valves: Install swing check valve, downstream from shutoff valve, on each sewage pump discharge.

3.04 HANGER AND SUPPORT INSTALLATION

- A. Pipe hangers and supports are specified in other Division 23 Sections. Install the following:
 - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 2. Individual, Straight, Horizontal Piping Runs: According to the following:
 - a. 100-feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100-feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100-feet, if indicated: MSS Type 49, spring cushion rolls.
 - 3. Multiple, Straight, Horizontal Piping Runs 100-feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Support vertical piping and tubing at base and at each floor.
- C. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

- D. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/2 and NPS 2: 60-inches with 3/8-inch rod.
 2. NPS 3: 60-inches with 1/2-inch rod.
 3. NPS 4 and NPS 5: 60-inches with 5/8-inch rod.
 4. NPS 6: 60-inches with 3/4-inch rod.
 5. Spacing for 10-foot lengths may be increased to 10-feet. Spacing for fittings is limited to 60-inches.
- E. Install supports for vertical cast-iron soil piping every 15-feet.
- F. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/4: 72 inches with 3/8-inch rod.
 2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
 3. NPS 2-1/2: 108 inches with 1/2-inch rod.
 4. NPS 3 to NPS 5: 10-foot with 1/2-inch rod.
 5. NPS 6: 10-foot with 5/8-inch rod.
- G. Install supports for vertical copper tubing every 10-foot.
- H. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
 2. NPS 3: 48 inches with 1/2-inch rod.
 3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
 4. NPS 6: 48 inches with 3/4-inch rod.
- I. Install supports for vertical PVC piping every 48 inches.
- J. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.05 CONNECTIONS

- A. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- B. Connect drainage and vent piping to the following:
1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
 3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
 4. Mechanical Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

5. Food Prep Equipment: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code, to equipment supplied by Owner and equipment supplied and installed by Owner.
6. Utensil and Dishwashing Equipment: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code to equipment supplied by Owner and equipment supplied and installed by Owner.
 - a. Provide only Type "L" hard drawn copper tubing, with wrought copper bronze fittings and 95/5 tin/antimony or 94/6 tin/silver solder for drain lines and fittings for this equipment due to the higher discharge water temperature.
7. Refrigerated Equipment: Drain lines from refrigerated equipment to building system shall be provided under Refrigeration Equipment Installation Specifications.

3.06 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Re-inspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for re-inspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction.
 1. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 2. Prepare reports for tests and required corrective action.

3.07 TESTING

- A. The entire soil, waste and vent system shall be tested per code and to the satisfaction of the Plumbing Inspector and the Owner. Cover no work until it has been approved. The minimum requirements shall be as follows:
- B. Water pressure: 10-foot head of water for 15 minutes without loss of water.
- C. Air pressure: 5 psi. for 15 minutes without loss of air.
- D. Entire soil and waste systems to be inspected for debris and flushed prior to pouring of concrete floor slab.

- E. Perform all systems tests in the presence of an authorized representative of the Owner. Notify the Owner of all systems tests at least 48 hours in advance.

3.08 CLEANUP

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION

SECTION 22 42 00

COMMERCIAL PLUMBING FIXTURES

PART 1 - GENERAL

1.01 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Closeout Submittals:
 - 1. Operation and Maintenance Data: For flushometer valves to include in operation and maintenance manuals

1.02 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Regulatory Requirements: "Americans with Disabilities Act" for plumbing fixtures for people with disabilities.
- C. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.
- D. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.
- E. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

PART 2 - PRODUCTS

2.01 ACCESSIBLE FIXTURES

- A. Accessible fixtures to conform to local code requirements, where indicated or as required. Unless local codes require otherwise, use the following fixtures.

2.02 PLUMBING FIXTURES

- A. Vitreous China Fixtures
 - 1. Products:
 - a. American Standard
 - b. Zurn
 - c. Kohler
 - 2. Water Closets: Floor mounted, bottom outlet, top spud.
 - a. Bowl:
 - 1) Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
 - 2) Material: Vitreous china.
 - 3) Type: Siphon jet.
 - 4) Style: Flushometer valve.
 - 5) Height: Standard or handicapped/elderly, complying with ICC/ANSI A117.1, as indicated.
 - 6) Rim Contour: Elongated.

- 7) Water Consumption: 1.6 gal. per flush.
- 8) Spud Size and Location: NPS 1-1/2; top.
- 9) Color: White.
- 10) Bowl-to-Drain Connecting Fitting: ASTM A 1045 or ASME A112.4.3.
- b. Flushometer Valve: Lever-handle, dual-flush, diaphragm type, chrome plated.
 - 1) Products:
 - a) Sloan Valve Company; Model WES-111
 - b) Delany Products; 1202-1.6 with F33A-SH SmartHandle.
 - c) Zurn Industries, LLC; AquaVantage AV, Z6000AV-WS1-DF
 - 2) Standard: ASSE 1037.
 - 3) Minimum Pressure Rating: 125 psig.
 - 4) Features: Include integral check stop and backflow-prevention device.
 - 5) Material: Brass body with corrosion-resistant components.
 - 6) Exposed Flushometer-Valve Finish: Chrome plated.
 - 7) Consumption:
 - a) Lift Handle Up: 1.1 gal.
 - b) Push Handle Down: 1.6 gal.
 - 8) Minimum Inlet: NPS 1.
 - 9) Minimum Outlet: NPS 1-1/4 to NPS 1-1/2 as required.
- c. Toilet Seat:
 - 1) Product: Church Seat Co., a division of Bemis Manufacturing Co.; model 295CT, no substitutions allowed.
 - 2) Material: Heavy weight injection molded solid plastic.
 - 3) Type: Commercial (Heavy duty).
 - 4) Shape: Elongated rim, open front.
 - 5) Hinge: Check.
 - 6) Hardware: Stainless steel.
 - 7) Color: White.
3. Urinal: Wall hung, back outlet, blowout.
 - a. Fixture:
 - 1) Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
 - 2) Material: Vitreous china.
 - 3) Strainer or Trapway: Manufacturer's standard strainer with integral trap.
 - 4) Water Consumption: 0.125 gal. per flush.
 - 5) Spud Size and Location: NPS 3/4; top.
 - 6) Outlet Size and Location: NPS 2; back.
 - 7) Color: White.
 - b. Flushometer Valve: Battery powered, sensor operated, diaphragm type, chrome plated.
 - 1) Product:
 - a) Sloan Valve Company; Ecos, model 8186-0.13.
 - b) Delany Products; Impulse 11451-0.125.
 - c) Zurn Industries, LLC; ZEG6003EV. (Included with Zurn model Z5798 low-flow urinal.)
 - 2) Features: Include integral check stop and backflow-prevention device.
 - 3) Material: Brass body with corrosion-resistant components.
 - 4) Exposed Flushometer-Valve Finish: Chrome plated.
 - 5) Actuator: Solenoid complying with UL 1951; listed and labeled as defined in NFPA 70.

- 6) Trip Mechanism: Battery-powered electronic sensor complying with UL 1951; listed and labeled as defined in NFPA 70.
- 7) Consumption: 0.125 gal. per flush.
- c. Concealed Urinal Carrier: ASME A112.6.1M, Type I, urinal carrier with fixture support plates and coupling with seal and fixture bolts and hardware matching fixture.
 - 1) Manufacturers:
 - a) Josem Company
 - b) Tyler Pipe, Wade Division
 - c) J. R. Smith Mfg. Co.
- 4. Restroom Lavatories: Basis of Design – Zurn Industries, Z5114
 - a. Fixture:
 - 1) Standard: ASME A112.19.1 / CSA B45.2.
 - 2) Type: counter top.
 - 3) Nominal Size: 20 by 17 inches, self-rimming.
 - 4) Faucet-Hole Punching: Three holes, 4-inch centers.
 - 5) Faucet-Hole Location: Top.
 - 6) Color: White.
 - 7) Mounting Materials: With stainless-steel ring, and sealant.
 - b. Faucet and Drain:
 - 1) Products:
 - a) Delta Faucet Company; 516LF-HDF
 - b) Moen, Inc.; Model 8425
 - c) American Standard Monterrey; #6114
 - 2) Type: Commercial with 3 hole 4-inch counterset, ADA compliant.
 - 3) Lever Handle: 6 inch.
 - 4) Aerator: Vandal resistant.
 - 5) Flow Rate: Aerator limited to maximum 1.5 gpm at 60 psi.
 - 6) Drain: 1-1/4-inch integral grid.
 - 7) Trap: 1-1/4-inch cast P-trap w/ CO.
 - 8) Shutoff Valves: Include manual hand wheel type shutoff valves and connecting stem pipes.
 - 9) Finish: Chrome.
- 5. Breakroom Sink, 2-comp Stainless Steel sink equal to Just Model DL-2233-A-GR. Provide faucet equal to Delta Model 400-DST.
 - a. Elkay Crosstown 33 x 22; Provide faucet equal to American Standard Monterrey; #6408.
 - b. Moen 1800 series 33 x 22; Provide faucet equal to Moen 8792.

B. Service Sink.

- 1. Basis of Design: Enameled cast Iron with wall hanger and rim guard. Drilled back 2 holes on 8 inch centers. Equal to American Standard Model Akron 7695-008. Provide faucet, 3 inches cast brass spout with vacuum breaker equal to Speakman model SC-5811.
 - a. Florestone Products Co., Inc.
 - b. American Standard
 - c. Speakman
 - d. Zurn Industries, LLC; Light Commercial Specialty Plumbing Products.

C. Eye Wash:

1. Basis of Design Product: Speakman Products Eyesaver Faucet with Eyewash/Drench Hose; Model SEF-9000
 - a. Speakman Company
 - b. Guardian Equipment

D. Electric Water Cooler: Wall mounted, split level dual unit, wheelchair accessible.

1. Products (Without Bottle Filler):
 - a. Oasis International; Model P8ACSL
 - b. Elkay Manufacturing Co.; Model EZSTL8LC
 - c. Halsey Taylor; Model HAC8FSBL-WF-Q
2. Cabinet: Bi-level with two attached cabinets, powder-coated paint or vinyl-covered galvanized steel with stainless-steel top.
3. Bubbler: One, with adjustable stream regulator, located on each cabinet deck.
4. Control: Push button or bar.
5. Cooling System: Electric, with hermetically sealed compressor, cooling coil, air-cooled condensing unit, corrosion-resistant tubing, refrigerant, corrosion-resistant-metal storage tank, and adjustable thermostat.
 - 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.
6. Capacities and Characteristics:
 - a. Cooled Water: 8 gph (0.0084 L/s).
 - b. Ambient-Air Temperature: 90 deg F.
 - c. Inlet-Water Temperature: 80 deg F.
 - d. Cooled-Water Temperature: 50 deg F.
 - e. Electrical Characteristics:
 - 1) Volts: 115-120-V ac.
 - 2) Phase: Single.
 - 3) Hertz: 60.
 - 4) Full-Load Amperes: 4.0
7. Support: ASME A112.6.1M, Type II water-cooler carrier.
8. Shutoff Valves: Include manual hand wheel type shutoff valves and connecting stem pipes.
9. Cane Apron: Manufacturer's standard apron installed on upper unit to comply with mandatory 27 inch floor to underside requirement per ADA guidelines. Match finish and color of cabinet.

E. Electric Water Cooler:

1. Single, free-standing equal to Oasis model P8FA.
2. Elkay FD700DL
3. Halsey Taylor SCWT8A

F. Shower Unit:

1. Equal to Zurn Industries Temp-Guard III Shower Unit Z7301-SS-MT;
2. American Standard Model 1662SG
3. Delta Model Lahara
4. Single handle pressure balancing mixing shower unit, ceramic control cartridge with stainless-steel balancing piston, built in reverse connection capability, two service stops / check stops, and adjustable limit stop. All exposed trim and handle are metal with polished nickel chrome plated surface. The valve is supplied with the 2.5 GPM chrome plated plastic – S1 shower head with spray adjustment, arm and flange in chrome plated finish.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install per manufacturer's instructions and recommendations.
- B. Install accessible wall-mounted fixtures at handicapped/elderly mounting height according to ICC/ANSI A117.1.
- C. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.
- D. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.
- E. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
- F. Install wall-mounting fixtures with tubular waste piping attached to supports.
- G. Install fixtures level and plumb according to roughing-in drawings.
- H. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
- I. Install flushometer valves for accessible water closets with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.
- J. Install toilet seats on water closets.
- K. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- L. Install traps on fixture outlets.
 1. Exception: Omit trap on fixtures with integral traps.
 2. Exception: Omit trap on indirect wastes, unless otherwise indicated.

- M. Install escutcheons at piping wall and ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings.
 - N. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color.
Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible sinks.
- 3.02 CONNECTIONS
- A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- 3.03 FIELD QUALITY CONTROL
- A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.
 - B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.
 - C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.
 - D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.
 - E. Install fresh batteries in sensor-operated mechanisms.
- 3.04 PROTECTION
- A. Provide protective covering for installed fixtures and fittings.
 - B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION

SECTION 23 05 53

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.

1.02 SUBMITTALS

- A. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- B. Chart and Schedule: Submit VRF valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- C. Product Data: Provide manufacturers catalog literature for each product required.
- D. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- E. Project Record Documents: Record actual locations of tagged valves.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Brady Corporation; www.bradycorp.com.
- B. Kolbi Pipe Markers; www.kolbipipemarkers.com.
- C. Seton Identification Products; www.seton.com/aec.

2.02 NAMEPLATES

- A. Description: Laminated three-layer plastic with engraved letters.
 - 1. Letter Color: White.
 - 2. Letter Height: 1/4 inch.
 - 3. Background Color: Black.

2.03 PIPE MARKERS

- A. Color: Conform to ASME A13.1.
- B. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners.
- B. Install plastic pipe markers in accordance with manufacturer's instructions.
- C. Identify fans, FCU's, and CU's with plastic nameplates.
- D. Identify gas piping, concealed or exposed, with plastic pipe markers. Use tags on piping 3/4 inch (20 mm) diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet (6 m) on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. AABC MN-1 - AABC National Standards for Total System Balance; Associated Air Balance Council; 2002.
- B. ASHRAE Std 111 - Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 1988, with 1997 Errata.
- C. NEBB (TAB) - Procedural Standards for Testing Adjusting Balancing of Environmental Systems; National Environmental Balancing Bureau; 2005, Seventh Edition.
- D. SMACNA (TAB) - HVAC Systems Testing, Adjusting, and Balancing; Sheet Metal and Air Conditioning Contractors' National Association; 2002.

1.02 SUBMITTALS

- A. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
 - 1. Submit under provisions of Section 01 40 00 Quality Requirements.
 - 2. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
 - 3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
 - 4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
 - 5. Include the following on the title page of each report:
 - a. Name of Testing, Adjusting, and Balancing Agency.
 - b. Address of Testing, Adjusting, and Balancing Agency.
 - c. Telephone number of Testing, Adjusting, and Balancing Agency.
 - d. Project name.
 - e. Project location.
 - f. Project Architect.
 - g. Project Engineer.
 - h. Project Contractor.
 - i. Project altitude.
 - j. Report date.

PART 2 - PRODUCTS – (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
1. AABC MN-1, AABC National Standards for Total System Balance.
 2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
 3. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
 4. SMACNA HVAC Systems Testing, Adjusting, and Balancing.
 5. Maintain at least one copy of the standard to be used at project site at all times.
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
- D. TAB Agency Qualifications:
1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
 2. Having minimum of three years documented experience.
 3. Certified by one of the following:
 - a. AABC, Associated Air Balance Council: www.aabchq.com; upon completion submit AABC National Performance Guaranty.
 - b. NEBB, National Environmental Balancing Bureau: www.nebb.org.
 - c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org.
- E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.
- F. TAB Supervisor Qualifications: Professional Engineer licensed in the State of Mississippi.

3.02 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
1. Systems are started and operating in a safe and normal condition.
 2. Temperature control systems are installed complete and operable.
 3. Proper thermal overload protection is in place for electrical equipment.
 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 5. Duct systems are clean of debris.
 6. Fans are rotating correctly.
 7. Air coil fins are cleaned and combed.
 8. Air outlets are installed and connected.
 9. Duct system leakage is minimized.

- B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.
- C. Beginning of work means acceptance of existing conditions.

3.03 PREPARATION

- A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
 - 1. Require attendance by all installers whose work will be tested, adjusted, or balanced.
- B. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.
- C. Provide additional balancing devices as required.

3.04 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.05 RECORDING AND ADJUSTING

- A. Field Logs: Maintain written logs including:
 - 1. Running log of events and issues.
 - 2. Discrepancies, deficient or uncompleted work by others.
 - 3. Contract interpretation requests.
 - 4. Lists of completed tests.
- B. Ensure recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. Mark on the drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.
- E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- G. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.
- H. Check and adjust systems approximately six months after final acceptance and submit report.

3.06 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.

- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.

3.07 MINIMUM DATA TO BE REPORTED

A. Electric Motors:

1. Manufacturer
2. Model/Frame
3. HP/BHP
4. Phase, voltage, amperage; nameplate, actual, no load
5. RPM
6. Service factor
7. Starter size, rating, heater elements
8. Sheave Make/Size/Bore

B. V-Belt Drives:

1. Identification/location
2. Required driven RPM
3. Driven sheave, diameter and RPM
4. Belt, size and quantity
5. Motor sheave diameter and RPM
6. Center to center distance, maximum, minimum, and actual

C. Air Cooled Condensers:

1. Identification/number
2. Location

3. Manufacturer
 4. Model number
 5. Serial number
 6. Entering DB air temperature, design and actual
 7. Leaving DB air temperature, design and actual
 8. Number of compressors
- D. Cooling Coils:
1. Identification/number
 2. Location
 3. Service
 4. Manufacturer
 5. Air flow, design and actual
 6. Entering air DB temperature, design and actual
 7. Entering air WB temperature, design and actual
 8. Leaving air DB temperature, design and actual
 9. Leaving air WB temperature, design and actual
 10. Saturated suction temperature, design and actual
 11. Air pressure drop, design and actual
- E. Heating Coils:
1. Identification/number
 2. Location
 3. Service
 4. Manufacturer
 5. Air flow, design and actual
 6. Entering air temperature, design and actual
 7. Leaving air temperature, design and actual
 8. Air pressure drop, design and actual
- F. Air Moving Equipment:
1. Location
 2. Manufacturer
 3. Model number
 4. Serial number
 5. Arrangement/Class/Discharge
 6. Air flow, specified and actual
 7. Return air flow, specified and actual
 8. Outside air flow, specified and actual
 9. Total static pressure (total external), specified and actual
 10. Inlet pressure
 11. Discharge pressure
 12. Sheave Make/Size/Bore
 13. Number of Belts/Make/Size
 14. Fan RPM
- G. Return Air/Outside Air:
1. Identification/location
 2. Design air flow
 3. Actual air flow

4. Design return air flow
5. Actual return air flow
6. Design outside air flow
7. Actual outside air flow
8. Return air temperature
9. Outside air temperature
10. Required mixed air temperature
11. Actual mixed air temperature
12. Design outside/return air ratio
13. Actual outside/return air ratio

H. Exhaust Fans:

1. Location
2. Manufacturer
3. Model number
4. Serial number
5. Air flow, specified and actual
6. Total static pressure (total external), specified and actual
7. Inlet pressure
8. Discharge pressure
9. Sheave Make/Size/Bore
10. Number of Belts/Make/Size
11. Fan RPM

I. Air Distribution Tests:

1. Air terminal number
2. Room number/location
3. Terminal type
4. Terminal size
5. Area factor
6. Design velocity
7. Design air flow
8. Test (final) velocity
9. Test (final) air flow
10. Percent of design air flow

END OF SECTION

SECTION 23 07 19

HVAC PIPING INSULATION

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus; 2010.
- B. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
- C. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2008.
- D. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2007e1.
- E. ASTM C585 - Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System); 2010.
- F. ASTM D1056 - Standard Specification for Flexible Cellular Materials--Sponge or Expanded Rubber; 2007.
- G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2010b.
- H. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2010.
- I. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.
- J. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.02 SUBMITTALS

- A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- B. Samples: Submit two samples of any representative size illustrating each insulation type.
- C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

PART 2 - PRODUCTS

2.01 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

- A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, NFPA 255, or UL 723.

2.02 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534 Grade 3; use molded tubular material wherever possible.
 - 1. Minimum Service Temperature: - 40 degrees F.
 - 2. Maximum Service Temperature: 220 degrees F.
 - 3. Connection: Waterproof vapor barrier adhesive.
- B. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

2.03 JACKETS

- A. PVC Plastic.
 - 1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F.
 - b. Maximum Service Temperature: 150 degrees F.
 - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 10 mil.
 - e. Connections: Brush on welding adhesive.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Insulate refrigerant suction and hot gas piping with 1" insulation.
- E. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.
- F. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with PVC jacket with seams located on bottom side of horizontal piping. Provide two coats of UV resistant finish for flexible elastomeric cellular insulation without jacketing.

END OF SECTION

SECTION 23 09 13

INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. AMCA 500-D - Laboratory Methods for Testing Dampers for Rating; Air Movement and Control Association International, Inc.; 2007.
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2001 (R2005)
- C. ASTM B32 - Standard Specification for Solder Metal; 2008.
- D. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2009.
- E. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2005.
- F. ASTM B819 - Standard Specification for Seamless Copper Tube for Medical Gas Systems; 2000 (Reapproved 2006).
- G. ASTM D1693 - Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics; 2008.
- H. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2008.
- I. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilation Systems; National Fire Protection Association; 2009.

1.02 SUBMITTALS

- A. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.
- B. Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system.
- C. Manufacturer's Instructions: Provide for all manufactured components.
- D. Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors. Accurately record actual location of control components, including panels, thermostats, and sensors.
 - 1. Revise shop drawings to reflect actual installation and operating sequences.
- E. Operation and Maintenance Data: Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.

PART 2 - PRODUCTS

2.01 EQUIPMENT - GENERAL

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

2.02 DAMPERS

- A. Performance: Test in accordance with AMCA 500-D.
- B. Frames: Galvanized steel, welded or riveted with corner reinforcement, minimum 12 gage.
- C. Blades: Galvanized steel, maximum blade size 8 inches wide, 48 inches long, minimum 22 gage, attached to minimum 1/2 inch shafts with set screws.
- D. Blade Seals: Synthetic elastomeric inflatable mechanically attached, field replaceable.
- E. Jamb Seals: Spring stainless steel.
- F. Shaft Bearings: Oil impregnated sintered bronze.
- G. Linkage Bearings: Oil impregnated sintered bronze.
- H. Leakage: Less than one percent based on approach velocity of 2000 ft/min and 4 inches wg.
- I. Maximum Pressure Differential: 6 inches wg.
- J. Temperature Limits: -40 to 200 degrees F.

2.03 DAMPER OPERATORS

- A. General: Provide smooth proportional control with sufficient power for air velocities 20 percent greater than maximum design velocity and to provide tight seal against maximum system pressures. Provide spring return for two position control and for fail safe operation.
1. Provide sufficient number of operators to achieve unrestricted movement throughout damper range.
 2. Provide one operator for maximum 36 sq. ft. damper section.
 3. Mount internal to damper frame at top of frame.
- B. Electric Operators:
1. Spring return, adjustable stroke motor having oil immersed gear train, with auxiliary end switch.

2.04 THERMOSTATS

- A. Electric Room Thermostats:
1. Type: NEMA DC 3, 24 volts.
 2. Service: cooling and heating.
 3. Covers: Locking with set point adjustment, without thermometer.

B. Line Voltage Thermostats:

1. Integral manual On/Off/Auto selector switch, single or two pole as required.
2. Dead band: Maximum 2 degrees F.
3. Cover: Locking with set point adjustment, with thermometer.
4. Rating: Motor load.
5. Temperature range: 45 – 75 degrees.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check and verify location of thermostats with plans and room details before installation. Locate 60 inches above floor. Align with lighting switches and humidistats.
- C. Install damper motors on outside of duct in warm areas. Do not install motors in locations at outdoor temperatures.
- D. Install "hand/off/auto" selector switches to override automatic interlock controls when switch is in "hand" position.

END OF SECTION

SECTION 23 11 13

GAS PIPING

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2009.
- B. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2010.

1.02 SUBMITTALS

- A. See Section 01 33 00 Submittal Procedures, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Project Record Documents: Record actual locations of valves.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.04 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.

PART 2 - PRODUCTS

2.01 GAS PIPING, BURIED

- A. Steel Pipe: Schedule 40 black.
 - 1. Fittings: Wrought steel welding type, with polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.
 - 2. Joints: ASME B31.1, welded.
- B. Fusion bonded HDPE for gas, meeting ASTM D2513

2.02 GAS PIPING, ABOVE GRADE

- A. Steel Pipe: Schedule 40 black.
 - 1. Fittings: Malleable iron or wrought steel threaded fittings.

2.03 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 - 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
 - 3. Trapeze Hangers: Welded steel channel frames attached to structure.
 - 4. Vertical Pipe Support: Steel riser clamp.

2.04 BALL VALVES

- A. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, solder ends with union.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- G. Install valves with stems upright or horizontal, not inverted.

H. Pipe Hangers and Supports:

1. Install in accordance with ASME B31.9.
2. Support horizontal piping as scheduled.
3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
4. Place hangers within 12 inches of each horizontal elbow.
5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

END OF SECTION

SECTION 23 23 00

REFRIGERANT PIPING

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2001 (R2005).
- B. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service; 2008.

1.02 SYSTEM DESCRIPTION

- A. Where more than one piping system material is specified ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
- B. Provide pipe hangers and supports in accordance with ASME B31.5 unless indicated otherwise.

1.03 SUBMITTALS

- A. Product Data: Provide general assembly of specialties, including manufacturers catalogue information. Provide manufacturers catalog data including load capacity.
- B. Shop Drawings: Indicate schematic layout of system, including equipment, critical dimensions, and sizes.
- C. Design Data: Submit design data indicating pipe sizing. Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.
- D. Test Reports: Indicate results of leak test, acid test.
- E. Manufacturer's Installation Instructions: Indicate support, connection requirements, and isolation for servicing.
- F. Project Record Documents: Record exact locations of equipment and refrigeration accessories on record drawings.
- G. Maintenance Data: Include instructions for changing cartridges, assembly views, spare parts lists.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store piping and specialties in shipping containers with labeling in place.
- B. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.
- C. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

PART 2 - PRODUCTS

2.01 PIPING

- A. Copper Tube: ASTM B280, H58 hard drawn or O60 soft annealed.
 - 1. Fittings: ASME B16.22 wrought copper.
 - 2. Joints: Braze, with silver/phosphorus/copper alloy.
- B. Pipe Supports and Anchors:
 - 1. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron adjustable swivel, split ring.
 - 2. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 - 3. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 - 4. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 - 5. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
 - 6. Vertical Support: Steel riser clamp.
 - 7. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 - 8. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
 - 9. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
 - 10. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

- A. Install refrigeration specialties in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and avoid interference with use of space.
- D. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

F. Pipe Hangers and Supports:

1. Support horizontal piping as scheduled.
2. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
3. Place hangers within 12 inches of each horizontal elbow.
4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
6. Provide copper plated hangers and supports for copper piping.

G. Provide clearance for installation of insulation and access to valves and fittings.

H. Flood piping system with nitrogen when brazing.

I. Follow manufacturer's procedures for charging and purging of systems and for disposal of refrigerant.

3.03 FIELD QUALITY CONTROL

A. Test refrigeration system in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 23 31 00

HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals; 2009.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2008.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2010b.
- D. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; Sheet Metal and Air Conditioning Contractors' National Association; 1985, First Edition.
- E. SMACNA (DCS) - HVAC Duct Construction Standards - Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; 2005.
- F. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.02 PERFORMANCE REQUIREMENTS

- A. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.03 SUBMITTALS

- A. Product Data: Provide data for duct materials.
- B. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual.

1.04 FIELD CONDITIONS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 - PRODUCTS

2.01 DUCT ASSEMBLIES

- A. All Ducts: Galvanized steel, unless otherwise indicated.
- B. Low Pressure Supply, return, exhaust, and heat recovery exhaust: 2 inch w.g. pressure class, galvanized steel.

2.02 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.

- B. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 - 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 - 2. Surface Burning Characteristics: Flame spread of zero, smoke developed of zero, when tested in accordance with ASTM E84.
 - 3. For Use with Flexible Ducts: UL labeled.
- C. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
- D. Insulated Flexible Ducts:
 - 1. UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound spring steel wire; fiberglass insulation; polyethylene vapor barrier film.
 - a. Pressure Rating: 10 inches WG positive and 1.0 inches WG negative.

2.03 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- C. Provide air foil turning vanes when rectangular elbows must be used.
- D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Install in accordance with manufacturer's instructions.
- C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- D. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- E. Install and seal metal and flexible ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- F. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- G. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

- H. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
- I. Use double nuts and lock washers on threaded rod supports.
- J. Connect air distribution to ducts directly or with five foot maximum length of flexible duct.
- K. Connect flexible ducts to metal ducts with draw bands and with metallic duct tape.
- L. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- M. At exterior wall louvers, seal duct to louver frame.

END OF SECTION

SECTION 23 33 00

AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association; 2009.
- B. SMACNA (DCS) - HVAC Duct Construction Standards - Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; 2005.

1.02 SUBMITTALS

- A. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.
- B. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers.
- C. Manufacturer's Installation Instructions: Provide instructions for fire dampers.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Protect dampers from damage to operating linkages and blades.

PART 2 - PRODUCTS

2.01 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- B. Flexible Duct Connections: Fabric crimped into metal edging strip.
 - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz. per sq. yd.
 - a. Net Fabric Width: Approximately 2 inches wide.
 - 2. Metal: 3 inches wide, 24 gage thick galvanized steel.
- C. Leaded Vinyl Sheet: Minimum 0.55 inch thick, 0.87 lbs. per sq. ft., 10 dB attenuation in 10 to 10,000 Hz range.

2.02 VOLUME CONTROL DAMPERS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- B. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.
- C. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
- D. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.

E. Quadrants:

1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- C. Provide duct test holes where required for testing and balancing purposes.
- D. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
- E. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- F. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
- G. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION

SECTION 23 34 50

CEILING MOUNTED CIRCULATION FANS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Motor-operated ceiling mounted circulation fans, with wall switch and accessories as required for a complete system as shown on the Drawings and as specified herein.
- B. Related Sections:
 - 1. Division 26 – Electrical: for electrical wiring and connections, for electrically circulation fans.

1.02 DESCRIPTION

- A. Fans shall be provided to meet the minimum capacities scheduled at the indicated conditions and shall meet constraints of construction and shall comply with specification Sections.

1.03 COORDINATION

- A. Fans of a specific manufacturer have been used as the basis of design. Modifications to controls, electrical connections, structural supports, etc., that result from use of equipment by other manufacturer, shall be coordinated with other trades; this coordination shall occur before delivery of equipment from the manufacturer. Modifications shall be performed without incurring additions to the Contract.

1.04 REFERENCES

- A. NFPA 70 - National Electrical Code.

1.05 SUBMITTALS

- A. Product Data: For each type of product.
- B. Furnish a copy of all operating and maintenance instructions for the fan.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver fans until building is enclosed and other construction where fans will be installed is substantially complete.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Protect fans from damage during delivery, handling, storage, and installation.

PART 2 - PRODUCTS

2.01 COMPONENTS

A. High Volume, Low Speed Fans:

1. Complete Unit: Fan shall be ETL certified and built pursuant to construction guidelines set forth by UL standard 507 and CSA standard 22.2.
 - a. Fan shall be designed to move an effective amount of air for cooling and destratification in large industrial applications with dense floor obstructions, over an extended life.
 - b. Fan and components shall be designed specifically for high volume, low speed fans to ensure lower noise operation.
 - c. Sound levels from fan operating at maximum speed shall not exceed 55 dBA (measured 20 feet below blades and 20 feet horizontally from center of fan).
2. Airfoils: Fan shall be equipped with ten (10) high volume, low speed airfoils of precision extruded aluminum alloy.
 - a. Each airfoil shall be of the high performance Powerfoil design.
 - b. Airfoils shall be connected by means of two (2) locking bolts per airfoil.
 - c. Airfoils shall be connected to the hub and interlocked with zinc plated steel retainers.
 - d. As an option, airfoils may be powder coated as specified by the Project Engineer or MDOT Architect.
3. Winglets: Fan shall be equipped with ten (10) Powerfoil Plus winglets designed to move air away from the fan at an angle, thereby increasing amount of area affected by fan.
 - a. Winglets shall be molded of high density polyethylene. A winglet shall be attached at the tip of each airfoil by means of a barrel screw.
 - b. Standard color of the winglets shall be "Safety Yellow," but may be colored as specified by the Project Engineer or MDOT Architect.
4. Motor: Fan motor shall be an AC induction type inverter rated at 1725 RPM, 230/460 VAC, 3 phase and 60 Hz.
 - a. Motor shall be totally enclosed, fan cooled (TEFC) with an IP55 NEMA classification. NEMA standard frames 56C/143TC/145TC shall be provided for ease of service.
 - b. Motor shall be manufactured with a double baked Class F insulation and be capable of continuous operation in -30F to 122F ambient conditions.
5. Gearbox: Fan gearbox shall be equal to NitroSeal™ Drive designed specifically for the Powerfoil X.
 - a. Gearbox shall include a high efficiency, hermetically sealed, nitrogen filled, offset helical gear reducer with two stage gearing, a 2-1/2 inches hollow output shaft, cast iron housing, double lip seals, high quality SKF Explorer Series bearings with crowned cages for optimal lubrication flow, and precision machined gearing to maintain backlash less than 11 arc-minutes over the life of the unit.
 - b. Lubrication shall be a high grade, low foaming synthetic oil with extreme pressure additives and a wide temperature range.
 - c. Fan gearbox shall be equipped with a passageway in which wiring, piping, etc. can be routed below the fan.
 - d. A non-rotating, standard junction box shall be provided at the base of the fan for installing optional features such as lights, cameras, and VESDA. An aluminum cover plate shall be provided for attachment to the junction box when these features are not installed.

6. Mounting Post: Fan shall be equipped with a mounting post that provides a structural connection between the fan assembly and upper mounting system.
 - a. Mounting post shall be 3 inches x 3 inches square tubing and powder coated for corrosion resistance and appearance.
 - b. As an option, mounting post may be colored as specified by the Project Engineer or MDOT Architect.
7. Hub: Fan hub shall be precision cast aluminum alloy for high strength and light weight.
 - a. Hub shall be secured to the output shaft of the gearbox by means of a steel flange interface.
 - b. Both hub and flange shall be precision machined to achieve a well balanced and solid rotating assembly.
 - c. Hub shall incorporate five (5) safety retaining clips made of 1/4 inch thick steel that shall restrain the hub/airfoil assembly in case of gearbox output shaft failure.
8. Mounting System: Fan mounting system shall be designed for quick and secure installation from a structural support beam.
 - a. Components in mounting system shall be of welded construction using low carbon steel no less than 3/16 inch thick and be powder coated for appearance and resistance to corrosion.
 - b. Mounting bolts shall be SAE Grade 8 or equivalent and rated with a minimum tensile strength of 150,000 psi.
 - c. As an option, mounting components may be colored as specified by the Project Engineer or MDOT Architect.
9. Safety Cable: Fan shall be equipped with a safety cable that provides an additional means of securing fan assembly to building structure.
 - a. Safety cable shall be 3/8 inch diameter and fabricated out of 7 x 19 stranded galvanized steel.
 - b. Loops shall be secured with swaged Nicopress fittings, pre-loaded and tested to 3,000 lb·f.
 - c. Field construction of safety cables is not permitted.
10. Controller: Fan controller shall be constructed using a Variable Speed Drive (VSD) that is pre-wired to motor and factory programmed to minimize starting and braking torques, for smooth and efficient operation.
 - a. Controller shall be prewired to the motor using a short run of flexible conduit THHM with a dedicated ground conductor to minimize electromagnetic interference (EMI) and radio frequency interference (RFI).
 - b. An incoming power cord shall also be pre-wired to the controller for ease of installation.
 - c. Controller shall be contained within a completely sealed aluminum enclosure and secured to the mounting post 'onboard' the fan assembly.
11. Wall Control: Fan shall be equipped with a remote wall control.
 - a. Wall control shall be a digital keypad device mounted inside an aluminum bezel.
 - b. The bezel shall be capable of mounting to a standard wall box. Wall control shall be equipped with touchpad controls and an LED display for controlling fan's direction, operation and speed.
 - c. Communication with the fan drive and controller shall be by a standard commercially available CAT-5 (or higher) Ethernet cable that is field installed and provided by the installer.

- d. 5'-0" 'patch cable' shall be provided to test and verify communication signals locally prior to connecting the remote connection cable.
 - e. Wall control shall be equipped with a simple diagnostic program to identify faults in the system. Provisions must be made for retrieving fan operation and diagnostic data (fault messages) through the remote wall device.
12. Warranty: Manufacturer shall replace products or components defective in material or workmanship, free of charge to the customer (including transportation charges), pursuant to complete terms and conditions of Manufacturer's Non-Prorated Warranty in accordance to the following schedule:
- a. Airfoils Lifetime (Parts)
 - b. Hub Lifetime (Parts)
 - c. Motor 10 years (Parts) †
 - d. Gearbox 10 years (Parts) †
 - e. Controller 10 years (Parts) †
 - f. Labor 1 year††

† 10 year parts warranty only valid with factory installation, 5 year parts without factory installation.

†† All reasonable costs of repair or replacement will be paid or reimbursed provided customer obtains pre-approval; see full warranty for details.

2.02 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by Delta T Corporation, dba Big Ass Fans, PO Box 11307, Lexington, Kentucky 40575. Phone (877) 244-3267. Fax (859) 233-0139.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. MacroAir, San Bernardino, CA Tel. (866) 668-3247.
 - 2. Rite-Hide Milwaukee, WI Tel. (888) 841-4283.
- C. Substitutions shall fully comply with specified requirements and Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Fan shall be mounted to an angle iron or I-beam structure. Consult the Installation Guide for proper sizing and placement of angle iron for a span mount.
 - 1. A structural engineer must be consulted for installation methods outside the manufacturer's recommendation and a certification submitted prior to installation.

- B. To reduce the risk of injury to persons, the fan shall be installed so that the airfoils are at least 10'-0" above floor.
 - 1. The fan installation area must be free of obstructions such as lights, cables, sprinklers or other building structures; with the airfoils at least 2'-0" clear of all obstructions.
 - 2. Fan should not be installed where it will be continuously subjected to wind gusts or in close proximity to the outputs of HVAC systems.

- C. If fan is hung from an extension tube that measures 4'-0" or longer, it may be necessary to provide guy cables or struts to limit potential lateral movement of the fan.
 - 1. A stiffening strut braced against an additional beam may be required if there is a close clearance situation.
 - 2. Design criteria for fan mounting system shall be capable of handling 300 ft·lbs of torque.

3.02 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Final Completion.

END OF SECTION

SECTION 23 81 29

VARIABLE REFRIGERANT VOLUME (VRV) HVAC SYSTEM

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; Air-Conditioning, Heating, and Refrigeration Institute; 2008.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. UL 1995 - Heating and Cooling Equipment; Current Edition, Including All Revisions.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

1.03 SUBMITTALS

- A. Design Data:
 - 1. Provide data showing that system will achieve performance specified.
 - 2. Provide refrigerant piping layout.
- B. Product Data: Submit manufacturer's standard data sheets showing the following for each item of equipment, marked to correlate to equipment item markings shown in the contract documents.
- C. Specimen Warranty: Copy of manufacturer's warranties.
- D. Shop Drawings: Installation drawings custom-made for this project; include as-designed HVAC layouts, locations of equipment items, refrigerant piping sizes and locations, condensate piping sizes and locations, remote sensing devices, control components, electrical connections, control wiring connections. Include:
 - 1. Detailed piping diagrams, with branch balancing devices.
 - 2. Detailed power wiring diagrams.
 - 3. Detailed control wiring diagrams.
 - 4. Drawings required by manufacturer.
- E. Operating and Maintenance Data:
 - 1. Manufacturer's complete standard instructions for each unit of equipment and control panel.
 - 2. Custom-prepared system operation, troubleshooting, and maintenance instructions and recommendations.
 - 3. Identification of replaceable parts and local source of supply.

F. Project Record Documents: Record the following:

1. As-installed routing of refrigerant piping and condensate piping.
2. Locations of access panels.
3. Locations of control panels.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Trained and approved by manufacturer of equipment. Submit list of at least five installations with submitted manufacturer.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, and handle equipment and refrigerant piping according to manufacturer's recommendations.

1.06 WARRANTY

- A. Compressors: Provide manufacturer's parts warranty for six (6) years from date of substantial completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: The system design shown in the contract documents is based on equipment and system designed by LG. Systems by Daikin and Samsung/Trane will also be acceptable.
- B. Coordinate with electrical subcontractor to provide power as required to submitted system.

2.02 HVAC SYSTEM DESIGN

- A. System Operation: Provide CU-1 heat pump systems that heat and cool simultaneously.
1. Zoning: Provide capability for temperature control for each individual indoor/evaporator unit independently of all other units.
 2. Zoning: Provide heating/cooling selection for each individual indoor/evaporator unit independently of all other units.
 3. Provide a complete functional system that achieves the specified performance based on the specified design conditions and that is designed and constructed according to the equipment manufacturer's requirements.
 4. Branch selector unit locations are not shown on the drawings.
 5. Connect equipment to condensate piping shown on the drawings.
- B. Controls: Provide the following control interfaces:
1. For Each Indoor/Evaporator Unit: One wall-mounted wired "local" controller, with temperature sensor; locate where indicated.
 2. Remote, multizone on/off control panels sufficient to control all units; locate where indicated.
 3. One central remote control panel for entire system; locate where indicated.
 4. One time clock control panel for entire system; locate where indicated.
 5. LonWorks gateways sufficient to connect units to building automation system by others; include wiring to gateways.

2.03 EQUIPMENT

- A. Units: Factory assembled, wired, and piped and factory tested for function and safety.
 - 1. Performance Certification: AHRI Certified; www.ahrinet.org.
 - 2. Safety Certification: Tested to UL 1995 by UL or Intertek-ETL and bearing the certification label.
 - 3. Provide units capable of serving the zones indicated.
 - 4. Energy Efficiency: Report EER and COP based on tests conducted at "full load" in accordance with AHRI 210/240 or alternate test method approved by U.S. Department of Energy.
- B. System Controls: Include self diagnostic, auto-check functions to detect malfunctions and display the type and location.
- C. Remote Centralized Control Panel.
- D. Remote On/Off Control Panel.
- E. Time Clock Panel.
- F. Unit Controls: As required to perform input functions necessary to operate system; provided by manufacturer of units.
 - 1. Provide interfaces to remote control and building automation systems as specified.
- G. Refrigerant Piping:
 - 1. Provide refrigerant system.
 - 2. Refrigerant Flow Balancing: Provide refrigerant piping joints and headers specifically designed to ensure proper refrigerant balance and flow for optimum system capacity and performance; T-style joints are prohibited.
 - 3. Insulate each refrigerant line individually between the condensing and indoor units.

2.04 OUTDOOR/CONDENSING UNITS

- A. Outdoor/Condensing Units: Air-cooled DX refrigeration units, designed specifically for use with indoor/evaporator units; factory assembled and wired with all necessary electronic and refrigerant controls; modular design for ganging multiple units.
 - 1. Refrigeration Circuit: Scroll compressors, motors, fans, condenser coil, electronic expansion valves, solenoid valves, 4-way valve, distribution headers, capillaries, filters, shut off valves, oil separators, service ports and refrigerant regulator.
 - 2. Refrigerant: Factory charged.
 - 3. Power Failure Mode: Automatically restart operation after power failure without loss of programmed settings.
 - 4. Provide refrigerant auto-charging feature and refrigerant charge check function.
 - 5. Safety Devices: High pressure sensor and switch, low pressure sensor/switch, control circuit fuses, crankcase heaters, fusible plug, overload relay, inverter overload protector, thermal protectors for compressor and fan motors, over current protection for the inverter and anti-recycling timers.
 - 6. Oil Recovery Cycle: Automatic, occurring 2 hours after start of operation and then every 8 hours of operation; maintain continuous heating during oil return operation.
- B. Unit Cabinet: Weatherproof and corrosion resistant; rust-proofed mild steel panels coated with baked enamel finish.

2.05 BRANCH SELECTOR UNITS

- A. Branch Selector Units: Concealed boxes designed specifically for this type of system to control heating/cooling mode selection of downstream units; consisting of electronic expansion valves, sub-cooling heat exchanger, refrigerant control piping and electronics to facilitate communications between unit and main processor and between branch unit and indoor/evaporator units.
1. Casing: Galvanized steel sheet; with flame and heat resistant foamed polyethylene sound and thermal insulation.
 2. Refrigerant Connections: Braze type.
 3. Condensate Drainage: Provide condensate drainage as required.

2.06 INDOOR/EVAPORATOR UNITS

- A. Factory assembled and tested DX fan-coil units, with electronic proportional expansion valve, control circuit board, factory wiring and piping, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch.
1. Refrigerant: Refrigerant circuits factory-charged with dehydrated air, for field charging.
 2. Temperature Control Mechanism: Return air thermistor and computerized Proportional-Integral-Derivative (PID) control of superheat.
 3. Coils: Direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond; waffle louver fin and high heat exchange, rifled bore tube design; factory tested.
 - a. Provide thermistor on liquid and gas lines.
 4. Fans: Direct-drive, with statically and dynamically balanced impellers; high and low speeds unless otherwise indicated; motor thermally protected.
 5. Return Air Filter: Washable long-life net filter with mildew proof resin, unless otherwise indicated.
 6. Condensate Drainage: Built-in condensate drain pan with PVC drain connection.
 - a. Units with Built-In Condensate Pumps: Provide condensate safety shutoff and alarm.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that required electrical services have been installed and are in the proper locations prior to starting installation.
- B. Verify that condensate piping has been installed and is in the proper location prior to starting installation.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install refrigerant piping in accordance with equipment manufacturer's instructions.
- C. Perform wiring in accordance with NFPA 70, National Electric Code (NEC).
- D. Coordinate with installers of systems and equipment connecting to this system.

3.03 FIELD QUALITY CONTROL

- A. Provide manufacturer's field representative to inspect installation prior to startup.

3.04 SYSTEM STARTUP

- A. Prepare and start equipment and system in accordance with manufacturer's instructions and recommendations.
- B. Adjust equipment for proper operation within manufacturer's published tolerances.

3.05 CLEANING

- A. Clean exposed components of dirt, finger marks, and other disfigurements.

3.06 CLOSEOUT ACTIVITIES

- A. See Section 01 77 00 Closeout Procedures, for closeout submittals.
- B. Demonstrate proper operation of equipment to Owner's designated representative.
- C. Demonstration: Demonstrate operation of system to Owner's personnel.
 - 1. Use operation and maintenance data as reference during demonstration.
 - 2. Conduct walking tour of project.
 - 3. Briefly describe function, operation, and maintenance of each component.
- D. Training: Train Owner's personnel on operation and maintenance of system.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of two hours of training.
 - 3. Instructor: Manufacturer's training personnel.
 - 4. Location: At project site.
- E. Provide a clearance letter from designer that the system is properly installed.

3.07 PROTECTION

- A. Protect installed components from subsequent construction operations.
- B. Replace exposed components broken or otherwise damaged beyond repair.

END OF SECTION

SECTION 26 00 10

GENERAL PROVISIONS, ELECTRICAL

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The complete electrical system for lighting, power, control, and other purposes, as herein specified and/or indicated on the drawings; all necessary electrical connections to equipment furnished under other sections of the specifications and by others, whether indicated or not; and all cutting and patching required for the electrical work.

1.02 CODES AND STANDARDS

- A. All work shall be installed in accordance with the applicable provisions of the 2012 Edition of the International Building Code, the 2014 Edition of the National Electrical Code, and the National Electrical Safety Code.
- B. All electrical materials shall be listed by Underwriters' Laboratory (UL), and shall be so labeled where UL labeling is customary.
- C. All electrical equipment shall conform to applicable NEMA Standards whether specified herein or not, and to other applicable Standards which may be specified hereinafter.

1.03 ACCURACY OF DATA AND DRAWINGS

- A. Drawings and Data: Electrical drawings are generally diagrammatic, and where not dimensioned or detailed, indicate approximate locations and general arrangements of electrical work. Conduit offsets, risers, junction boxes, pull boxes, and fittings are not necessarily shown; however, provide these as required by the conditions involved and applicable codes for a correct and complete installation.
- B. Building and structure dimensions: TAKE THESE FROM ARCHITECTURAL AND STRUCTURAL DRAWINGS AND FROM ACTUAL MEASUREMENTS MADE BY ELECTRICAL SECTION OF EACH BUILDING AND STRUCTURE INVOLVED.
- C. Equipment NOT furnished by Electrical Section but requiring electrical connections: From other sections and others furnishing this equipment, determine exact electrical connection requirements therefore; Locations and arrangements of electrical connections indicated for this equipment are APPROXIMATE ONLY.

1.04 SUBMITTALS AND SHOP DRAWINGS

- A. Submittals shall be provided to the Engineer as described in the General Conditions section, unless otherwise specified in the individual specification section.
- B. Submittals shall be made for all wire, conduit, equipment and devices described in this specification which is applicable to the project.
- C. All submittals shall be COMPLETE such as all lighting fixtures, all panelboards, etc. Partial submittals will be returned, unchecked, for completion and resubmittal.

- D. The submittals shall consist of manufacturer's standard published catalog or other data sheets and shop drawings. Data sheets can be originals or good quality copies. Shop drawings shall be prepared by the manufacturer or their authorized representative. Each data sheet or shop drawing shall clearly indicate the manufacturer's name, catalog number, physical size, color, electrical characteristics, options and accessories that are specified, indicated on the drawing and/or applicable for the project.
- E. Each submittal shall be in a bradded folder, booklet or a standard three ring binder. Loose sheets or sheets paper-clipped or stapled together will not be accepted. A plain cover sheet shall be provided for stamping in each copy of the submittal. At the top of this cover sheet shall be typed the project name and number as it appears on the contract documents; the name, address and telephone number of the electrical Contractor; the electrical Contractor's representative; the date the submittal was prepared and the name, address, telephone number and representative of those who prepared the submittal if different than the electrical Contractor.
- F. Resubmittals of items, that were not approved in the initial submittal and required to be resubmitted, shall be in the same format as the initial submittal.

PART 2 - PRODUCTS

2.01 PROCUREMENT OF ELECTRICAL DEVICES AND EQUIPMENT

- A. The Contractor shall not release orders for devices and equipment until submittals and shop drawings are approved. If a Contractor does, corrections and replacements for items not approved or approved as corrected shall be made at the Contractor's expense.

2.02 GROUNDING

- A. Ground electrical equipment and conductors as required by the National Electrical Code and other applicable electrical codes.

2.03 TYPE OF SYSTEM, WIRING METHOD

- A. Electrical system characteristics: These shall be as indicated. In addition, whether indicated or not, provide low voltage (less than 150 volts) wiring for controls and other purposes, as required for the complete electrical system.
- B. Enclosures: Regardless of voltage or use, install wiring in conduits, raceways or other enclosures, unless otherwise indicated or otherwise specified.
- C. Finished Areas: Conceal conduits below floors, within slabs only where indicated, within walls, within pipe chases, above suspended ceilings, and within other building construction, in finished areas, unless otherwise indicated. Conduits shall not be run in floor slabs except where otherwise indicated. Conduits for feeders to panelboards, generators, motors, and HVAC equipment may be run below floor slabs on grade. Outlet and junction boxes shall be flush mounted in walls and ceilings or mounted above accessible ceilings.
- D. Unfinished Areas: Install above-floor conduits exposed in areas where pipe chases or suspended ceilings are not indicated or concealing is otherwise impracticable, in mechanical and electrical equipment rooms or storage areas, and other unfinished areas. Outlet and junction boxes may be flush mounted in walls or surface mounted.

- E. Derating: The contractor shall be responsible for increasing the size of branch circuit and feeder conductors due to voltage drop, banking of conduits below grade or ambient temperatures above 86 degrees F unless otherwise indicated or specified.
- F. Flexible Cords: Exposed flexible cords approved for the purpose involved shall be used to connect equipment where indicated or specified, and where equipment is factory furnished with or factory arranged for flexible cord connections only. However, in each such case, install the supply outlet as near as practicable to the equipment served thereby, and use the shortest practicable length of exposed flexible cord between the equipment and the outlet

2.04 TEMPORARY CONSTRUCTION POWER

- A. The Contractor shall provide temporary power service equipment and wiring as required for the project. The service shall be obtained from the Electric Utility Company in the Owner's name. The Owner shall pay all usage fees. The Contractor shall pay all installation charges and include such charges in the bid. The Contractor shall remove all temporary power devices and wiring.

PART 3 - EXECUTION

3.01 EQUIPMENT INSTALLATION

- A. Install all equipment in accordance with applicable manufacturer's drawings and recommendations.

3.02 TESTS, INSPECTIONS, ADJUSTMENTS AND CLEANUP

- A. Furnish suitable testing equipment, give the Engineer and all applicable authorities ample advance notice of all proposed tests and readiness of work for inspections, and conduct each test in their presence, as approved. Do not conceal electrical work until all necessary inspections have been made and all required tests have been approved by the Engineer and all applicable authorities.
- B. Put entire electrical system in operation, test all equipment, remedy all defects and make all necessary adjustments. Demonstrate that the entire system functions satisfactorily, as specified, as indicated and as approved.
- C. After the electrical system has been tested and before any field painting is commenced, clean up all electrical work thoroughly. Remove all foreign matter which has accumulated in all fixtures, equipment, and enclosures. Clean all fixture glassware and reflectors and clean and polish all other surfaces that are not to be painted so that they present a new and acceptable appearance.

3.03 FEEDER, STARTER, SWITCH, PROTECTIVE DEVICE, AND OTHER ELECTRICAL DEVICE SIZES

- A. Capacities of feeders, motor starters, circuit breakers, switches, protective devices, and other electrical devices indicated to be furnished and installed by Electrical Section for electrically operated equipment, regardless of who furnishes and/or installs that equipment, are based upon the average horsepower and/or electrical ratings of the types and sizes of the equipment used. HORSEPOWER AND/OR ELECTRICAL RATINGS OF ELECTRICALLY OPERATED EQUIPMENT INDICATED ON ELECTRICAL DRAWINGS SHALL NOT LIMIT SIZES OF THE ELECTRICALLY OPERATED EQUIPMENT AND CAPACITY OF THE ELECTRICAL WORK.
1. Before commencing electrical work for electrically operated equipment, electrical section shall: check horsepower and/or electrical rating of each individual electrically operated equipment items, regardless of who furnished and/or installs that equipment; and adjust sizes of all applicable feeders, motor starters, circuit breakers; switches, protective devices, and other electrical devices furnished by Electrical Section, as required to provide proper protection and satisfactory operation of the electrically operated equipment actually installed. This includes increasing to next larger size, or decreasing to next smaller size, all feeders, circuit breakers, starters, switches, protective devices, and other electrical devices involved, as required to match capacities of corresponding electrically operated equipment actually installed, except that no sizes shall be decreased without approval. The Contractor shall notify the Engineer of any such changes.
- B. Switches, circuit breakers, motor starters, protective devices, and other electrical devices furnished by other Sections and by others for installation and/or wiring by Electrical Section, are specified elsewhere to have adequate capacities to serve the electrically operated equipment which they are furnished. However, BEFORE installing and/or wiring each of these devices, Electrical Section shall check each individual device's electrical rating with the horsepower and/or electrical rating of the corresponding electrically operated equipment actually installed, regardless of who furnishes and/or installs the devices and equipment. Electrical Section shall not install and/or wire any device that is found to be the incorrect size, and shall see to it that correctly sized devices are furnished by the applicable Section and other applicable persons in all cases. The Contractor shall notify the Engineer of any such changes.
- C. Major equipment items such as panelboards, transfer switches, generators, control panels, etc. are drawn to scale using nominal dimensions based on information of one of the major manufacturers of the item. The Contractor shall inform prospective equipment suppliers of any space limitations associated with the locations of the equipment and verify that their equipment will or will not fit in the space indicated on the drawings. Proper clearances in front of and around equipment as indicated for working and cooling shall be maintained as indicated or required by applicable codes. If there are any conflicts, the Contractor shall notify the Engineer before bids are submitted for the project or work.
- D. All electrical outlets, switches, starters, etc. shall be installed in approximately the locations indicated. Adjustments shall be made as required to avoid interferences with installed equipment, work by other divisions, and structure. Code required clearances shall be maintained around electrical equipment.

3.04 PROTECTION AND CLEANING

- A. Work shall be protected at all times. Conduit openings shall be closed with caps or plugs until permanent connections are made. Fixtures and equipment shall be covered, if necessary, to protect against dirt, water, chemical or mechanical damage or defacement.

3.05 OPERATING INSTRUCTIONS

- A. Furnish the services of a competent person (or persons) to instruct the Owner's personnel in the proper operation and maintenance of all equipment, for a period of not less than one working day for each system installed.
- B. Furnish and deliver to the Owner three sets of operating instructions for all equipment installed under this contract, including as-built shop drawings and wiring diagrams, installation, operation and testing instructions, preventative maintenance recommendations and information concerning replacement parts and service representative.

3.06 AS-BUILT DRAWINGS

- A. The Contractor shall provide a complete set of as-built drawings as described in the General Conditions section. The drawings shall include the same information as the contract and/or shop drawings and any changes or deviations which were made. The location of all underground wiring or wiring concealed in or under the slab in contact with the ground and devices shall be dimensioned on the drawings referenced from the exterior walls, columns and corners of the building.

3.07 GUARANTEE

- A. The Contractor shall guarantee all work to be in accordance with contract requirements and free from defective or inferior materials, equipment, and workmanship for a period of one year from the date of final acceptance, and he shall guarantee that all equipment is of proper size and design and so installed as to produce the capacities and results specified and shown on the drawings.
- B. Defects arising during the warranty period shall be promptly remedied by the Contractor at no expense to the Owner.

END OF SECTION

SECTION 26 00 50

BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Equipment and materials used in the work shall be in accordance with the contract documents; of the best quality and grade for the use intended; shall be new and unused; and shall be the manufacturer's latest standard or current model for which replacement parts are readily available.
- B. Work shall be installed under the constant supervision of a competent superintendent and by skilled and competent electricians.
- C. Apparatus and equipment shall be installed and connected in accordance with the best engineering practices and in accordance with the manufacturer's recommendations. Auxiliary wiring, relays, contactors, controllers, and electrical connections of any description recommended by the manufacturer and required for the proper operation of items of equipment furnished under this contract shall be furnished and installed complete.

1.02 ELECTRICAL WIRING FOR EQUIPMENT OF OTHER SECTIONS

- A. General:
 - 1. Electrical wiring of every description required to operate equipment furnished by other sections shall be done by the Electrical Section, except as otherwise specified in mechanical and control sections, to be provided by the Mechanical Section, and as otherwise specified hereinafter. Read carefully other sections in which electrically operated equipment is specified, and include in the electrical work electric wiring required for the proper operation of the equipment, whether indicated on the electrical drawings or not. Coordinate the Electrical section work with that of other sections that furnish equipment requiring electrical connections.
 - 2. Control devices required to operate the equipment shall be furnished by the Section that furnishes the equipment, unless otherwise specified. Control devices which are not factory mounted on the equipment and require electrical connections ONLY shall be installed by the Electrical Section. Control devices which are not factory mounted on the equipment and require piping, linkage, remote bulb, or other mechanical connections as well as electrical connections shall be installed by the Section that furnishes the equipment involved, ready for electrical connections.
 - 3. Outlet locations indicated on the electrical drawings for motors, controls, and other electrically operated items of other Sections are APPROXIMATE ONLY, as the actual wiring requirements are not necessarily identical for the various makes of each item of equipment involved. However, the Electrical Section shall locate outlets and arrange wiring to properly serve the equipment ACTUALLY INSTALLED, generally as indicated on the electrical drawings, but EXACTLY in accordance with rough-in sheets and/or wiring diagrams furnished by the other Sections involved.
 - 4. The necessary wiring diagrams shall be furnished by the Section that furnishes the equipment involved, and after these are approved, do all wiring accordingly.

- B. Wiring NOT included: Wiring which is factory installed on equipment.
- C. Wiring Included: Generally, equipment of other Sections requiring wiring that is not provided by that section.

PART 2 - PRODUCTS

2.01 HANGERS, SUPPORTS, AND SLEEVES

- A. Securely attach hangers, supports, and devices to the building structure with anchors suitable for the types of building construction involved. Provide necessary pipe, angle iron, "Unistrut", "Kindorf", "B-Line" or other suitable steel auxiliary supports for the electrical work.
- B. Trapeze hangers may be used for groups of suspended horizontal conduits, with each conduit attached to each trapeze bar.
- C. Conduit hangers shall be pre-manufactured metal hangers. Tie wire is not acceptable. Wire, plastic cable ties, or other "temporary" supports shall not be permitted.
- D. Maximum hanger or support spacings for all conduits shall be as required by Codes. Support non-concrete encased underground conduits by laying with full length bearing on firm trench bottoms. Support each riser conduit at each building floor level.
- E. Conduits shall not be supported from the ceiling hanger wires or ceiling tee bars. Conduits shall not be run across and secured directly to the ceiling tee bar system that will prohibit the raising and removal of the ceiling tile.
- F. Adequately support all boxes, gutters, panelboards, switches, starters, fixtures, and other devices, and equipment. Where supporting method is indicated or detailed, provide supports accordingly; OTHERWISE, supports shall be as required by the Codes, and as approved.
- G. Provide necessary sleeves for conduits and other electrical items passing through concrete and masonry construction where conduit and other electrical items are not installed prior to concrete placing or masonry laying. Sleeves through concrete walls, concrete columns, and concrete beams shall be IPS steel pipe or rigid steel conduit, flush with finished concrete surfaces. Sleeves for all conduits passing through the slab on grade shall be PVC extending two inches above finished floor.

2.02 CONDUIT AND FITTINGS

- A. Conduits: These shall be zinc coated rigid steel, zinc coated steel electrical metallic tubing (hereinafter referred to as "thin wall conduit"), Type 40 or 80 as approved UL listed heavy wall rigid PVC, as applicable. In each case where the conduit type is indicated, specified, or required by the Codes, install only the indicated, specified, or Code required type; OTHERWISE, conduit usage shall be as follows:
 - 1. Embedded in concrete on grade: PVC conduit only where indicated on the drawing.
 - 2. In contact with the ground: PVC conduit.
 - 3. Run exposed in the interior or concealed in walls or above ceilings: Rigid steel, intermediate metal or (EMT) conduit.

4. For supporting fixture, outlet boxes, and other devices and equipment which are not directly anchored to the building structure: Rigid steel, with all joints and connections threaded.
5. Exposed to weather, in wet or damp locations or wash-down areas, and hazardous locations; rigid steel conduit.
6. Flexible connections: Flexible steel conduit ("Greenfield"), in short lengths only, at each motor and transformer connection and other location requiring flexibility; of liquid tight type where exposed to weather, excessive moisture or wash-down areas.
7. Other locations: thin wall, rigid steel, conduit, as applicable and allowed by Codes.

B. Acceptable Manufacturers:

1. EMT, Rigid Steel
 - a. Allied
 - b. LTV Steel Tubular Products Company
 - c. Triangle
 - d. Wheatland
2. Flexible Metal Conduit
 - a. AFC
 - b. Alflex Corp.
 - c. Anamet, Inc.
 - d. Electri-Flex Co.
3. Liquidtight Flexible Metal Conduit
 - a. AFC
 - b. Alflex Corp.
 - c. Anamet, Inc.
 - d. Carol
 - e. Electri-Flex Co.
 - f. Spiraduct
4. PVC
 - a. Carlon
 - b. Cantex
 - c. Georgia Pipe
 - d. Certain Teed

C. Conduit Fittings: For metallic conduit, fittings shall be zinc coated steel or malleable iron. For EMT, fittings shall be rain tight compression type. Set screw fittings shall not be allowed. For rigid steel conduit, fittings shall be threaded type. For PVC conduit, fitting shall be of the same material and make as those of the conduit. Fittings exposed to weather and wash-down areas shall be weatherproof type.

1. Acceptable Manufacturers:
 - a. Appleton
 - b. Crouse Hinds
 - c. O-Z/Gedney
 - d. Raco
 - e. Thomas and Betts
 - f. Steel City
 - g. Midwest Electric
 - h. Remke Industries
 - i. M.E. Madison
 - j. Regal

- k. Spring City
- l. Carlon (PVC)
- m. Cantex (PVC)
- n. Georgia Pipe (PVC)
- o. Certain Teed (PVC)

D. Installation:

1. General: ream ends of all conduits after cutting. Prior to wire pulling, keep open conduit ends plugged, and swab out all trapped conduits in which water or moisture has collected. Where conduits are concealed in walls, install these conduits so that the exposed wall faces will not be marred.
2. Minimums size of conduit shall be $\frac{3}{4}$ " except for light switch legs to single switches which may be $\frac{1}{2}$ ".
3. Conduit routing, general: see TYPE OF SYSTEM, METHOD OF WIRING herein before for locations where concealed and exposed conduits are required and/or permitted. Where conduit routings are detailed or dimensioned install conduits with the shortest practicable path, and install concealed and exposed conduits in straight, level, and plumb lines, parallel with or at right angles with beams, walls, ceilings, and other building lines.
4. Branch circuit conduit routings: except where detailed or dimensioned, the indicated branch circuit conduit routings are generally diagrammatic, and are intended to show the required circuitry from panelboards to outlets. However, if necessitated by job conditions, deviations from the indicated routings may be made, provided that regardless of the actual installed arrangement of the conduits: each outlet marked with the same circuit number is connected to the same corresponding numbered circuit; outlets are switched and controlled as indicated; and no home run is brought into any switch box unless otherwise indicated.
5. Conduit shall be installed a minimum of 12" from steam or hot water piping run in parallel with the conduit, a minimum of 6" where piping run perpendicular to the conduit and a minimum of 3" from cold water piping.
6. Provide approved expansion fittings where conduit crosses expansion joints.
7. Use double locknuts and approved grounding type insulating bushings on all feeder conduits and at panelboards, and transfer switches.
8. Where conduits penetrate fire walls, smoke partitions, floors or fire rated ceilings, sleeves shall be provided. The penetration shall be sealed in an approved manner with a fire-rated sealant with a rating equal to that of the wall, floor, etc. but not less than 2 hour. Refer to Specifications for acceptable manufacturers.
9. Provide pull chords in all empty conduits 50' or longer.
10. Conduit shall not pass through air ducts, or air shafts.
11. Conduits shall not be attached to supports for plumbing piping or duct-work.
12. Conduits shall be installed concealed, except in unfinished mechanical and electrical rooms.
13. PVC conduits: solvent weld joints between PVC materials, with cement furnished by the conduit manufacturer. Provide suitable adapter where PVC conduits are coupled to metallic conduits. Provide a steel threaded coupling in the slab at the base of each riser from below ground, in and below floor to above ground and above floor. There shall be no PVC conduit run exposed or concealed above ceilings or in walls in the building.
14. Where concrete encased duct lines are indicated on the drawings, the conduits shall be grouped neatly using PVC spacers and encased in 3 inches of concrete.
15. Where conduits penetrate exterior walls below grade, use "Link-Seal" or as approved modular seal fittings with stainless steel hardware.

2.03 PULL BOXES, JUNCTION BOXES, AND WIRING GUTTERS

- A. General: Pull boxes, junction boxes, and wiring gutters shall be of the types and minimum sizes indicated, or as required for the conditions involved where types and sizes are not indicated. Before installation, check proposed locations of boxes and gutters with the architectural, structural, and mechanical drawings, and locate each box and gutter so that it will be accessible in the finished project. Install above grade boxes so that the cover faces to the side or down.
- B. Four (4) inch square pull boxes and junction boxes in or on ceilings shall be supported from the tee bar or ceiling support member with a hanger designed for this purpose that secure to the tee bar or ceiling support. Neither the box nor the device attached to that box shall be supported by the ceiling material. Larger pull boxes and junction boxes shall be supported on or from the structure.
- C. Pull boxes and junction boxes in or on gypsum board and stud walls shall be secured to the studs or bracing. The boxes shall not be supported by the gypsum board material.
- D. Junction and pull boxes exposed to the weather, in wet location and in wash-down areas shall be cast metal with threaded hubs and gasketed covers with stainless steel screws.
- E. Pull boxes and junction boxes shall be identified as to their contents. Boxes for power feeder and branch circuit wiring shall indicate the circuit numbers. Boxes for communication and control wiring shall indicate the system or what the wiring is for. The identification shall be written on the cover in bold characters using a wide tip, black, permanent marker.
- F. Provide code size pull boxes, in accessible locations, in all conduits where the number and degree of bends exceed code limitations and every 150 feet for long straight runs.
- G. Inground pull boxes for telecommunications cables shall be UL Listed, polymer concrete type, Quazite Style PG or as approved. Boxes shall be of the size indicated on the drawings. The sizes noted indicate the inside dimensions of the box. Boxes shall be open bottom with no mouse holes. Holes shall be cut in boxes per the manufacturers instructions. Covers shall be one or two piece, Tier 22, 22,500/33,750 lb load, extra heavy duty with stainless steel bolts and washers and a logo as required by the owner. Install the boxes in accordance with the manufacturer's instructions. Boxes shall be set on a minimum 8" bed of crushed rock for drainage and shall be set flush with the ground. Provide internal bracing in the box during backfilling. Provide a concrete collar around the box per the manufactures instructions.

2.04 OUTLET BOXES

- A. General: Outlet boxes and covers therefore shall be steel or cast ferrous metal with zinc or other suitable metallic rustproof coating, or cast aluminum, of the proper sizes and types to accommodate the conduits, conductors, connections, devices, fixtures, architectural conditions and structural conditions involved. Interior dry wall boxes shall be 4 inch square single or multi-gang, non-gangable, 2-1/8 inches deep with plaster rings. Masonry boxes shall be FS type, single or multi-gang.

1. Acceptable Manufacturers:

- a. Appleton
- b. Crouse-Hinds
- c. O-Z Gedney
- d. Killark
- e. Thepitt
- f. Raco
- g. Steel City

B. Special Box Requirements

1. Exposed-to-weather or wash-down area outlet boxes shall be cast metal "FS" type, with threaded hubs and gasketed covers and stainless steel screws, strictly weatherproof.

C. Installation

1. Before installation, check proposed location of each outlet box with the architectural structural, and mechanical drawings and locate each outlet box so that they will be accessible and interference free in the finished project.
2. Set each concealed box flush with finished surfaces, and so that exposed finished surfaces will not be marred.
3. Install each wall switch on the knob side of the door involved. Before placing each wall switch box, verify the applicable door swing with the architectural drawings, and locate the wall switch box accordingly.
4. Where equipment is served by exposed flexible cords, locate the outlet box as near as practicable to the equipment connection point, to minimize flexible cord length.
5. All outlet boxes in or on ceilings shall be supported from the tee bar or ceiling support member with a hanger designed for this purpose that secure to the tee bar or ceiling support. The box nor the device attached to that box shall not be supported by the ceiling material.
6. All outlet boxes in or on gypboard and stud walls shall be secured to the studs or bracing. The boxes shall not be supported by the gypboard material.

2.05 WIRE, JOINTS, AND SPLICES, 600 VOLTS AND LESS

- A. Lighting and power wire shall be copper only: Types shall be as follows:

1. Where type is indicated: indicated type only.
2. High temperature and other special conditions: types NEC approved for the conditions involved.

3. Exposed flexible cords: Type SO, with grounding conductor.
 4. Other lighting and power wire: No. 12 and larger, Type THWN or THHN stranded; as allowed by code, unless otherwise indicated.
- B. Control wire shall be Type MTW copper, stranded.
- C. Signaling, sound, communications, alarm, indicating, and other special system wire shall be copper, of the types specified hereinafter with the equipment, or as indicated, or as recommended by the equipment manufacturers if neither indicated nor specified.
- D. Wire Sizes: Where sizes are neither indicated nor otherwise specified, wire sizes shall be:
1. Branch circuit wire: No. 12, minimum.
 2. Control wire: No. 14, or as recommended by the control manufacturer.
 3. Special system wire: as recommended by the manufacturer of the equipment involved.
- E. Identification:
1. General: All wires shall be identified as required by NEC.
 2. The insulation on wiring #8 or smaller shall be factory-color coded. Each phase conductor of each branch circuit shall be of one color throughout the installation. Colors shall be as follows:
 - a. 280/120 volt system:
 - b. Phase A – black
 - c. Phase B – red
 - d. Phase C – blue
 - e. Neutral – white
 - f. Ground – green
 3. Control and special systems wire: These shall be color coded throughout, or identified at each terminal and junction point with a suitable permanently attached tag or label.
- F. All wire of each type shall be of the same manufacturer. Do not mix wire of different manufacturers.
- G. Acceptable Manufacturers
1. Building wire 600 volts and less:
 - a. American Electric
 - b. Capitol Wire and Cable
 - c. Condux Inc
 - d. Diamond Wire
 - e. General Cable
 - f. Southwire
 - g. Triangle Wire

- H. Joints and Splices: Make these with suitable solderless connectors, in the various boxes, gutters, and similar locations, but not in any conduit. Leave enough wire slack to permit at least one splice or joint to be remade.
1. Interior branch circuit, control and special system wire joints No. 8 and smaller: use tool-applied to twist-on type connectors.
 - a. Acceptable Manufacturers:
 - (1) Ideal "Wing Nut"
 - (2) ITT Blackburn "Free Spring"
 - (3) Buchanan "B Cap"
 - (4) 3M "Scotchlok"
 - (5) Thomas & Betts "Piggy"
 - (6) Panduit "P-Conn"
 2. Exterior branch circuit, control and special system wire joints No. 8 and smaller: use tool-applied copper compression connectors.
 3. All other wire joints No. 6 or larger: Use suitable copper tool-applied mechanical compression or bolted type connectors for interior joints and copper tool-applied mechanical compression connectors for exterior joints. Split bolt connectors are not acceptable.
 - a. Acceptable Manufacturers
 - (1) Buchanan
 - (2) Burndy
 - (3) IlSCO
 - (4) Ideal
 - (5) ITT Blackburn
 - (6) Thomas and Betts
 - (7) Panduit
 4. Insulate interior joints and splices with suitable insulating sleeves or caps integral with the connectors or separate therefrom, or with vinyl plastic insulating tape.
 5. Insulate exterior joints with heavy wall heat shrink tubing or caps. The heat shrink material shall be U.L. Listed "Waterproof".
 - a. Acceptable Manufacturers:
 - (1) Ideal
 - (2) Panduit
 - (3) Raychem
 - (4) 3M
 - (5) Thomas & Betts
- I. Testing of Wiring and Cable, 600 volts and less: Make insulation tests with a "Megger". Demonstrate that neither short circuits nor ground faults exist, and that wiring complies with NEC.

2.06 PANELBOARDS

- A. General: Panelboards shall be Cutler Hammer, General Electric, Square D, or Siemens, as approved by the Engineer, circuit breaker type as specified below. Capacities, quantities of overcurrent protective devices, mounting type (surface or flush), and special requirements (if any) for each panelboard shall be as indicated on drawings. Each panelboard shall have a lockable door with a circuit directory card and card holder. All panelboards shall be keyed alike; furnish two keys for each lock; deliver these to the Owner's authorized representative, and obtain his signed receipt therefore. Where two or more flush panelboards are mounted side-by-side, boxes shall be same size and type.
1. Unless otherwise indicated or otherwise specified, load centers will not be permitted.
- B. Types of Panelboards: Each panelboard shall be of type required to accommodate application involved, and indicated or available fault current at panelboard. Panelboard busses shall be minimum 98% conductivity copper with full rated neutral busses. Panelboard and overcurrent protective device type shall be:
1. Branch circuit panelboard: Bolt-on type molded case circuit breakers. Where indicated or required, circuit breakers shall have ground fault tripping devices.
 2. Distribution panelboards (panelboard construction): Bolt-on type thermal-magnetic molded case circuit breakers as indicated.
 3. Thermal-magnetic molded case circuit breakers shall be adjustable for 250 amps and larger frame sizes.
 4. Panelboards and devices shall be fully rated. Series rated systems are not acceptable.
 5. Breakers in 208/120 volt panels shall have a published ampere interrupting rating at 125/250 V, DC. Breakers without the DC rating are not acceptable.
 6. Unused breaker or conduit openings shall be plugged with snap-in devices designed for the purpose.
- C. Circuiting: Circuit numbers shown on drawings indicate specific panelboard to which each branch circuit shall be connected, and specific outlets which shall be connected to each branch circuit, and unless otherwise indicated these circuit numbers do not necessarily indicate actual number of circuit breaker in each panel to each branch circuit shall be connected. Connect each outlet marked with same circuit number to same numbered branch circuit, and connect each branch circuit to indicated panelboard. In each individual panelboard:
1. Balance active circuits on panelboard busses, and leave spare circuit breakers equally divided among panelboard busses, as nearly as practicable.
 2. Connect each ungrounded wire of each 3 and 4 wire common neutral circuit to a different panelboard bus.
- D. Identification:
1. Identification of Circuits and Equipment: Identification designations shall correspond to those indicated on the electrical drawings.
 2. Clearly typewrite on each panelboard directory card the designations and locations of the fixtures, outlets and equipment served by each device in the panelboard. Panelboard directory cards shall indicate actual assigned room numbers and not those indicated on the plans.

3. Identify each entire panelboard assembly with a laminated plastic nameplate engraved with 1/2-inch minimum height characters showing panelboard designation. The nameplate shall be white with black characters and securely attached to the outside front of the panel with screws or revits. Provide an additional separate laminated plastic sign of the same specifications with 1/4" characters, which indicates the feeder size, circuit number, protective device size and origin from which it is fed and securely attach to the inside of panelboard door over directory card.
- E. Panelboard supplier shall perform a system-wide coordination and arc-flash study for breakers and fused switches, and motor starters and provide to the Contractor recommended settings for all adjustable features of distribution panelboard circuit breakers based upon the designed use of the equipment and the feeder size and length information obtained from the contractor and the available fault current information obtained from the engineer. Submit one copy of the study to the engineer. Provide and install the arc-flash labels on the panelboards, separately enclosed breakers, fused switches and motor starters.
- F. Acceptable Manufacturers:
1. Cutler Hammer "Pow-R-Line" Series
 2. General Electric "A or Spectra" Series
 3. Square D "NQOD or I-Line" Series
 4. Siemens "P1 thru P5" Series

2.07 DISCONNECT SWITCHES, MOTOR STARTERS AND SEPARATE CIRCUIT BREAKERS

- A. General: Except as otherwise specified below, Electrical Section shall provide disconnect switches, circuit breakers, and motor starters for all motors and other electrically operated equipment, regardless of who furnishes and/or installs that equipment. Types and locations of these devices shall be as indicated, or as required where types and/or locations are not indicated.
1. These devices which are located on other equipment shall be as specified under the corresponding headings; these devices NOT located on other equipment shall be as specified below, and shall be separately mounted.
 2. Separately mounted disconnect switches, circuit breakers, and motor starters shall be General Electric, Cutler Hammer, Square D, or Siemens as approved. Enclosure types shall be NEMA 3R for devices exposed to weather; NEMA 4 in wash-down areas, NEC required type for devices in other special locations, and NEMA 1 type for devices in dry indoor locations. Each circuit breaker and each disconnect switch, including those integral with motor starters, shall have padlocking means and mechanical override to open the enclosure while energized.
- B. Disconnect Switches: These shall be heavy-duty type and shall be non-fused safety switches where overcurrent protection is not required; and fused safety switches or circuit breakers (as indicated) where overcurrent protection is required; except that other suitable properly rated switches may be used for fractional hp motors and other small loads.
- C. Separately Enclosed Circuit Breakers: These shall be thermal-magnetic molded case type as indicated.

- D. Manual Motor Starters: These shall be heavy-duty type and shall have neon motor running pilot lights and proper sized overload protective devices for the motors involved; and shall be surface mounted in equipment rooms and unfinished areas, and flush mounted in finished areas. Where manual motor starters are not indicated, small manually controlled motors shall be controlled directly by the panelboard circuit breakers.
- E. Magnetic Motor Starter: These shall be heavy-duty type. Each of these shall have built-in HOA selector switch, phase loss relay that monitors all phases, running light, power available light, 2 NO and 2 NC auxiliary contacts, and shall have in each pole a separate overload protective device of proper rating for the motor controlled by the starter. Except as otherwise specified below, each magnetic starter shall have a built-in control circuit transformer with primary and secondary fuses to supply 120 volts to the control circuit. All control circuits extending outside of starter enclosures shall operate on overcurrent-protected 120 volts.
1. Built-in control circuit transformers shall be omitted: where 120 volts is available from motor feeder within starter enclosure; where one or more 120 volt control circuits from sources outside of starter enclosures are indicated; and where control devices and control circuitry are contained entirely within the starter enclosure, in which case the holding coil and control devices may operate directly on the motor feeder voltage.
- F. Devices Furnished by Other Sections or Others:
1. 3/4 hp and smaller exhaust and small single phase roof mounted fans: disconnect switches for these shall be furnished with and factory mounted on the equipment; Electrical Section shall connect to fan motors and/or switches, as required. See the mechanical spec sections for equipment that is provided with starters and disconnects.
- G. Identification for separately enclosed devices: Identify each separately enclosed circuit breaker, disconnect switch, magnetic motor starter, and manual motor starter, by attaching to the device cover a laminated plastic nameplate clearly and permanently lettered with the description and location of the equipment controlled by the device and the circuit number and origin from which it is fed. The nameplate shall be white with 1/8" high black characters.
- 2.08 DEVICES
- A. General:
1. Wiring devices shall be Hubbell, P & S or Cooper, as specified below. Hubbell is listed below to establish the standard requirements. Type of wiring devices required for this project shall be as indicated on the drawings, or suitable for the application involved if type is not indicated; qualities, ratings, and other requirements of wiring devices shall be as specified below. Wiring device types specified below may not necessarily be required for this project; disregard specifications for devices which are neither indicated nor required for this project.
 2. Receptacle configurations shall conform to NEMA standards.
 3. Duplex receptacles shall be installed with U-grounded up.

- B. Devices: Qualities, ratings, and other requirements shall be:
1. Wall switches: 20A 120-277VAC, single or double pole, 3 or 4 way, as applicable; Hubbell 1220 series specification grade. Where indicated as WEATHERPROOF, the above specified switch in FS Condulet, with lift spring door type weatherproof device plate.
 2. Duplex receptacles 20A, 125 volt, 2 pole, 3 wire grounding; Hubbell 5362 specification grade.
 3. Ground fault circuit interrupter receptacles: 20A 125 volt, specification grade, feed through duplex 5 ma sensitivity type with test and reset buttons; Hubbell GF5362 or as approved.
 4. USB Charger Duplex Receptacles: 20A, 125 volt, 2 pole, 3 wire, grounding, tamper-resistant duplex receptacle with two USB type 2.0 ports, 3 amp, 5 volt DC ; Hubbell USB20X2I.
 5. Single receptacles: 20A, 125 volt, 2 pole, 3 wire grounding type, specification grade: Hubbell 5361 or as approved.
 6. Single twist lock receptacles: 20A, 125 volt, 2 pole, 3 wire grounding type, specification grade; Hubbell No. 2310A or as approved.
 7. Single Heavy Duty Receptacles: 20A, 250 volt, 2 pole, 3 wire grounding; Hubbell 5461 or as approved.
 8. Single Heavy duty receptacles: 250 volt, 2 pole, 3 wire grounding; 30A or 50A as required; Hubbell 9330 and 9367 or as approved.
 9. Other devices not specified above; as indicated on the drawings.
 10. The colors of switches and receptacles shall be ivory except as follows:
 - a. Duplex receptacles that are switched shall be gray.
 - b. Heavy duty 250 volt receptacles shall be brown or black.
- C. Device Plates:
1. General: Device face plates shall be single or ganged type as required. They shall properly mate with the device and outlet box to which they are attached. They shall be standard size. Screws shall be metal with standard slot head unless otherwise indicated or specified.
 2. Interior Plates: These shall be 302 smooth satin finish stainless steel with beveled edges. Screw heads shall match the plate.
 3. Exterior or Weatherproof Plates: For switches, Hubbell "HBL7420" or as approved, UL listed for wet locations with the cover closed. Plates shall be cast aluminum, with self closing spring door and designed to fit over a type FS outlet box. Springs, screws and other hardware shall be stainless steel. For receptacles in use where indicated, Hubbell "WP26M" or as approved, UL listed for wet locations with the cover closed and receptacle in use. For receptacles not in use where indicated, Hubbell WPFS26 or as approved. Plates shall be cast aluminum, with self closing spring door and designed to fit over a type FS outlet box. Springs, screws and other hardware shall be stainless steel.
- D. Identification of receptacles and switches on emergency power: 15 and 20 amp single and duplex receptacles and the handles of switches on emergency power shall be red. The color of other devices on emergency power shall be as indicated or specified. The stainless steel face plate for switches and receptacles shall be red and engraved with the circuit number including the panelboard designation.

- E. Plates for switches used as disconnects for equipment and receptacles dedicated to a specific piece of equipment, such as 250V receptacles, shall be engraved with a description of the item and circuit number for which they are dedicated such as: refrigerator, fan, etc.

2.09 FUSES

- A. Provide fuses of indicated types and sizes, in place, for each device requiring fuses. Unless otherwise indicated, fuses shall be time delay, nonrenewable type. Fuses shall be UL Class "RK1" or 600 amp and below and UL Class "L" for above 600 amps. Fuses shall be Brush Fuse, Bussman, Gould/Shawmut or Littlefuse.

- 1 Spare fuses: Furnish three spare fuses of each size and type required for the electrical system, deliver these to the Owner's authorized representative in a suitable clearly labeled box, and obtain his signed receipt therefore.

2.10 CONTACTORS, PHOTOCELL SWITCHES

- A. Lighting Contactors:

- 1 Mechanically or Magnetically Held Lighting Contactors:
- a. Multipole type
 - b. Number of poles as indicated.
 - c. Load contacts rated 20 amperes continuous, at 208/120 volts for tungsten, LED, fluorescent or H.I.D. lighting loads.
 - d. Coil voltage 120 VAC
 - e. Control relay or module for two wire control.
 - f. Coil clearing contacts so that contactor coils shall be energized only during the instance of operation.
 - g. NEMA Type 1 enclosure
 - h. U.L. Listed under standard UL 508.
 - i. CSA Approved
 - j. Acceptable Manufacturers:
 - (1) Asco 917
 - (2) G.E. CR160MA
 - (3) Square D Class 8903 type LX
 - (4) Westinghouse Class A202

- B. Photocell Switches:

1. For Exterior Mounting:
- a. Tork No. 2101 or as approved.
 - b. 1 inch diameter cadmium sulphide, hermetically sealed glass to steel.
 - c. Gasketed die cast aluminum weatherproof housing with 1/2 inch conduit nipple.
 - d. Rated for 2000 watts tungsten at 120, 240 or 277 volts.
 - e. Contacts shall be SPST normally closed snap action type.
 - f. ON/OFF adjustment range of 2 f/c to 50 f/c with turn-OFF approximately three times turn-ON.

2.11 LIGHTING CONTROL OCCUPANCY SENSOR SYSTEMS

- A. The occupancy sensor lighting control system shall be used to control the lighting fixture in rooms and areas where the sensors are located.
- B. The system shall consist of individual controllers, switches and sensors for controlling fixtures in individual rooms or areas.
- C. The system indicated on the drawings was designed around Watt Stopper systems and the Watt Stopper model numbers indicated on the drawings are to establish the standard of performance.
- D. The supplier shall prepare a set of installation shop drawings indicating the detector type, and location, wiring diagrams similar to those on the drawings along with installation, aiming and adjusting instruction for the contractor to install the systems.
- E. Provide the system supplier architectural and electrical plans; including reflected ceiling plans for the system supplier to prepare their drawings.
- F. Install the systems per the shop drawings and installation instructions including the outlet boxes, conduit devices, 120 volt and low voltage wiring, etc required for a complete system. Occupancy sensors and controllers shall be installed on outlet boxes installed in or above the ceiling. Low voltage wiring shall be per the manufacturers standards and shall be plenum rated. Wiring may be run without conduit but shall be supported in accordance with the NEC with approved fasteners. Splices shall be made in junction boxes. Proper fittings shall be used where the cable enters the box.
- G. After the systems have been installed, the supplier will commission the systems including testing each device for proper operation and performing required adjustments. After the systems have been commissioned, the supplier shall instruct the owner on how the devices and systems function.
- H. Acceptable manufacturers:
 - 1. Leviton
 - 2. Watt Stopper
 - 3. Hubbell

2.12 CORD REELS

- A. Acceptable Manufacturers:
 - 1. Reelcraft Model L 5550 123 7 50 ft. with GFCI Outlet.
 - 2. Hubbell GCC 12350-DR Industrial Duty Cord Reel with GFCI Outlet.
 - 3. KH Industries RTBB3L-WDD520-J12K with Duplex Outlet Box.

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 26 06 10

EMERGENCY GENERATOR SYSTEM

PART 1 GENERAL

1.01 DESCRIPTION:

- A. Work included in this section: Materials, equipment, fabrication, testing and installation for a complete and operable Natural Gas Emergency Electric Generating System, including all devices and equipment specified herein, shown on the drawings and installed in conforming with the applicable codes and authorities having jurisdiction and shall include the following, but not limited to the following:
1. Natural gas engine-generator set rated as indicated on the drawings.
 2. Engine-generator controls and distribution panels as outlined.
 3. Automatic transfer switch and accessories as specified.
 4. All necessary control devices to provide a complete, operable system, along with all auxiliary equipment as specified and/or shown on drawings.
- B. The power system consisting of prime mover, generator, transfer switch and all controls necessary to operate the prime mover.
- C. Warranty: The complete standby electric power system shall have a comprehensive warranty for a period of five years the date of system acceptance. Multiple warranties for individual components (engine, alternator, controls, etc.) will not be acceptable. Satisfactory warranty documents must be provided. This warranty shall be for complete parts and labor, for the automatic transfer switches as well as the engine-generator sets for the above period of time.
- D. The emergency system described herein, including the engine-generator set, engine auxiliary and engine-generator control panel, and transfer switch shall be furnished by a single supplier who is regularly engaged in the production of natural gas fueled control products. The responsibility for performance to this specification in its entirety cannot be split up among individual suppliers of components comprising the system, but must be assumed solely by the supplier of the system. A single manufacturer shall furnish schematic and wiring diagrams for the emergency generating sets, and an interconnection wiring diagram showing all connections to each individual piece of equipment which constitutes the emergency power system. The manufacturer shall have printed literature and brochures describing the standard series specified (not a one-of-a-kind fabrication).
- E. The emergency system described herein including engine-generator set, engine auxiliaries, engine-generator control panel, transfer switch, etc. is designed around Cummins, and all equipment furnished shall be as approved equal in every way to that specified herein, including quality, operation and function.

1.02 REFERENCE STANDARDS:

- A. Published specifications, standards, tests or recommended methods of trades, industry or governmental organizations apply to work in this section where cited below:
1. ANSI - American National Standards Institute.
 2. DEMA - Diesel Engine Manufacturers Association.
 3. IEEE - Institute of Electrical and Electronic Engineers.

4. NEMA - National Electrical Manufacturers Association.
5. NFPA - National Fire Protection Association.
6. UL - Underwriters Laboratories, Inc.

1.03 QUALITY ASSURANCE

- A. All equipment and accessories to be the product of a manufacture regularly engaged in its manufacture.
- B. Supply all equipment and accessories new, free from defects and listed by Underwriters Laboratories, Inc., and bearing its label.
- C. Supply all equipment and accessories in compliance with the applicable standards herebefore listed in this section and with all applicable national, state and local codes.
- D. All items of a given type to be the products of the same manufacturer.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Ship equipment in its original packaged to prevent damaging or entrance of foreign matter. All handling performed in accordance with manufacturer's recommendations. Provide protective coverings during construction.
- B. Replace at no expense to Owner, equipment or material damaged during storage or installation.

PART 2 PRODUCTS

2.01 DESCRIPTIONS

A. Engine-Generator Set

1. General: The engine-generator set shall be rated as indicated on the drawings on a continuous standby basis. The engine-generator set shall be factory mounted on a common suitable structural steel base capable of maintaining proper alignment between components during shipment, installation, and operation. Unit shall incorporate seismic restraint vibration isolators of the design, size and quantity specified by the manufacturer. The engine generator shall be capable of picking up the load and meet the rated voltage and frequency within 10 seconds after the loss of normal power.
2. Engine: Engine shall be stationary, liquid-cooled, natural gas type. Design shall be four-cycle. Engine shall be arranged for direct connection to an alternating current generator. Engine shall be certified by the engine manufacturer as capable of developing the break horsepower required to drive a generator yielding rated kVA on a continuous standby basis for ambient conditions of 104 degrees F, (40 degrees C), 29.92 inches Hg (101 Kpa) barometric pressure and 300 feet above sea level elevation.
3. Engine Equipment: Engine equipment shall include the following:
 - a. An electronic speed sensing engine governor capable of isochronous operation and remote speed adjustment. Frequency regulation shall be within $\pm .25$ percent of rated, frequency during steady-state conditions, and frequency dip during full load application shall not be greater than six cycles from rated frequency

- b. An electric starting motor with a positive shift solenoid, for operation on 12 volts DC, to engage the starter motor and crank the engine for an on/off alternating cranking cycle of 75 seconds without overheating at the speed required for the respective engine and at 0 degrees F. ambient temperature. Two means of cranking termination shall be provided to automatically disconnect the starting circuit and disengage the starter pinion when the engine starts to prevent inadvertent starter engagement.
 - c. Engine shall be cooled by a unit mounted radiator. Engine coolant pump shall circulate coolant through engine and radiator.
 - d. Provide a water jacket heating system for the engine. The heating elements shall operate on 120 volt, single phase, 60 Hz power. Thermostat shall control the temperature of the jacket heater within the range 120 degrees F (49.3 degrees C) to 140 degrees F (60.5 degrees C). Heater shall be disconnected whenever the engine starts by an oil pressure switch mounted on the engine.
 - e. Positive displacement, mechanical lubrication oil pump, full flow lubrication oil filters, and dipstick oil level indicator.
 - f. Provide a replaceable dry element air cleaner as required.
 - g. Sensing elements, located on the engine to initiate the following preliminary alarms and engine shutdowns as per NFPA 110, and NFPA 37.
 - h. The engine shall have a battery charging alternator.
4. Generator: The generator shall be designed for 3 phase, 4 wire voltage as indicated and shall not have a bonding jumper, per the NEC, from the neutral to ground for a non-separately derived system. Generator shall be of drip-proof construction and, shall be engine-driven, single bearing type, and self-aligning with brushless excitation, evolving field, permanent magnet exciter and amortisseur windings. Generator shall be directly connected to the engine housing and driven through a flexible coupling. Insulation shall be Class H, but temperature rise at rated continuous output shall not exceed 150 degrees C at 40 degree C ambient. Generator shall be rated as indicated on the drawings for 60 Hz operation at rated RPM. Voltage regulator shall be 3 phase sensing solid-state design with antihunt provisions providing no load to full load regulation within ± 0.5 percent of rated voltage during steady-state conditions. Generator shall provide a minimum kVA as indicated for motor starting with 10 percent or less sustained RMS voltage dip. The generator characteristics of the engine in such a manner that with full load connected to the generator terminal, the generator can utilize all the available engine power without exceeding it at all speeds.
5. Auxiliary Equipment:
- a. Starting Batteries: A battery set shall be supplied for the engine and shall be mounted in a rack alongside the unit and within the weatherproof enclosure. Battery set shall be 12 volt DC and composed of the number of batteries required to maintain the cranking speed of the engine through two complete cranking cycles as specified. Each battery shall be a heavy-duty starting lead acid battery. All necessary intercell connecting and battery cables shall be provided. Batteries shall be supplied dry-charged and electrolyte added shortly prior to acceptance tests according to manufacturer's instructions. Batteries shall be warranted for 2 years.
 - b. Battery Charger: A battery charger shall be provided for the engine generator set.

- c. Exhaust Silencer: A weatherproof exhaust silencer shall be supplied for the engine. The silencer shall be of chambered construction and shall provide "critical" degree silencing. Silencer shall be sized to assure proper operation without excessive back pressure when installed in the exhaust system. Provide companion flanges as required. Flexible bellows connectors to match engine and exhaust silencer, shall be provided for installation between the engine and silencer. Exhaust condensation traps shall be installed to trap and drain off condensation to prevent condensation from entering the engine. Exhaust system shall be properly installed to allow for expansion of the pipes.
- d. Vibration Isolators: The unit shall be mounted to a steel support frame through adjustable spring vibration isolators. The number of such isolators shall be as required by the engine generator manufacturer for the engine-generator and shall be sized to load the springs within the proper working range.
- c. Remote Annunciator: Provide a remote annunciator in accordance with NFPA 110. Provide a manual start switch to start the generator.
- d. The annunciator shall be powered by the engine batteries. It shall have a common audible alarm device and an alarm-silencing means. The annunciator shall include repetitive alarm circuitry so that after the audible alarm is silenced, it will be reactivated after clearing the fault condition and must be restored to normal position to be silenced. Silencing the audible alarm after the occurrence of the alarm condition shall not inhibit any subsequent alarms from again sounding the audible alarm. The annunciator shall be solid state with LED lamps, and shall have a lamp test switch and contacts for common remote alarm. A permanent legend shall indicate the condition that each lamp represents. The annunciator housing shall be code gage steel with a stainless steel front panel for flush mounting as indicated on the drawings. The annunciator shall be located where shown on the drawings.
- e. Double action breakglass weatherproof manual stop station for remote mounting at the location indicated on the plans.
- f. Provide a standard 100%, molded case, thermal magnetic circuit breaker in separate enclosure connected to the output terminals of the generator to protect the feeder to the building. The breaker shall be sized as indicated on the drawings and shall be mounted within the weatherproof enclosure.
- g. Weatherproof enclosure. The generator set, control panel, disconnect switches, starting batteries, battery charger, and receptacles specified shall be within a weatherproof enclosure. The enclosure shall be designed for NEMA sound level 2. Provide a 20 amp, duplex receptacle, as specified, with a weatherproof cover plate in or on the enclosure.

6. Engine-Generator Control:

- a. The engine-generator control panel shall be mounted on the generator end of the set and shall be a rigid metal enclosed structure containing all devices specified herein, and as required to perform the described functions. The control box shall include a control section for the engine-generator set and provision for cable termination. Panel construction shall be of sheet metal suitable formed to provide a rigid surface for mounting the devices specified. Hinged, front-opening doors shall provide required access to all components; removable top and side panels shall provide required access to cable entry and terminations. The panel shall be mounted to the generator with antishock vibration mountings. Control wire shall be of the stranded type required by the manufacturer. Nameplates shall be provided to identify each device or function and shall be silkscreened white on a black background. Metal enclosures shall be chemically cleaned, treated to prevent the entrance of moisture and rust and painted manufacturer's standard color with black control panels. The panel shall be approved for use in Level 1 installations.

B. Acceptable Manufacturers

1. Cummins Model GGHE
2. Caterpillar – as approved
3. Kohler – as approved

C. Automatic Transfer Switch

1. General: The automatic transfer switch shall be microprocessor controlled and furnished by the manufacturer of the emergency AC power generator to maintain system compatibility and local service responsibility for the complete emergency power system. They shall be listed by Underwriters Laboratories, Inc., (Standard 1008) for emergency service. The manufacturer shall furnish schematics and wiring diagrams for the particular transfer switch furnished and an interconnection diagram for the entire system.

Switch mechanism shall be quick-make, electrically operated, mechanically held, quick-break design so that speed of opening and closing is not controlled by the operator during manual operation. Switch shall have positive mechanical interlock to prevent simultaneous contact closure to both normal and emergency sources. The switch shall transfer and retransfer the load automatically.

Complete AL-CU lugs (UL listed and C.S.A. approved) shall be provided for normal, emergency, and load connections.

The automatic transfer switch shall be mounted in a separate NEMA 3R cabinet with gasketed locking doors.

Minimum withstand and closing ratings (amperes) for the switches, per UL Standard 1008 shall be as required for the available fault currents indicated on the drawings.

2. Rating: The automatic transfer switch shall be rated for total system loads, including motor loads, LED lighting and plug loads. Transfer switch shall be rated for continuous operation in ambient temperatures of -40 degrees C (-104 degrees F) to +67 degrees C (142 degrees F).

The switch shall have three operable poles as indicated with full rated neutral bus and shall have ampere ratings as shown on drawings.

3. Construction: Transfer switch shall employ an actuator device that produces equal torque in both directions throughout the switching operation to ensure positive opening and closing. Transfer switch shall have a direct drive actuator (that does not use gears, cams, or pivoted rods); switch closing shall not rely on gravity, weights, or momentum for positive closing of either the normal or emergency contacts. Transfer switch using magnetic contactors or molded-case circuit breaker mechanisms as the switching devices are not acceptable as meeting this specification.

The transfer switch actuator shall have an automatic reset, overcurrent protective device; and shall have an independent disconnect means to disable the actuator during manual operation.

The switch shall have provisions to safely operate the switch by nonelectric manual means and instructions for this operation shall be displayed on the front outside of the switch.

A prototype switch shall have passed all UL endurance tests. A prototype switch shall have passed all UL withstand and closing tests without welding or excessive burning of the contacts. Provide tables indicating rating and capacities (interrupting, withstand, closing, maximum instantaneous peak let-through, and inrush currents) for the transfer switch.

Switch shall have dual current carrying contacts and separate arcing contacts. All switches shall have arc chutes of heat absorbing material and metal leaves for positive magnetic extinguishing of arcs quickly and effectively; arc chutes shall have insulating covers to prevent interphase flashover.

Transfer switch shall have auxiliary switches rated 10A at 208 volts that are operated by the transfer switch in the normal or emergency position (suitable for use either N.O. or N.C.) for monitoring transfer switch position and controlling indicator lights or other peripheral equipment.

Voltage sensors and time delays shall be solid-state, plug-in devices. The control relays shall be plug-in devices. These control accessories shall mount on a dead-front, swing-out control accessory panel to avoid shock hazard while adjusting control functions, but will swing out exposing the wiring to facilitate servicing. A Control Disconnect Plug shall be provided to de-energize control circuits when control accessory panel is in the open, swing-out position. Indicating lamps shall be set in a front mounted meter panel to be visible without opening doors.

Control accessories shall be provided to:

- a. Monitor all phases of both normal and emergency sources with adjustable voltage, solid-state sensors to sense a decrease of voltage below a set point, or a loss of voltage at any phase.

- b. Signal the emergency power system to start in the event of a power interruption. A time delay (adjustable from 0.5 to 10 seconds and set at 2 seconds) shall delay this signal to avoid nuisance start ups on momentary voltage dips or power outages.
 - c. Transfer the load to the engine-generator after it reaches proper voltage and frequency. A time delay (adjustable from 0 to 120 seconds and set at 2 seconds) shall delay this transfer to allow the engine-generator to stabilize.
 - d. Retransfer the load to the normal line after normal power voltage on all phases has been restored. A time delay (adjustable from 0 to 32 minutes and set at 15 minutes) shall delay this retransfer to avoid short term normal power restoration. The time delay shall be automatically bypassed if the generator fails.
 - e. Signal the engine-generator to stop after load retransfer to normal source. A time delay (adjustable from 0 to 8 minutes and set at 5 minutes) shall permit engine to run unloaded to cool down before shutdown.
 - f. Provide a device to electrically disconnect the control section from the transfer switch for maintenance service during normal operation.
 - g. The transfer switch controls shall have a built-in control mode status indicators indicating the following sequence of functions:
 - (1) Normal line power.
 - (2) Time delay in starting emergency system.
 - (3) Engine cranking.
 - (4) Engine running time delay to transfer load to emergency power.
 - (5) Load transferred to emergency power.
 - (6) Time delay to retransfer after normal power is restored.
 - (7) Time delay to stop engine, after load has been retransferred to normal power source.
 - (8) Normal power restored - same as sequence 1 above. Should the system malfunction during any of the timed sequences (1 through 8), the signal shall show the sequence in which the system malfunctioned.
 - h. Provide meter-lamp combination for automatic transfer switches, consisting of devices mounted on front of cabinet for easy use without opening cabinet doors, consisting of: Front panel lights to indicate position of transfer switch, which sources are available, and which source is supplying the load. Key locks and key switches for front cabinet door, for drawout handle, and for initiating test transfer without opening door. The electronic metering shall indicate the voltage and amperage of each phase of the load site of the switch.
 - i. Provide a generator exercising timer in the transfer switch. The timer shall be solid state type with adjustable day, date and time. The timer shall be set to crank and run the generator for a period of thirty minutes once monthly.
 - j. The transfer switch shall have a test switch mounted in the front cabinet door that will simulate failure of the normal power source, start the generator and transfer the load to the emergency power system. The system shall remain in this condition until the switch is turned off. The load will then be transferred to the normal source and the generator will go into its cool-down cycle.
4. Acceptable Manufacturers:
- a. Cummins "OTPC" Series or as approved
 - b. Caterpillar – as approved
 - c. Kohler – as approved

PART 3 - EXECUTION

3.01 INSTALLATION OF STANDBY POWER PLANT

- A. The electrical wiring, fuel, exhaust, and cooling system has been sized based on an Cummins set. Any changes in the Electrical and Mechanical work, made necessary for the proper operation of a generator set installed other than Cummins, shall be the responsibility of the Installing Contractor, without additional cost to the Owner. Verify with the equipment manufacturer.
- B. Installation: Emergency engine-generator system shall be installed, including all connections, where and as indicated on drawings and wiring diagrams as specified herein, and in accordance with approved shop drawings and manufacturer's instructions.
- C. Submittal: Provide complete and detailed submittal data adequate to determine compliance with specifications for components of the emergency power system. Submit complete schematic, wiring and interconnection diagrams showing all terminals and destination markings for all of the emergency system equipment such as the engine generator, distribution equipment, transfer switch, etc. Drawings shall indicate the physical dimensions of all equipment. Submit data sheets indicating all performance data for the equipment such as fuel consumption, air requirements, generator short-circuit current capability, transfer switch short circuit withstand rating, etc.
- D. Factory Tests: Before shipment of the engine-generator set, it shall be tested under rated load at .8 power factor for performance and proper functioning of component parts and circuits.

Certified copies of test results shall be forward to the Engineer for review if requested.

- E. On-Site Acceptance Tests: The complete installation shall be tested for compliance with the specification following completion of all site work including all accessory, support mechanical and fire protection equipment in place and operating. Testing shall be conducted by representatives of the manufacturer, with test equipment, load banks, etc., provided by the Installing Contractor. The Engineer, Owner's representative and the authority having jurisdiction shall be notified in advance and shall have the option to witness the tests. Certified copies of the test procedures and results shall be forwarded to the Engineer. Tests to be conducted on-site shall include:
 - 1. Simulated Power Failure Test:
 - a. With the engine generator in a "cold start" condition, initiate a normal power failure by opening the breaker supplying normal power to the transfer switch. The test load shall consist of a loadbank of sufficient size to provide a load equal to 100 percent of the nameplate KVA rating of the generator.
 - b. Observe and record the time delay on start.
 - c. Observe and record the cranking time until the engine generators starts and runs.
 - d. Observe and record the time required to come up to operating speed.
 - e. Record voltage and frequency overshoot.
 - f. Observe and record time required to achieve steady state condition with all automatic transfer switches transferred to the emergency position.

- g. Record voltage, frequency, amperes, kw, engine oil pressure, water temperature and battery charge rate at 5 minute intervals for the first 15 minutes and at 15 minute intervals thereafter for the duration of the test.
 - h. Continue the test for one hour.
 - i. Return normal power to the building or facility.
 - j. Observe and record the time delay on retransfer for each transfer switch.
 - k. Observe and record the time delay on the engine cooldown period and shutdown.
 - l. After the completion of the test the engine shall be allowed to cool for 5 minutes before commencing with the full load test.
2. Cycle Crank Test:
- a. Utilize any method recommended by the manufacturer to prevent the engine from running.
 - b. Put the control switch into "run" to cause the engine to crank. Observe the complete crank/rest cycle and record the battery voltage for each cycle.
3. Safety Test:
- a. Test all safeties, prealarms, shutdowns, indicators, and alarms for the engine, generator for the emergency power system.
 - b. Observe and record that all safeties operate properly and all alarms annunciate properly at the remote annunciator.
4. Transfer Switch Tests:
- a. The switch shall be tested to verify that all features of the switch operate as specified or as required.
 - b. The circuit breaker serving the normal side of the transfer switch shall be opened to simulate a power failure to the switch. The starting of the generators, time delays, transfer time, remote signals, annunciation, etc. shall be observed and recorded.
 - c. The circuit breaker serving the normal side of the transfer switch shall be closed to simulate normal power restoration to the switch. Time delays, transfer time, remote signals, annunciation, engine shut down, etc. shall be observed and recorded.
 - d. Operate the transfer switch test switch to simulate a power failure with this feature. Observe and record engine start, time delays, transfer times, remote signals, annunciation, engine shutdown, etc.
 - e. Operate the generator through an exercising cycle using the exercising timer. Observe and record the starting, running time and cool down cycle of the generator. Set the timer to the day, date, and time specified by the Owner's representative.
- F. The manufacturer shall have parts and service available through a local distributor.
- G. Instructions and Drawings: Complete instructions consisting of operating and maintenance manuals, parts books, dimensional drawings, separate unit wiring diagrams and schematics, and interconnection wiring diagrams shall be provided.
- H. The following shall be made available to the authority having jurisdiction at the time of the on site acceptance tests:
- 1. Evidence of the prototype tests.
 - 2. Certified analysis verify torsional vibration compatibility of engine and generator.
 - 3. A letter of compliance with NFPA standards 37, 99, 110 and Article 700 of NFPA 70 as they pertain to the engine, generator, transfer switch, controls, alarms and shutdowns.

4. A manufacturer's certification of a rated-load test at rated power factor with ambient temperature, pressure, altitude and fuel recorded.

 - I. Instructions for starting, stopping, operation emergency shutoff, fuel control, and routine maintenance of the engine generator shall be provided. These instruction shall be in the form of a white engraved laminated plastic sign with 1/2" high black characters and secured to the inside of the door of the weatherproof housing at the generator control panel. Provide a copy of the riser diagram, shop drawings, wiring diagrams, schematics, and operation and maintenance manual.

 - J. Owner Orientation: A representative of the supplier shall meet with representatives of the owner at the time of final acceptance tests and shall review the operation and parts books, correct starting and control methods, and recommend preventive maintenance procedures. A total of [2] hours of personal hands-on training in the presence of the supplier's representative shall be provided. The supplier shall notify the owner's representative at least one week in advance to set up a time for the training session and obtain a list of those who are to attend.

 - K. Parts and Operation Information: Two copies of complete parts and operation information shall be supplied prior to the final acceptance test. Material shall be in booklet form and shall include all components supplied under this section. The engine-generator supplier shall provide two copies of the recommended operation, maintenance and service practices for the engine-generator supplied.

 - L. Provide fresh charge of engine coolant and engine lube oil after all tests are completed.
- 3.02 GENERAL INSTALLATION OF THE EMERGENCY SYSTEM
- A. All conduit, boxes, wiring, panelboards, devices, etc. shall be installed as specified in the section that specifies that item.

 - B. Bushings shall be installed on the ends of all conduits of the emergency power system for feeder, branch circuit, control and alarm wiring.

 - C. All conduit junction boxes, pull boxes, and condulets shall be identified as part of the emergency system. The circuit number or identification for the circuits within the box shall be written on the cover in bold characters using a wide tip, black, permanent marker. Boxes for control and annunciator wire shall be identified such as: generator annunciator wiring, generator start circuit, heater circuit, battery charger, etc.

END OF SECTION

SECTION 26 40 02 ELECTRICAL SERVICE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The work required under this Section includes work necessary to provide a complete electrical service.

PART 2 - PRODUCTS

2.01 GENERAL SERVICE AND METERING

- A. The Electric Utility Company will:
 - 1. Furnish and install the riser pole and overhead primary circuit conductors, poles and hardware to bring power to the site.
 - 2. Furnish and install pole mounted service transformers.
 - 3. Furnish and install metering transformers on the pole.
 - 4. Furnish and install the meter enclosure on the pole.
 - 5. Furnish and install the meter.
 - 6. Furnish and install all meter wiring and connections.
 - 7. Make primary and secondary cable connections to the service transformer.

- B. DIVISION 26 shall:
 - 1. Furnish and install low voltage concrete encased underground building service from building service equipment to the riser pole.
 - 2. Leave free line ends on building service conductors at the top of the pole as directed by Electric Utility Company.
 - 3. Furnish and install rigid steel conduit risers with fittings from the underground concrete encased duct-line up the utilities service pole as required by the Electric Utility Company.
 - 4. Make arrangements with Electric Utility Company for their service and metering work, as described above PAY CHARGES THEREFORE, AND INCLUDE COST THEREOF IN CONTRACT PRICE.
 - 5. Coordinate work of DIVISION 26, for both the utilities off site and on site work, with that of Electric Utility Company. The Electric Utility Company is Holly Springs Utility Department.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 26 50 00

LIGHTING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS:

- A. Lighting fixtures shall be those specified on the drawings or approved equivalent thereof, each complete with LED's, drivers, hangers, end caps, and all other necessary devices to provide a complete installation. Fixture types indicated in the fixture schedule correspond to those indicated on the drawings. Required wattages shall be as specified or indicated. Unless otherwise specified or indicated, other general requirements shall be as follows as applicable to the fixtures involved.

PART 2 - PRODUCTS

2.1 BATTERY UNITS

- A. Battery units for LED exit signs shall operate the sign for a minimum of 90 minutes. The battery unit shall have integral charger, high temp nickel cadmium battery and required electronic circuitry. Electronic circuitry shall be self-testing in design and automatically test the unit for a minimum of 30 seconds every 30 days, and 90 minutes once a year. An embedded microcontroller will continually monitor the battery charging current and voltage. An audible alarm and light-emitting diode shall be provided to indicate test results and status conditions. A solid-state status indicator light to monitor the charger, fault condition, and battery, a single-pole test switch, and installation hardware shall be provided. The unit shall be UL Listed for the conditions in which it is installed. The battery unit, indicator light, and test switch shall be installed in the fixture at the factory by the fixture manufacturer unless a remote mounted unit is indicated on the plans. The unit shall be warranted for a minimum of five full years. The unit manufacturer shall be the product selected by the exit sign manufacturer to meet the performance specification.
- B. Battery units for LED lighting fixtures shall operate the fixture at full brightness for a minimum of 90 minutes. The battery unit shall have integral charger, high temp nickel cadmium battery and required electronic circuitry. Electronic circuitry shall be self-testing in design and automatically test the unit for a minimum of 30 seconds every 30 days, and 90 minutes once a year. An embedded microcontroller will continually monitor the battery charging current and voltage. An audible alarm and light-emitting diode shall be provided to indicate test results and status conditions. A solid-state status indicator light to monitor the charger, fault condition, and battery, a single-pole test switch, and installation hardware shall be provided. The unit shall be UL Listed for the conditions in which it is installed. The battery unit, indicator light, and test switch shall be installed in the fixture at the factory by the fixture manufacturer unless a remote mounted unit is indicated on the plans. The unit shall be warranted for a minimum of five full years. The unit manufacturer shall be the product selected by the lighting fixture manufacturer to meet the performance specification.

2.2 LENSES

- A. Lenses shall be as indicated in the lighting fixture schedule on the drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install the fixtures where indicated, but make adjustments using the same numbers of fixtures in accordance with the Architectural reflected ceiling plan where ceilings exist and verified to be compatible with system.
- B. Where suspended ceilings are involved, coordinate recessed fixture types and trims with actual installed ceiling system, and provide all necessary frames and trim to properly complete each particular installation.
- C. Recessed lay-in type fixtures shall be secured to the ceiling tee bar by clips provided by the fixture manufacturer on the vertical part of the tee bar main runners only at each of the four corners of the fixture.
- D. Surface and wall mounted fixtures shall be secured with a minimum of four bolts or screws. Do not use clips or fasteners. The bolts or screws shall be run through or into a structural member, slab, stud or other support added for this purpose. Do not secure or support the weight of the fixtures from gypsum board on walls or any ceiling material. Fixtures attached to ceiling tees shall be attached to the main runners only with at least two positive clamping devices. Rotational spring catches or other clips shall not be used. Chain hangers shall be secured to the fixture and the structure with screws or bolts. Do not use clips or fasteners.
- E. Recessed flanged type fixtures shall be secured using adjustable swing-gate type hangers that fit over the ceiling support member around the opening and adjusted to secure the fixture flange tight against the ceiling. The hangers shall be adjustable from inside the fixture and a minimum four shall be provided for each fixture.
- F. Recessed can type fixtures installed in lay-in type ceilings shall be supported from the tee bar system using suspension bar hangers designed for the purpose that fasten to the vertical part of the tee bar. Support the fixture from the main runners only. Do not secure to or support the weight of the fixture from the ceiling material.
- G. Recessed can type fixtures installed in non-lay-in type ceilings shall be supported from the ceiling support system using suspension bar hangers designed for the purpose that fasten to the support system. Do not secure to or support the weight of the fixture from the ceiling material.
- H. Exit signs shall be secured to an outlet box with a minimum of two screws. The outlet box shall be secured as specified in Section 26 00 50.
- I. Undercabinet fluorescent fixtures shall be secured to the underside of millwork with screws installed on and each end of 2 and 3 foot fixtures and each end and center of four foot fixtures.

- J. Surface and wall mounted fixtures larger than 8 inches in any dimension or weights more than 40 pounds shall be supported independently of the outlet box and secured with a minimum of four bolts or screws. Do not use clips or fasteners. The bolts or screws shall be run through or into a structural member, concrete or masonry wall, or ceiling support member, stud or other support added for this purpose. Do not secure or support the weight of the fixture from gypsum board on walls or any ceiling material. Smaller fixtures shall be supported from the outlet box and secured with a minimum of two screws. The outlet box shall be secured as specified in Section 26 00 50. Fixtures attached to ceiling tees shall be attached to the main runners only with at least two positive clamping devices. Rotational spring catches or other clips shall not be used.
- K. Circuit connections to lighting fixtures shall be made with minimum 3/8 inch flexible metal conduit, maximum 6' in length.
- L. Liquid-tight, flexible metal conduit shall be used for connections to exterior fixtures and fixtures in wet and wash-down areas.

END OF SECTION

SECTION 27 15 00

TELEPHONE AND DATA CABLING SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Comply with all applicable electrical sections; refer to "Related Work" section below.
- B. Comply with all applicable EIA/TIA guidelines; refer to "Reference" section below.
- C. Supply and install a complete and certified structured cabling system consisting of the following components:
 - 1. Horizontal Unshielded Twisted Pair (UTP) Plenum Rated cable: CAT 5e for all Voice and Data applications.
 - 2. Copper termination hardware.
 - 3. Patch Panels.
 - 4. Connectors and faceplates.
 - 5. Equipment racks, bridle rings and wire supports.
 - 6. Grounding for Telecommunications Rooms and equipment mounting locations.
 - 7. Complete Labeling and documentation.
 - 8. Testing and testing documentation.
- D. The structured cabling system shall minimally meet the standards referenced in the "Related Work" and "References" section of this specification.
- E. The contractor shall provide, test and warrant all work as required within these documents.
- F. The contractor shall be responsible for obtaining all required permits.
- G. The structured cabling system was designed around Hubbell devices and equipment. The product number and descriptions in this specification are for Hubbell and are to establish the standard of quality and performance for the products used for this project. Other manufacturers will be considered but they must meet the quality and certifications standards of the Hubbell products and system.

1.02 RELATED WORK

- A. Comply with the following sections
 - 1. 26 00 10 – General Provisions, Electrical
 - 2. 26 05 50 – Basic Materials and Methods
 - 3. 28 23 00 – Security CCTV Video Surveillance
 - 4. 28 31 00 – Fire Alarm Security System

1.03 REFERENCES

- A. Telecommunication Industry Association (TIA), Electronic Industries Alliance (EIA):
 - 1. TIA/EIA-568-B.1 – Commercial Building Telecommunications Cabling Standard Part 1: General Requirements (May 2001)

2. TIA/EIA-568-B.2 – Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components (May 2001) - Addendum 1- Transmission Performance Specifications for 4-Pair 100 Ohm Category 5 cabling (June 2002)
 3. EIA/TIA-569 – Commercial Building Standard for Telecommunications Pathways
 4. TIA/EIA-606-B – Administration Standard for the Telecommunications Wiring Standard
 5. ANSI-J-STD-607-B – Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
 6. TSB 67 – Transmission Performance Specifications for Field Testing of Unshielded Twisted-Pair Cabling Systems
- B. Building Industry Consulting Services International (BICSI)
1. Telecommunications Distribution Methods Manual (Most Recent Edition)
- C. American Society for Testing and Materials (ASTM)
1. ASTM E 814 – Fire Tests of Through-Penetration Fire stops.
- D. Underwriters Laboratories, Inc. (UL)
1. UL 1479 – Fire Tests of Through-Penetration Fire stops.
- E. National Fire Protection Association (NFPA):
1. NFPA 70 – National Electrical Code (2014 Edition)
- F. Americans with Disabilities Accessibility Guidelines.
- G. Code of Federal Regulations, Title 29, Chapter XVII, Part 1910 (OSHA).
- H. IEEE 802
- 1.04 PRE-CONSTRUCTION SUBMITTALS
- A. Manufacturer product data sheets for each material and equipment specified. Mark each sheet to clearly identify the specific products and component parts, and data applicable to installation.
- B. Shop Drawings
1. Point-to-point wiring diagrams for cables to be installed.
 2. Detailed plan views of Equipment Rooms showing equipment racks, punchdown blocks, cable supports and termination hardware.
- C. Assurance/Quality Control Submittals:
1. Proposed test forms for copper horizontal UTP cable.
 2. Documentation of manufacturer's qualification of contractor as an approved certified installer of the proposed cabling system.
 3. Certificate of insurance.

1.05 FINAL SUBMITTALS

(These submittals must be submitted and approved within thirty days of completion of the project.)

- A. Certification of level of performance as evidenced by comprehensive test results for copper UTP horizontal cabling as specified in this document. Test results should be provided as hard copies and on electronic media.
- B. Record drawings with as-built information and finalized versions of the shop drawings. These submittals shall be on the base plan as provided by the Architect. These submittals shall be one copy in print form and one in electronic format (AutoCAD or DXF file).
- C. Manufacturer's system certification supporting the product warranty.

1.06 QUALITY ASSURANCE AND WARRANTIES

- A. The system shall be a certified structured cabling system with a twenty-five (25) year application and product warranty. All work shall be done in accordance to the Hubbell Mission Critical Certified Training program and Mission Critical Warranty requirements or approved equivalent.
- B. All workers will have been trained by Hubbell Premise Wiring or approved equivalent and shall submit proof of training with submittals.
- C. All certified installers shall have a BICSI Registered Communications Distribution Designer on staff.
- D. Contact information for the Owner's Telecommunications Representative:

Don Douglas
District 2 Analyst
Mississippi Department of Transportation
Phone: (662) 563-4541
Cell: (662) 417-5902
Fax: (662) 563-0138

1.07 PRE-INSTALLATION MEETING

- A. The contractor shall convene a meeting prior to commencing work of this section. The contractor shall have in attendance all parties directly affecting work of this section. Provide a sign in sheet and obtain the names, firm and contact information for all in attendance.
- B. Agenda:
 - 1. Tour, inspect and discuss building conditions relating to structured cable system.
 - 2. Review all required submittals.
 - 3. Review drawings and specifications.
 - 4. Approve proposed equipment.
 - 5. Review and finalize construction schedule of structured cable system and verify availability of materials, personnel, equipment and facilities needed to proceed.
 - 6. Review required inspections and testing.
 - 7. Review cable routing and support.

1.08 STORAGE AND HANDLING

- A. The contractor shall be responsible for the receipt, safe storage and delivery of communications materials and equipment to the job site until the owner accepts the complete and functioning system.

- B. Ship and store all communications products and materials in a manner that will protect them from damage, weather and entry of debris. If items are damaged, do not install, but take immediate steps to obtain replacements at no cost to the owner.

PART 2 PRODUCTS

2.01 All communications material and equipment furnished shall be new and unused and free of defects. They shall be clean and free of damage or corrosion.

2.02 All communications materials used shall be UL listed.

2.03 ACCEPTABLE MANUFACTURERS

- A. Hubbell Premise or as approved wiring products for all connectivity, work area outlets, wire management, racks, and patch panel products.
- B. Hubbell Premise or as approved for copper cable.
- C. As Approved by the Owner's Representative.

2.04 HORIZONTAL CABLE

A. Voice cable

1. Category 5e PLENUM rated, 4 pair, UTP, 24 AWG solid copper (White).
2. Part Number: C5ESPW

B. Data cable

1. Category 5e PLENUM rated, 4 pair, UTP, 24 AWG solid copper (Blue).
2. Part Number C5ESPB

C. Voice Backbone Riser Cable

1. General 2133269E, 25 pair, 24 AWG solid copper, fire rated riser cable with gray jacket.

2.05 CABLE TERMINATING HARDWARE AND CONNECTORS

A. Horizontal Cabling

1. Terminate on wall mounted patch panels in the communications closets.
2. Terminate on jacks at the station outlet locations indicated on the plans.
3. Provide one CAT 5e cable from each telephone and data jack in the station outlets to the nearest 110 punch down block for telephone jacks and a separate like jack in the system patch panel for data jacks as indicated on the drawings.

B. Station Outlets

1. Data jacks shall be Hubbell HXJ5EB, RJ45, CAT 5e, T568A or T568B, 8 Position/8 conductor, blue color. Coordinate the configuration with the owner.
2. Face Plates shall be Hubbell IFP11W series, 1 port, for single devices and IFP12W, 2 port for two devices. The plates shall be white, high impact thermoplastic with label fields.
3. Telephone jacks shall be Hubbell HXJU, RJ11, 6-position USOC jack, white color. Terminate 4 of the 8 horizontal cable conductors.

4. Telephone jack and faceplate for wall telephones shall be Hubbell P630SR1GJ6, stainless steel with RJ11 telephone jack.
5. Provide dust covers for all jacks and blanks for all unused ports on the face plates and outlet frames.
6. Part Number: Blanks Hubbell IFPW10, white
7. Part Number: Dust Cover Hubbell HXJDC25

C. Communications Closets

1. 24 Port Patch Panel for Data Cable Terminations
 - a. Per industry standards
 - b. Part Number: Hubbell UDX24E, multimedia patch panel with CAT 5e, RJ45 jacks as indicated on the drawings. Provide rear cable management bar.
 - c. Provide required mounting hardware.
2. 110 Punch Down Blocks for Telephone Cable Terminations
 - a. Per industry standards
 - b. Part Number: 110BLK100FTK4 for a 100 pair block and 110BLK300BWL for a 300 pair block. The blocks shall have detachable stand-off legs and field termination kits as required.
 - c. Provide required mounting hardware.

2.06 WALL BRACKETS

A. Wall Mounted for patch panels.

1. 19-inch wide standard wall mount bottom hinged, 8 inch deep, height as required. Provide a grounding kit.
2. 16 gauge steel construction
3. Black powder coat finish
4. EIA-310D universal spacing tapped #12-24
5. Mounting hardware
6. Part Number: Hubbell HPWWB series, height as required.

2.07 WIRE MANAGEMENT

A. Cable Management panels for patch panels and wall brackets.

1. Provide one cable management panel for each patch panel.
2. The panel shall be 3.5 inches high and shall have (7) 3.5inch rings, (6) pass-through holes and fit the wall bracket.
3. 16 gauge steel
4. 0.225" diameter steel rings
5. Black powder coat finish
6. Required mounting hardware
3. Hubbell: HC219CE3N

C. Cable Management for the 110 punch down blocks shall be Hubbell 110TRA with standoff legs.

- D. Provide spools, rings and bridle rings as required above the ceilings, on the back boards and in the closets to provide a neat cable installation in accordance with the applicable codes and standards.

2.08 GROUNDING

- A. Comply with requirements in Section 26 00 50 "Grounding Requirements" for grounding conductors and connectors.
- B. Use an NA30-5 AP-1400 Ground Buss Bar
- C. Comply with ANSI-J-STD-607-A.

2.09 MISCELLANEOUS EQUIPMENT

- A. Outlet boxes shall be single gang, 4 inch square, 2-1/8 inch deep with a single gang plaster ring in accordance with Section 26 00 50.
- B. Conduit and fittings shall be in accordance with Section 26 00 50.
- C. Provide J hook hangers and bridle rings as required for cable support.

2.10 PLYWOOD BACKBOARDS

- A. Plywood backboards for mounting communications systems equipment shall be 3/4" thick, A-D, fire retardant treated, plywood of sizes indicated on the drawings with the A grade side exposed. Secure the backboard to the wall with bolts as required.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS FOR COMMUNICATIONS CABLE

- A. Pulling tension on communications cable shall not exceed 100 Newtons or 25 foot-pounds.
- B. The contractor shall avoid cable stress from cable twist during installation and tension from suspended cable runs and from tightly cinched cable ties.
- C. All communications cable, supports, conduit and bridle rings shall be supported to the structure, independent of other services.
- D. All exposed cable in the equipment rooms shall be secured to the plywood backboards or frames and routed through wire management hardware. All work should be neat and professionally done.
- E. Cable should be placed in conduit provided for this use. Cable not run in conduit shall be placed in J hook hangers or bridle rings. Cable should be routed so that no passageways are obstructed and that no doors are prevented from closing or ceiling tile prevented from being lifted. No cable or attachments shall be installed that inhibit access to any steam line, electrical or communications cable or device or mechanical equipment.
- F. When placing cable through sleeves or penetrations, the contractor shall patch and seal all holes and gaps around the cable in accordance with fire rating.
- G. Each station cable run shall be placed as an uninterrupted conductor section from origination to termination point.

H. After installation is complete, the Contractor shall conduct an operational test for approval. The installation shall be demonstrated to be in accordance with the requirements of this specification. Any defects revealed shall be promptly corrected at Contractor's expense and the tests re-conducted. Operational testing is defined for the following circuit types.

1. Station cable
 - a. Color code compliance
 - b. Labeling
 - c. Routing
 - d. Workmanship
 - e. Compliance with EIA/TIA 568A requirements

J. Conduit, outlet boxes and backboards shall be installed in accordance with Section 26 00 50.

3.02 HORIZONTAL CABLE

A. Installation

1. All cables installed from the workstation to punch down blocks or patch panel shall be a continuous run.
2. A 10 foot service loop shall be in each telecommunications room for all copper cables.
3. Quantities of cables per workstation shall be provided as indicated on the construction drawings.
4. All cables shall be installed in accordance with TIA/EIA – 568 and manufacturer recommendations. Strict attention shall be paid to maintaining sheath integrity, avoiding cable kinks and sharp bends and proper use of cable ties.

B. Termination - Voice Cable

1. At the punch down, voice cables shall be terminated on separate contact.
2. At the workstation, voice cables shall be terminated on a separate RJ11 jack in the wall plate.
3. Voice cables serving wall-mounted telephones shall be terminated on wall phone faceplates.
3. Pair twist shall be maintained as close as possible to the point of termination. Untwisting shall not exceed 13mm (0.5 inch) for "Category 5e" installations. The sheath of the cable shall be removed only as far as required to terminate the individual pairs.
4. Leave 12" of cable slack in the box or above the ceiling.

C. Termination – Data Cable

1. At the patch panel, data cables shall be terminated on separate RJ45 jacks in the patch panels.
2. At the workstation, the data cables shall be terminated on separate RJ45 jacks in the wall plate.
3. Pair twist shall be maintained as close as possible to the point of termination. Untwisting shall not exceed 13mm (0.5 inch) for "Category 5e" installations. The sheath of the cable shall be removed only as far as required to terminate the individual pairs.
4. Leave 12 inches of cable slack in the box or above the ceiling.

D. Testing and Inspection

1. All cables will be tested for opens, shorts, polarity reversals, transpositions and presence of AC voltage.
Any cable failing these tests must be repaired or replaced and retested.
2. A channel test shall be conducted on each data cable at a frequency bandwidth of at least 350 Mhz using test equipment approved for "Category 5e" testing (Fluke DSP, Microtest Omni-scanner or equal). Any cable not passing this test must be repaired or replaced and retested.
3. Printed test results must be provided for each cable.

3.03 LABELS

A. COMMUNICATIONS OUTLETS

1. The Contractor shall label the telephone and data outlets per Owner's standards.
2. Contractor shall use the Hubbell Labeling System and labels.
3. Contractor shall use the Hubbell Labeling Software.
4. All telephone and data jacks shall be labeled both at the station outlet and the patch panel.
5. Hubbell Labeling Software Part Number: XPSOFT
6. Hubbell Label Paper-use the appropriate XPL series.

3.04 PATCH PANELS AND WALL MOUNTED BRACKETS

- A. Wall mounted brackets shall be provided and installed in all equipment rooms as specified in this document and on the construction drawings.
- B. Vertical and horizontal cable management hardware shall be installed on the plywood backboards and wall mounted brackets as required.
- C. Racks and punch down blocks shall be secured to the wall in such a manner that they will remain stable when loaded with the patch panels and cabling.
- D. Racks shall be located within the room so as not to block access to any existing equipment or backboard space. The racks shall be located so that there is a minimum 36" access to the front of the patch panel.
- E. The racks shall be properly grounded using the communications grounding/bonding system.

END OF SECTION

SECTION 28 23 00

SECURITY CCTV VIDEO SURVEILLANCE

PART 1 - GENERAL

1.01 SUMMARY

- A. This document covers the installation of a CCTV surveillance system which will also be able to share video information with the MDOT state wide security system.
- B. The CCTV surveillance system security access system shall incorporate the following:
 - 1. CCTV Cameras
 - 2. Camera Mounts
 - 3. Power Supplies
 - 4. Communication System
 - 5. Digital Video Recorder
- C. The Contractor shall provide and pay for labor, materials, equipment, tools, utilities, construction equipment and machinery, transportation and other facilities and services necessary for the proper execution, operation and completion of the Work.
- D. Specification Language: Specifications and notes are written in imperative and abbreviated form. Imperative language of the technical specifications is directed at the Contractor, unless specifically noted otherwise. Incomplete sentences shall be completed by inserting "shall", "shall be", "the Contractor shall", and similar mandatory phrases by inference. The words "shall be" shall be supplied by inference where a colon (:) is used within product specifications.
- E. Drawings And Specifications
 - 1. Carefully study the Drawings and Specifications, and at once report any error, unforeseen circumstances, inconsistency or omission discovered.

1.02 PROJECT DEFINITIONS

- A. General Definitions
 - 1. CCTV: Closed-Circuit Television.
 - 2. DPDT: Double pole double throw switch
 - 3. DVR: Digital Video Recorder
 - 4. I/O: Input/Output.
 - 5. LAN: Local Area Network.
 - 6. NC: Normally closed contacts
 - 7. NO: Normally open contacts
 - 8. PDF: (Portable Document Format.) The file format used by the Acrobat document exchange system software from Adobe.
 - 9. RS-485: TIA/EIA standard for multipoint communications.
 - 10. SPST: Single pole single throw switch
 - 11. TCP/IP: Transport Control Protocol/Internet Protocol incorporated into Microsoft Windows.
 - 12. TPZ: Tilt Pan Zoon

- 13. UPS: Uninterruptible Power Supply.
- 14. Windows: Operating system by Microsoft Corporation.

B. Definitions Contract Language

- 1. Words that are in common use are used throughout the Drawings and Specifications except:
 - a. Words which have well-known technical or trade meanings are used in accordance with such recognized meanings.
 - b. Whenever the following listed words and phrases are used, they shall be mutually understood to have the following respective meanings:
 - 1) The words "as indicated." means: as shown on the Drawings, and in accordance with the Specifications.
 - 2) The words "as required." means: as required to provide a complete and satisfactory Work in full conformance with the Drawings and Specifications.
 - 3) The word "Provide" means: furnish, install, connect, test and make ready for use.
 - 4) The word "Work": The Work is the completed construction required by the Drawings and Specifications, and includes all labor necessary to produce such construction, and all materials and equipment incorporated or to be incorporated in such construction.
 - 5) The word "Furnish" means: supply item as specified. Item to be installed by others.
 - 6) Subcontractor is a person or entity who has a direct contract with the Contractor to perform any of the Work at the site.
 - 7) Project Record Drawings or Record Drawings are drawings that completely record and document all aspects and features of the Work. (Also known as "as-built" drawings.)

1.03 REFERENCES

- A. NFPA 70 – National Electrical Code
- B. UL 1449 – Surge Protective Devices

1.04 SYSTEM DESCRIPTION

- A. This project shall include the installation of CCTV cameras, camera mounts, power supplies, cabling, digital video recorder, and monitors that shall be compatible with the MDOT security standard.
- B. The CCTV Surveillance System shall be controlled from the District Security Center with video transfer capability over the MDOT WAN to the MDOT security center in Jackson.

1.05 SUBMITTALS

- A. Product Data: Submit nine (9) sets of three binders of manufactures supplied data. Each binder shall contain:
 - 1. Specification/cut sheets for equipment provided
 - 2. Design guides
 - 3. Installation and operating instructions

- B. Shop Drawings: Submit nine (9) copies of each submittal.
1. Diagrams of cable layout with system labeling schedule.
 2. Wiring diagrams.
- C. Field quality-control test report showing all cameras and digital video recorders / devices are installed / tested and are functioning correctly.
- D. Project Record Drawings:
1. The purpose of Project Record Drawings is to provide factual information regarding aspects of the Work, to enable future service, modifications, and additions to the Work
 2. Project Record Drawings are an important element of this Work. Contractor shall accurately maintain Project Record Drawings throughout the course of this project.
 3. Project Record Drawings shall include documentation of Work, including the camera locations, of setup perimeters, equipment, wiring, and cable runs.
 4. The contractor will be furnished with two (2) sets of site plans for Contractor's use in preparing Project Record Drawings. One set shall be used as a working set, the other shall be used to prepare the final record set.
 5. Project Record Drawings shall accurately show the physical placement of the following:
 - a. Cameras, power supplies, and digital video recorders.
 - b. Cable runs
 - c. Pull box locations.
 - d. Project Record Drawings shall show the physical placement of each camera and conduit to be accurate to within one foot (1') of the nearest landmark. Where the site plan conflicts with actual conditions, Contractor shall amend site plan as required. Indicate exact description of conduit runs and cable tray runs
 - e. Project Record Drawings shall show wire and cable runs, camera zone numbers, electrical panel/circuit breaker numbers from which equipment is powered, and splice points. Such information may be shown on the site plans.
 - f. Upon completion of Work, and prior to Final Acceptance, Contractor shall prepare and submit final record set of Project Record Drawings. This set shall reflect the installed work.
 - g. Final Project Record Drawings shall be provided to the MDOT or MDOT's representative.
 6. Closeout Submittals:
 - a. Provide a set Project Record Drawings to the Project Engineer including:
 - 1) Project Record Drawings
 - 2) Product Data
 - 3) Installation Manuals
 - 4) Operating Manuals
 - 5) Maintenance/Service Manuals

1.06 QUALITY ASSURANCE

A. Contractor Minimum Qualifications

1. Contractor shall be an installation and service contractor regularly engaged in the sale, installation, maintenance and service of CCTV Surveillance System.
2. Contractor shall have five (5) years experience with the installation, start-up and programming of systems of a similar size and complexity to the one proposed.

B. Supervision of Work: Contractor shall employ a competent Foreman to be in responsible charge of the Work. The Foreman shall be on the project site daily during the execution of the Work. The Foreman shall be a regular employee, principle, or officer of the Contractor, who is thoroughly experienced in managing projects of a similar size and type. Contractor shall not use contract employees or Subcontractors as Foremen.

C. Qualifications Of Technicians

1. Electronic systems Work shall be performed by electronic technicians thoroughly trained in the installation and service of CCTV systems.
2. Journeyman Wireman electrical workers may be used to install conduit, raceways, wiring, and the like, provided that final termination, hook-up, programming, and testing is performed by a qualified electronic technician, and that all such Work is supervised by the Contractor's Foreman.
3. Incidental Work, such as cutting and patching, lock hardware installation, painting, carpentry, and the like, shall be accomplished by skilled crafts persons regularly engaged in such type of work. Work shall comply with the highest standards applicable to that respective industry or craft.
4. 120 VAC power wiring and connections are to be performed by a qualified Journeyman Wireman, licensed to perform such Work.

D. Subcontractors

1. Use of any Subcontractor is subject to the approval of the MDOT or MDOT's representative and shall be identified at the time of Bid submittal.
2. Make no substitution for any Subcontractor previously selected without MDOT approval.
3. Contractor's Foreman shall be on the project site daily during all periods when Subcontractors are performing any of the Work. Contractor's Foreman shall be in responsible charge of Work, including any Work being performed by Subcontractors.
4. By an appropriate written agreement, 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 the terms of the Drawings and Specifications, and to assume toward the Contractor the obligations and responsibilities which the Contractor, by these documents, assumes.

E. Supervision And Construction Procedures

1. Supervise and direct the Work, using best skill and attention. Contractor is solely responsible for construction means, methods, and techniques.
2. Employ a competent foreman who shall be in attendance at the project site during the progress of the Work. The foreman shall represent the Contractor and communications given to the foreman shall be as binding as if given to the Contractor.

F. Regulatory Requirements and Permits

1. Work shall conform to applicable building, fire, and electrical codes and ordinances. In case of conflict between the Drawings / Specifications and codes, the codes shall govern. Inform the MDOT's representative of any such conflicts.
2. Secure and pay for licenses, permits, plan reviews, engineering certifications, and inspections required by regulatory agencies. Prepare, at Contractor's expense, any documents, including drawings, that may be required by regulatory agencies.
3. Make application for and obtain any permits required by federal, state, county, city, or other authority having jurisdiction over the work.

G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

H. Comply with NFPA 70, "National Electrical Code."

1.07 DELIVERY, STORAGE, AND HANDLING

A. Security of Contractor's Tools and Equipment: The MDOT or the MDOT's representative is not responsible for the care, storage or security of any of the Contractor's tools or equipment.

1.08 PROJECT/SITE CONDITIONS

A. Environmental Conditions

1. Dust Control: Make provisions to control dust, dirt, and foreign material caused by the performance of the Work.
2. Notify MDOT or MDOT's representative immediately of any damage or possible damage to any other equipment.

B. Clean-Up

1. Clean-up, on a daily basis as the Work progresses, dirt, dust and debris caused by Contractor's operations. Clean-up shall be completed by the end of each workday.
2. In the event that Contractor fails to clean-up, the MDOT or MDOT's representative may elect to have cleanup performed by others, with the costs of such clean-up being charged to the Contractor.

C. Construction Aids

1. Definition: Construction Aids are facilities and equipment required by personnel to facilitate the execution of the Work. Construction Aids include scaffolds, staging, ladders, platforms, hoists, cranes, lifts, trenchers, core drillers, protective equipment, and other such facilities and equipment.
2. Provide Construction Aids required in the execution of the Work. Construction Aids that are the property of MDOT or other contractors shall not be used without permission.
3. Storage of Construction Aids shall be coordinated with MDOT or MDOT's representative.

D. Safety

1. The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work.
2. Comply with local, state, and federal regulations and laws for the safety of the work place.

E. Accident Reports

1. Serious or fatal accidents shall be reported immediately by telephone or radio to the MDOT or MDOT's representative.

1.09 SEQUENCING

A. Description: This implementation plan describes the general approach that shall be followed in order to minimize the time for the CCTV Surveillance System to be operational.

B. Approach: Contractor shall plan and schedule work in such a sequence as to minimize the time before the system is operational. The following is a suggested work sequence:

1. Order equipment needed and notify any subcontractors to schedule their participation.
2. Insure there are an adequate number of power receptacles available to operate CCTV equipment and coordinate with MDOT or MDOT's representatives to where power is available.
3. Perform system layout work.
4. Provide shop drawings to verify location of equipment, conduit runs, power connections, etc. Submit shop drawings to MDOT or MDOT's representative.
5. Coordinate with MDOT or MDOT's representatives the access to the indicated camera location.
6. Prepare and pre-test all video equipment, set back light compensation to the greatest extent possible.
7. Install equipment.
8. Test and inspect all systems.
9. Perform other Work as required.
10. Perform the Acceptance Test.
11. Provide training.
12. Provide as-built drawings.

1.10 COMMISSIONING

- A. After Work is completed, and prior to requesting the Acceptance test, conduct a final inspection, and pre-test equipment and system features. Correct any deficiencies discovered as the result of the inspection and pre-test.
- B. Submit a request for the Acceptance test in writing to the MDOT's representative no less than fourteen days prior to the requested test date. The request for Acceptance test shall be accompanied by a certification from Contractor that Work is complete and has been pre-tested, and that corrections have been made.
- C. During Acceptance test, demonstrate video equipment and system features to MDOT. Any portions of the Work found to be deficient or not in compliance with the Project Drawing and Specifications may be rejected.
- D. Promptly correct deficiencies. Upon correction of deficiencies, submit a request in writing to MDOT or MDOT's representative for another Acceptance Test.
- E. Bare the cost for the second acceptance test.

1.11 MAINTENANCE

- A. Provide full procedures for testing video quality and alignment.
- B. Provide full procedures for any other tasks that must be performed to ensure the warranty remains intact.

PART 2 - PRODUCTS

2.02 EQUIPMENT AND MATERIALS

- A. Drawings and Specifications indicate major system components, and may not show every component, connector, module, or accessory that may be required to support the operation specified. Provide components needed for complete and satisfactory operation.
- B. Products not provided by MDOT shall be new and unused, and shall be of manufacturer's current and standard production.
- C. Where two or more equipment items of the same kind are provided, they shall be identical and provided by the same manufacturer.
- D. Product Availability:
 - 1. Prior to submitting a proposal, determine product availability and delivery time, and include such considerations into proposed Contract Time.
 - 2. Certain products specified may only be available through factory authorized dealers and distributors. Verify ability to procure the products specified prior to submitting a proposal.

2.03 CAMERAS

- A. Available Manufacturers:
 - 1. D-Link
- B. Color Fixed Camera
 - 1. Type:
 - a. D-Link DCS-7.10 HD
- C. Color Dome Fixed Camera:
 - 1. Type:
 - a. D-Link DCS-4602EV
- D. Lenses: Optical-quality coated optics, designed specifically for video surveillance applications, and matched to specified camera. Provide lenses for camera manufacture if available.
- E. CCTV Camera Mounting:
 - 1. Parapet wall mount – Pelco model PP350 or equal
 - 2. Parapet rooftop mount – Pelco model PP351 or equal
 - 3. Wall mount – Pelco model WM2000 or equal
 - 4. Corner mount adaptor for WM2000 – Pelco model CM100 or equal.

2.04 POWER SUPPLIES

- A. Power Supplies: Power to be supplied over Ethernet (POE).

2.05 UTP Transceivers / Switches

- A. General Requirements:
 - 1. Type:
 - a. TREND net TPE-2840WS 28 – Port Giga bit web-Smart POE & Switch – switch 28.

2.06 DIGITAL VIDEO RECORDERS

- A. Available Manufacturers:
 - 1. D-Link.
- B. Requirements:
 - 1. Type:
 - a. D-Link DNR-3221

2.07 LCD MONITOR

- A. Type: Flat panel LCD
- B. Size: 19 inches minimum
- C. Input: VGA
- D. Resolution: Supports up to 1280 X 1024 for SXGA input
- E. Brightness: adjustable to 300 cd/m²
- F. Minimum Contrast Ratio: 500:1
- G. Maximum Response Time: 12 ms
- H. Industrial rated for 24 hour x7 days a week operation
- I. Power: 120 V ac @ 50 Watts

2.08 WIRE AND CABLE

- A. General: Provide wire and cable required to install systems as indicated.
 - 1. Video cable shall be sized to provide adequate video signal at the recording equipment. The maximum cable length are as follows:
 - a. RG-59 – 700 feet
 - b. RG-6 – 1200 feet
 - c. CAT-6
 - 2. Wire and cable shall be sized to provide adequate signal for the worst case distance.
- B. Cables shall be specifically designed for their intended use.
- C. Coax cable with only a foil shield and drain wire shall not be acceptable.
- D. Comply with equipment manufacturers recommendations for wire and cable size and type.
- E. Comply with all applicable codes and ordinances.

2.09 JUNCTION AND PULL BOXES

- A. Interior Boxes: Sheet Metal Outlet Boxes: Sizes to be determined in accordance with code requirements for conductor fill. No box shall be smaller than a single gang 1-1/2" deep. Provide box covers as required.
- B. Exterior Boxes: Exterior boxes shall NEMA 4 or NEMA 3R, watertight and dust-tight.
- C. Interior and exterior boxes shall have their covers fastened using security screws.

D. Lightning Protection:

1. Provide suitable lightning protection for security panels.
2. Lightning protection equipment shall be UL listed.

PART 3 - EXECUTION

3.01 FIELD INSTALLATION

- A. Field located security panels where indicated.
- B. Mount field camera and power and run connecting cables as indicated.
- C. Align cameras as indicated.
- D. Set focal length (variable focal length (VFL) lenses) as required to encompass indicated view.
- E. Set back light compensation. Use neutral density filters to simulate darkness to set with iris full open.
- F. Set focus and depth of field. Set focus to give desired depth of field in lowest light level.
- G. Check communication and operation of remote control (PTZ dome camera) Field locate cables from security panel to security work station.
- H. Field locate cable and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other adverse conditions affecting installation.

3.02 EXAMINATION

- A. Junction and Pull Boxes
 1. Interior Boxes: Sheet Metal Outlet Boxes: Sizes to be determined in accordance with code requirements for conductor fill. No box shall be smaller than a single gang 1-1/2 inches deep. Provide box covers as required.
 2. Exterior Boxes: Exterior boxes shall be NEMA 4 or NEMA 3R, watertight and dust-tight
 3. Interior and exterior boxes shall have their covers fastened using security screws.
- B. Lightning Protection
 1. The Contractor shall provide suitable surge protection at both the camera and at the recording equipment for exterior cameras.
 2. Camera on poles or exposed in top of buildings shall have air terminals. The air terminals shall be bonded to the existing lightning protection system.
 3. Lightning protection equipment shall be UL listed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 CABLING

- A. Layout, size, and plan new wire and cable runs as required.
- B. Wire and cable passing through metalwork shall be sleeved by an approved grommet or bushing.
- C. Splices shall be made in junction boxes (except at equipment). Power and CAT 5 splices shall be made with an approved crimp connection. Coax cable splices shall be made by first terminating the cable with a coax connector and then using barrel coax cable connectors to join the coax cables. Wire nuts shall not be used on any low-voltage wiring unless the device.
- D. Identify all wire and cable at terminations (both ends) and at every junction box. Identification shall be made with an approved permanent label, Brady or equal.
- E. Wiring Method: Install wiring in raceway and cable tray except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use NRTL-listed plenum cable in environmental air spaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.
- F. Install coax cables using techniques, practices, and methods that are consistent with coax video cable and that ensure coax video performance of completed and linked signal paths, end to end.
- G. Install LAN cables using techniques, practices, and methods that are consistent with Category 5E rating of components and that ensure Category 5E performance of completed and linked signal paths, end to end.
- H. Install cables without damaging conductors, shield, or jacket.
- I. Boxes and enclosures containing security system components or cabling, and which are easily accessible to employees or to the public, shall be provided with a lock. Boxes above ceiling level in occupied areas of the building shall not be considered to be accessible. Junction boxes and small device enclosures below ceiling level and easily accessible to employees or the public shall be covered with a suitable cover plate and secured with tamperproof screws.
- J. Wire and Cable Terminations
 - 1. Identify all inputs and outputs on terminal strips with permanent marking labels.
 - 2. Neatly dress and tie all wiring. The length of conductors within enclosures shall be sufficient to neatly train the conductor to the terminal point with no excess. Run all wire and cable parallel or normal to walls, floors and ground.
 - 3. Install connectors as required by equipment manufacturers.
 - 4. Do not obstruct equipment controls or indicators with wire or cable.
 - 5. Route wire and cable away from heat producing components such as resistors, regulators, and the like.
 - 6. Comply with EIA/TIA-569, "Commercial Building Standard for Telecommunications Pathways and Spaces."
 - 7. Cable application requirements are minimum requirements and shall be exceeded if recommended or required by manufacturer of system hardware.

K. Conduit and Raceway Installation

1. Lay-out, size and plan conduit and raceway systems as indicated or as required which ever will allow for the greatest number of cables.
2. Route exposed conduit and raceway parallel and perpendicular to walls and adjacent piping.
3. Maintain minimum six (6) inch clearance between conduit and piping.
4. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps.
5. Use conduit bodies to make sharp changes in direction, as around beams. Fasten conduits and raceways to structural steel using approved spring clips or clamps.
6. No exposed conduit, raceway, or junction box shall be installed within any populated area.
7. Install boxes, card reader, intercoms and push buttons straight and plumb.
8. Do not support conduit from mechanical, plumbing, or fire sprinkler systems.
9. Do not use flexible conduit in lengths longer than six (6) feet.

- L. Penetrations: When penetrating a fire wall for passage of cables and/or conduit, provide a fire-stop system that complies with code and the local authority having jurisdiction.

M. Camera

1. Install number of conductor pairs recommended by manufacturer for the functions specified.
2. Install CAT-6 from the camera to the DVR where required.

3.04 IDENTIFICATION

- A. Label both ends of each cable. Use unique, alphanumeric designation for each cable, and label cable and jacks, connectors, and terminals to which it connects with same designation. Use logical and systematic designations for facility's architectural arrangement.
- B. Label each terminal strip and screw terminal or coax cable connector in each cabinet, rack, or panel.
1. Wiring conductors connected to terminal strips shall be individually numbered, and each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with the name and number of the particular device as shown.
- C. At completion, cable and asset management software shall reflect as-built conditions.

3.05 SYSTEM SOFTWARE

- A. Provide and install the DVR software and the CCTV software. Configure software to the project requirements. Assign software licenses to MDOT.

3.06 FIELD QUALITY CONTROL

- A. Provide wiring diagrams and labeling charts to properly identify all wiring.
- B. Provide a screen capture of each CCTV view.
- C. If corrections are needed, the Contractor shall perform the needed corrections in a timely fashion.

3.07 DEMONSTRATION - TRAINING

- A. Engage authorized service representative to train MDOT's maintenance personnel to adjust, operate, and maintain CCTV camera system.

END OF SECTION

SECTION 28 31 00

FIRE- ALARM SECURITY SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes

1. Fire alarm/security system:

- a. The design and installation drawings for the fire alarm / security system.
- b. Insure that the devices listed in this specification are incorporated into the design of the fire alarm system and the security alarm system.
- c. Provide one control panel for the fire alarm and security alarm system.
- d. Provide fire alarm wiring to fire alarm system devices and wiring to make connection between fire alarm panel and HVAC control system to shut down air handlers

1.02 SYSTEM DESIGN

- A. The design and installation drawings of the fire alarm system shall be designed to obtain the minimum compliance and installed in accordance with the latest edition of NFPA 72. In addition, the drawings shall meet the requirements of this Section, the authority having jurisdiction and complete in all respects and in operating condition including its supervision.
- B. The design drawing and subsequent installation drawings of the security system shall cover areas of the buildings and shall meet the requirements of this Section and be installed complete in respects and in operating condition including its supervision.
- C. The fire alarm and security system shall be designed to obtain the minimum compliance and installed in accordance with the latest edition of NFPA 72 and specifications Section 28 31 00 Fire Alarm Security System. Components, materials, and methods shall be in accordance with NFPA 72 and as listed by Underwriters Laboratories, Inc.
- D. Construction Documents and Shop Drawings should include a floor plan with device locations and room identification, a graphic symbol legend, a riser diagram, a matrix of operations, applicable general notes, a description of the secondary power supply, and other data necessary for the fabrication and installation of the fire alarm / security system, and any required changes or revisions thereof necessary to obtain approval from the authority having jurisdiction.
- E. No extra charges will be allowed for changes to drawings required to conform to NFPA 72, the Owner's requirements, of the authority having jurisdiction, the Owner's underwriter, or with conflict with other trades. The drawings become the property of the Owner.

1.03 STANDARDS

- A. Equipment and installation shall comply with the current applicable provisions of the following standards:

1. NFPA 70, The National Electrical Code (including Article 760)
2. National Fire Protection Standards (including but not limited to):
 - a. NFPA 71 Central Station Signaling Systems-Protected Premises Unit
 - b. NFPA 72 National Fire Alarm and Signaling Code
 - c. NFPA 72 Automatic Fire Detectors
 - d. NFPA 101 Life Safety Code
3. Local and State building codes;
4. Requirements of the Local Authority Having Jurisdiction (AHJ);
5. Underwriters Laboratories, Inc.

- B. The system and components shall be listed by Underwriters Laboratories, Inc. for use in Fire Protective Signaling Systems under the following standards as applicable. Not all of the standards will apply to this project, see Drawings for more information:

1. UL 864 Control Units for Fire Protective Signaling Systems (including UUKL sublisting)
2. UL 268 Smoke Detectors for Fire Protective Signaling Systems
3. UL 268A Smoke Detectors for Duct Applications
4. UL 217 Smoke Detectors, Single and Multiple Station
5. UL 521 Heat Detectors for Fire Protective Signaling Systems
6. UL 228 Door Closers-Holders for Fire Protective Signaling Systems
7. UL 464 Audible Signaling Appliances
8. UL 1638 Visual Signaling Appliances
9. UL 1971 Signaling Devices for the Hearing Impaired
10. UL 38 Manually Actuated Signaling Boxes
11. UL 346 Water flow Indicators for Fire Protective Signaling Systems
12. UL 1481 Power supplies for Fire Protective Signaling Systems.
13. UL 609, 1610, 1635 Commercial Fire and Intrusion Alarm systems..

1.04 FIRE ALARM OPERATION

- A. When a fire alarm condition is detected by one of the system initiating devices, the following functions shall occur simultaneously.

1. System point shall be shown on the control panel and remote annunciator by type of device, location and time of day.
2. The audio-visual alarm devices shall activate throughout out the building.
3. The digital dialer shall notify the monitoring company (as listed in the execution portion of this specification) that an alarm condition exists.
4. Shut down all air handlers, unless specifically forbidden by the authority having jurisdiction.

- B. When a trouble or supervisory condition occurs, the following functions shall occur simultaneously.
1. System point shall be shown on the control panel and remote annunciator by type of device, location and time of day.
 2. A distinct trouble sound shall occur at the keypad.
 3. The digital dialer shall notify the monitoring company (as listed in the execution portion of this specification) that a trouble or supervisory condition exists.
- C. Whenever a smoke, duct or heat detector is tripped, alarm verification shall function and a timer shall start. After a program time delay compliant with prevailing codes, the horn strobes shall sound if the detector is still in alarm.
- D. The system shall monitor for head sensitivity and give a warning message if the smoke or duct detector needs cleaning.
- E. The system shall be fully field-programmable with the equipment on site or a programmer. While programming, the system shall continue to operate, polling devices currently in the program.
- F. Other features of the system shall include the following.
1. Walk test
 2. Device Disabling: Feature pass code protected for use by manufacturer's authorized technician only. Pass code not available to end user.
 3. Read status of any point.
 4. Field programmable at control panel.
 5. Multiple password protection (for remote programming).
 6. Manual on/off for any output point.
 7. Calibrated smoke detector test.
 8. Low air pressure monitoring of air compressor of any dry pipe system.

1.05 SUBMITTALS

- A. General:
1. Pay application fees and obtain approval of submittals in writing from the State Fire Marshal's office and / or the local authority having jurisdiction prior to submittal to Owner's Representative for review.
 2. Submit fire alarm submittals to the Owner's Representative within 30 calendar days after award of Contract.
 3. Permit Drawings and other Submittals shall be prepared by a fire alarm installer certified by the approved manufacturer of the fire alarm system.
- B. Product Data: Complete documentation for the fire alarm system showing the model number, type, rating, size, style, manufacturer's names, and manufacturer's catalog data sheets for items to ensure compliance with these specifications.

C. Shop Drawings

1. Complete set of permit drawings showing conduit sizes and number of conductors required to components plus detailed wiring connections required at each type of device based on the level of the fire alarm system indicated in the Contract Documents.
2. Detailed drawings showing the intended location of field devices and their connections to the system along with room identification and a graphic symbol legend. Prepare submittal drawings utilizing AutoCad Release 2009 or newer Computer Aided Drafting system.
3. Detailed wiring diagrams and riser diagrams showing color-coding of wiring per manufacturer recommendations. Include calculations showing adequate capacity of the standby batteries, where applicable, as required by prevailing codes:

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by fire alarm/security system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
 1. Installing and programming technicians shall be individually certified by fire alarm/security system manufacturer.
- B. The alarm control panel shall be supplied with cards and future expansion slots needed for a complete operating system.
- C. Provide system with a 3-year warranty for the control panel starting from the time this system is operational.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturer: Provide products identified in other Part 2 articles by Bosch Security Systems, Inc. (Fire and Intrusion) or as approved.
 1. This specification requires that a certified fire and security alarm system dealer be contracted to install a complete system, honor the warranty, provide the training and service the system after the warranty period expires.
 - a. Installing and programming technicians shall be individually certified by fire alarm / security system manufacturer.
 2. Products (Bosch Security Systems, Inc.) identified as Basis of Design in other Part 2 articles are identified to set the standard of quality for equipment used.

2.02 GENERAL

- A. Incorporate each of the devices listed in this specification into the design of the Fire Alarm and Security Alarm System.

- B. Provide a complete addressable fire alarm system throughout the building as shown on the drawings and in accordance with NFPA 72 and authorities having jurisdiction. Equipment shall be UL listed.
- C. Each smoke detector shall be addressable for the exact location in the building and provide "dirty" maintenance type messages at the annunciator, central station and remote programming software. Manual stations, sprinkler devices and all other "contact only" closing devices shall be addressable

2.03 PANEL

- A. Main Fire and Security Alarm Control Panel (FACP/FAP): Bosch Security Systems; Model D7412GV4/D9412GV4.
 - 1. CPU (Central Processing Unit): Include the following:
 - a. Programming protection in the event of a power failure.
 - b. Addressable communication transmission.
 - c. History of the last 499 - 1000 activities.
 - d. LEDs for AC power, fire alarm, security alarm, supervisory signal, system trouble, disabled points and alarm silenced.
 - e. Main power supply for the panel and for peripheral devices with 120VAC 60HZ input power or transformer and an integral charger for batteries usable for peripherals.
 - f. SIC data loop board(s) capable of handling 255 or 120 detectors/modules per board.
 - g. A serial interface board for printer or display terminal.
 - h. Battery backup shall comply with Section 1-5.2.6 of NFPA -72.
 - i. Local or remote programming.
 - j. Two different passwords required for programming.
 - 2. DIA Display Interface Board:
 - a. 32 or 16-character liquid crystal display command center.
 - 3. Equip control panel to provide the following capacities:
 - a. Data loops: 2
 - b. On-board points: 4 or 8
 - c. Addressable points: 255 or 238
 - d. Programmable horn circuits: 2 or 3
 - e. Integrated network communications capable, dialer capture module will not be accepted
 - 1) Number of Boards (i.e. "cards") determined by system designer.
 - f. Real Time clock
 - 4. Digital Communications: Provide system capable of communicating with a digital receiver such as the Bosch/Radionics D6600 receiver.
 - 5. Remote programming access codes must remain at the factory default code. IT IS FORBIDDEN FOR INSTALLERS TO INSERT THEIR OWN CODES

2.04 CIRCUITS AND WIRING

- A. Provide a Class B wiring system.
- B. Provide 15 percent capacity for future expansion of A/V alarm device and data loop circuits.

- C. Separate alarm wiring from any open conductors or power, or Class 1 circuits. Do not place in any conduit, junction box or raceway containing these conductors, per NEC Article 760-55.
- D. Wiring for 24 volt DC control, alarm notification, emergency communication and similar power-limited auxiliary function may be run in the same conduit as initiating and signaling line circuits. Provide circuits with transient suppression devices and design system to permit simultaneous operation of all circuits without interference or loss of signals.
- E. Wire:
 - 1. Provide wiring meeting local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the system. Provide number and size of conductors as recommended by the system manufacturer, but not less than 18 AWG (1.02 mm).
 - a. Line Voltage Circuits: Standard 14 gage copper wire with THHN insulation.
 - b. Low voltage Circuits: Twisted shielded 16 gage stranded copper wire.
 - 2. Provide wire and cable listed and approved by a recognized testing agency for use with a protective signaling system.
 - 3. Provide wire and cable not installed in conduit with a fire resistance rating suitable for the installation as indicated in NFPA 70 (e.g., FPLR).
 - 4. Field wiring shall be electrically supervised for open circuit and ground fault.
- F. Terminal Boxes, Junction Boxes and Cabinets: UL listed for use and purpose.

2.05 MANUAL PULL STATIONS

- A. Product: Bosch Security Systems; FMM-7045-D or FMM-462-D.
- B. The unit shall be dual action (i.e. requiring two motions to activate the station) and shall be addressable for connections to the fire alarm control panel(s).
- C. Unit shall meet UL 38, standard for manually actuated signaling boxes.
- D. Mount manual pull stations 48 inches (1220 mm) above the finished floor and in accordance with local building codes and as called out in NFPA 72

2.06 CEILING / WALL SMOKE DETECTORS

- A. Bosch Security Systems; D7050 with D7050-B6 base or F220 series smoke with F220-B6PM/S POPIT bases.
- B. Provide base for all applications where auxiliary contacts are required.

2.07 DUCT SMOKE DETECTORS

- A. Intelligent Addressable Duct Mounted Photoelectric Smoke Detectors:
 - 1. Bosch Security Systems; D341P Series Duct Detector Housings.
 - a. D9127U addressable single point module.
 - 2. Provide UL 268A listed unit with two LEDs that will provide local alarm indication and a remote alarm output will be required for use with auxiliary devices.

3. Operating Velocities: 300 to 4000 feet/minute.
4. Provide sampling tube per NFPA, test station and all other required accessories.
5. The shut-down of air handlers shall occur via a signal from the Fire Alarm Panel should any smoke detector be activated, unless specifically forbidden by the authority having jurisdiction, in which case provide auxiliary contact as required to shut down equipment and wire into the stop circuit of the associated air handler starter.
6. Provide remote key activated test station (with status / alarm / trouble indicating LEDs), on the wall beneath the duct detector as indicated on Drawings or as determined in field.
 - a. Provide electrical conduit from duct detector to remote test station for column and wall mounted applications.
 - b. Provide engraved (or approved machine-generated equivalent method) plate at each remote station to read: "#### Duct Smoke Detector", where #### is the RTU or AHU identification number used on Drawings. Install test stations at 80-inches above finish floor (AFF).
7. Provide required power and control wiring so that upon detection of smoke, the following sequence of operations occurs where applicable:
 - a. A supervisory signal is sent by the fire alarm control panel to the monitoring central station.
 - b. All HVAC units shut down (including applicable dampers).
 - c. Associated smoke dampers close (wired to automatically re-open on duct detector reset)

2.08 HEAT DETECTORS

A. Addressable Heat Detectors:

1. Products:
 - a. Bosch Security Systems; F220 series detectors with applicable base.
2. Provide both rate of rise and fixed temperature with 135 degrees F. alarm threshold.

2.09 FIRE ALARM NOTIFICATION DEVICES

A. General:

1. Comply with requirements of NEC and NFPA-72.
2. Provide weather resistant back boxes for units installed on the exterior or in wash-down areas to diminish the risk of damage due to weather or wash-down.

B. Horn/Strobe Units

1. Manufacturers:
 - a. Cooper Industries; Wheelock Brand
 - b. Gentex Corporation
2. Comply with ANSI S3.41 temporal code, when required by authority having jurisdiction.
3. Synchronize strobe units.
4. Color: Red

5. Strobe Luminous Intensity: ADA-compliant.
 - a. Minimum candela rating as indicated.
 - b. Minimum candela units as required to comply with ADA and the equivalent NFPA 72 requirements.
6. Mounting: Semi-flush mounting plates, ceiling or bottom of open steel structure whenever possible, wall mounted (only when required) at 80-inches as shown on Drawings.

C. Strobe-Only Units

1. Manufacturers:
 - a. Cooper Industries; Wheelock Brand
 - b. Gentex Corporation
2. Comply with ANSI S3.41 temporal code, when required by authority having jurisdiction.
3. Synchronize strobe units.
4. Color: Red.
5. Luminous Intensity: ADA-compliant.
 - a. Minimum candela rating as indicated.
 - b. Minimum candela units as required to comply with ADA and the equivalent NFPA 72 requirements.
6. Mounting: On ceiling or to the bottom of open steel structure whenever possible, Wall mounted (only when required) at 80-inches as shown on Drawings.

2.10 ACCESSORY DEVICES

A. Remote Annunciator

1. Bosch model D1256RB
2. Locate remote annunciator where indicated on the drawings or as directed by the local fire department.
3. Mount remote annunciator on wall 60 inches above finish floor to center of unit or as required by local fire department.

B. Sprinkler Devices

1. Sprinkler tamper and flow switches will be provided by the fire protection installer.

C. Monitor Modules

1. Provide as required to interface "non-intelligent" devices into the system as shown on the Drawings (i.e. Sprinkler Flow Switches, Tamper Switches, Pressure Switches, etc. as applicable).
 - a. Provide electrical conduit for wall mounted applications, and for ceiling mounted applications if the above-ceiling space acts as a plenum return.
 - b. Provide required relays for auxiliary devices including door closures and supervised control functions such as air handler shut-downs.

2.11 DIGITAL COMMUNICATOR ("DIALER")

- A. Description: Programmed to report to the Owner's UL LISTED CENTRAL STATION via two dedicated POTS telephone lines for fire alarm systems and one dedicated POTS telephone line for the burglar alarm system. Do not install network module unless directed by the owner. Phone lines will be set up to allow long distance calling.
1. UL station will be the Owner's central alarm control monitoring company.
 2. The dialer and/or network module will be UL listed for fire alarm use.
 3. Mounting: Mount in single equipment housing containing battery charger and battery with coupler cable.
- B. Provide one duplex telephone outlet connected to a non-dedicated telephone line (with two RJ31X connecting block jacks) within two feet of the Fire Alarm Panel / Digital Communicator for back up connection to telephone system.

2.12 SECURITY ALARM SYSTEM

- A. Control Panel
1. Configure system to accommodate the needs of the facility. Supply all security modules and future expansion slots needed for a complete operating system.
- B. Keypads:
1. Product: Bosch Security Systems; D1255.
 2. Keypad installation shall be located where indicated, exact location field verified with Owner. Mount keypads 48 inches above finished floor to center of keypad.
- C. Door Switch
1. Basis of Design:
 - a. Rolling Doors: UTS Fire and Security, GE Security; Sentrol 2300 Series, track mounted contacts.
 - b. Other Doors: UTS Fire and Security, GE Security; Sentrol 1078T Series, recessed contact.
 2. Provide at doors indicated.
 3. Install wiring for door switch in conduit to a junction box adjacent to door jam. Install wiring from junction box to door switch in surface raceway or flexible conduit depending on the installation.
- D. Motion Sensors
1. Bosch Security Systems; ISC-PDL1-WA18G wall-mount motion, DS9360 (up to 17 feet) and DS9370 (above 17 feet) ceiling mount motions.
 2. Install on ceiling or on wall 80 inches above finished floor to provide a curtain of protection just inside the potential access point in locations shown on the Drawings.

E. Glass Break Sensors

1. Intellisense NFG 730 25' Wall/Ceiling Glass Break Square
2. Equip each window indicated with a glass break sensor, installed so that cable is not exposed and the detector is hidden from view.

F. Security System Monitoring Devices

1. Basis of Design: GE Security; Sentrol.
2. Provide in selective equipment as indicated.
3. Monitoring of the specialized equipment will require coordination with the equipment manufacturers. Provide supplemental equipment needed to monitor this equipment for a complete and operational system.

PART 3 - EXECUTION

3.01 GENERAL

- A. The Authority Having Jurisdiction (AHJ) shall be notified prior to installation of equipment and wiring.

3.02 INSTALLATION

A. General:

1. Install equipment in accordance with the NEC, NFPA 72, local and state codes, as shown on the Drawings, and as recommended by the manufacturer.
2. Conceal wiring, cabling, conduit, junction boxes, conduit supports and hangers from view in finished ceiling areas and exposed in open structure areas. Place alarm wiring in conduit when installed down a column and in walls.
3. Do not install smoke detectors prior to the system programming and test period. If construction is ongoing during this period, protect smoke detectors from contamination and physical damage.
4. Flush mount fire detection and alarm system devices, control panels and remote annunciators when located in finished areas. Devices may be surface mounted when located in unfinished areas.

B. Connect 120VAC power for fire and security alarm equipment.

- C. Provide required 20A / 120VAC power as required to energize components of the security and fire alarm system. Include home-runs for fire alarm control panels as well as home-runs and wiring for any accessory devices such as remote power supplies / panels, dialer, etc. as applicable.

1. This requirement applies whether or not such power work is shown on the Drawings.
2. Dedicate branch circuits serving fire alarm equipment to fire alarm equipment only. Label circuit at the main power distribution panel as FIRE ALARM. Ground control panel cabinet securely to either a cold water pipe or a grounding rod.
3. Provide machine generated label at FACP and intrusion control panel indicating location of breaker box and circuit number.

D. Smoke or Heat Detector Locations:

1. Do not exceed the rated coverage of the detector.
2. Install no more than 15-feet from a wall or 30-feet apart.
3. Do not install within 3-feet of a supply air diffuser.

E. Duct Smoke Detector Installation:

1. Duct smoke detectors are typically shown schematically at the respective air handling unit on the Drawings, but shall actually be installed maximizing the distances between ductwork offsets, and installed ahead of the first branch duct take-off. Coordinate with HVAC installer and fire alarm manufacturer's representative in field.
2. In fully ducted systems, install duct smoke detectors in the appropriate side of air handling equipment as required by the authority having jurisdiction. Where more than one detector is indicated associated with a particular piece of air handling equipment, there are special reasons for the additional detectors (i.e. split returns, return risers serving multiple floors, etc.); coordinate all locations for same with the HVAC installer.

F. Digital Communicator (Dialer) Installation

1. Connect each jack to a separate phone line and install as the first in-house device tied to the respective phone line. Do not connect the jacks to a party line or a "ground start" telephone circuit.

3.03 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing.
- B. Upon completion of installation, the system shall be checked and tested by a fire alarm inspector that is State-Licensed, NICET Level II Certified, or approved equivalent. Contact system manufacturer for this service if installer cannot provide on their own.
- C. After making tests and corrections, conduct a system demonstration for Owner and the authority having jurisdiction.

3.04 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project outside normal occupancy hours for this purpose.
- B. Follow-Up Tests and Inspections: After date of Completion, test the fire alarm system complying with testing and visual inspection requirements in NFPA 72. Perform tests and inspections listed for three monthly, and one quarterly, periods.

3.05 DEMONSTRATION

- A. Engage a manufacturer certified service representative to train Owner's personnel to operate the fire alarm system.
 - 1. Provide onsite training and User Guide documentation at no cost to Owner. Training includes but is not limited to:
 - a. How to arm and disarm the Intrusion system.
 - b. How to check point status and identify faults on the Intrusion system.
 - c. How to silence a trouble signal on the Intrusion or Fire system.
 - d. How to silence the horns on the Fire system.
 - e. How to reset the smoke and / or duct detectors on the Fire system.
 - f. How to reset a pull station on the Fire system.
 - g. How to identify phone line, A/C power, and battery fails on the Intrusion or Fire system.
 - 2. Provide 24 hour / 7 days per week / 365 days per year technical support at no cost to Owner.

END OF SECTION

SECTION 31 23 11

EXCAVATION, FILLING AND GRADING FOR BUILDING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: The extent of excavation, filling and grading is shown on the Drawings.
 - 1. Preparation of subgrade for building slabs is included as part of this Work
 - 2. Backfilling for trenches within the building lines is included as part of this Work.
- B. Related Sections:
 - 1. Section 01 40 00 – Quality Requirements (For Testing Laboratory Services).
 - 2. Section 01 45 29 – Testing Laboratory Services – MDOT.

1.02 DEFINITIONS

- A. Backfill: Soil material used to fill an excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.
- C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
 - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.

- H. 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.
- I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- J. 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.
- K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.03 SUBMITTALS

- A. Notification shall be provided to Project Engineer indicating source of borrow material in advance of start of Work and certification provided that proposed soil material is satisfactory for specified use.

1.04 QUALITY ASSURANCE

- A. Preexcavation Conference: Conduct conference at Project site.
- B. Perform excavation Work in compliance with applicable requirements of governing authorities having jurisdiction.
- C. Compaction density shall be 95 percent of the maximum dry density value as determined by ASTM D 698 (Standard Proctor Test) of AASHTO T-99.
- D. Soils compaction control tests shall be performed as specified herein and under Section 01 40 00 –Quality Requirements. Stability is defined as absence of significant yielding or pumping of soils under compaction effort.
- E. Number of Tests: Make test(s) in accordance with AASHTO T-99 for each class of material. Make in-place density tests in accordance with AASHTO T-238 (Nuclear Method) for density tests, as the fill and backfill work progresses. At least one test per lift of any isolated portions and each footing.
- F. Work on Non-Tested Areas: Placing permanent construction over fill that has not been tested and approved may require removal of permanent Work, recompacting the fill and replacing the Work at no additional cost to the Owner.

1.05 PROJECT CONDITIONS

- A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.
 - 1. Locate existing underground utilities in the areas of Work.
 - 2. If utilities are to remain in place, provide adequate means of protection during earthwork operations.

- 3. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult the Utility Owner immediately for directions.
 - 4. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
- B. Do not interrupt existing utilities serving facilities occupied and used by Owner or others except when permitted in writing by Project Engineer and then only after acceptable temporary utility services have been provided.
- 1. Demolish and completely remove from site existing underground utilities indicated "To Be Removed".
 - 2. Coordinate with utility companies for shut off of services if lines are active.
- 1.06 PROTECTION OF PERSONS AND PROPERTY
- A. Barricade open excavations occurring as part of this Work and post with warning lights.
- 1. Operate warning lights as recommended by authorities having jurisdiction.
 - 2. Protect structures, utilities, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.
- 1.07 USE OF EXPLOSIVES
- A. The use of explosives is not permitted.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Backfill and Fill: Select fill shall be an approved select material free from trash, debris, stones larger than 3 inches, roots and other organic matter.
- C. Granular Fill:
 - 1. Below existing natural grade line: Sandy clay with a liquid limit less than 45 and PI in range of 10 to 22, or clayey sand with PI not less than 7 and liquid limit not greater than 35.
 - 2. Above existing natural grade under slabs and footings: Silty or sandy clay as above or clayey-sand with LL less than 35 and PI of 3 to 15.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Examine the areas and conditions under which excavating, filling, and grading are to be performed and notify the Contractor, 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 an acceptable manner.

3.02 EXCAVATION

- A. Excavation consists of removal and disposal of material encountered when establishing required grade elevations.
- B. Earth excavation includes removal and disposal of pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, material of any classification indicated in data on subsurface conditions, and other materials encountered that are not classified as rock excavation or unauthorized excavation.
- C. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Project Engineer. Unauthorized excavation, as well as remedial Work directed by the Project Engineer, shall be at the Contractor's expense. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to Project Engineer.
- D. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Project Engineer.
- E. Additional Excavation: When excavation has reached required subgrade elevations, notify the Project Engineer who will make an inspection of conditions. If unsuitable bearing materials are encountered at the required subgrade elevations, carry excavations deeper and replace the excavated material as directed by the Project Engineer. Removal of unsuitable material and its replacement as directed will be paid on the basis of contract conditions relative to changes in work.
- F. Stability of Excavations. Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.
- G. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross braces, in good serviceable condition. Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

H. Dewatering: Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrade and foundations.

1. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
2. Convey water removed from excavations and rainwater to collecting or run-off areas. Establish and maintain temporary drainage ditches and other diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.

3.03 STORAGE OF SOIL MATERIALS

A. Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage. Locate and retain soil materials away from edge of excavations. Dispose of excess soil material and waste materials as herein specified.

3.04 EXCAVATION FOR STRUCTURES

A. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 feet, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection. In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive concrete.

3.05 EXCAVATION FOR TRENCHES

- A. Dig trenches to the uniform width required for the particular item to be installed, sufficiently wide to provide ample working room. Excavate trenches to the depth indicated or required. Carry the depth of trenches for piping to establish the indicated flow lines and invert elevations. Beyond the building perimeter, keep bottoms of trenches sufficiently below finish grade to avoid freeze-ups.
- B. Grade bottoms of trenches as indicated, notching under pipe bells to provide solid bearing for the entire body of the pipe. Backfill trenches with concrete where trench excavations pass within 18 inches of column or wall footings and which are carried below the bottom of such footings, or which pass under wall footings. Place concrete to the level of the bottom of adjacent footings.
- C. Do not backfill trenches until tests and inspections have been made and backfilling authorized by the Project Engineer. Use care in backfilling to avoid damage or displacement of pipe systems.

3.06 COLD WEATHER PROTECTION

A. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

3.07 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.
 - 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.08 COMPACTION

- A. Control soil compaction during construction providing minimum percentage of density specified for each area classification.
- B. Building Slab: Compact top 12 inches of subgrade and each layer of backfill or fill material at 95 percent maximum dry density.

3.09 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.10 BACKFILL AND FILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.
- C. Under buildings use sub-base material, or satisfactory excavated or borrow material, or combination of both. Backfill excavations as promptly as work permits, but not until completion of the following:
 - 1. Acceptance by Project Engineer of construction below finish grade including, where applicable, dampproofing, waterproofing, and soil treatment.
 - 2. Inspection, testing, approval, and recording locations of underground utilities.
 - 3. Removal of concrete formwork, shoring and bracing, and backfilling of voids with satisfactory materials.
 - 4. Removal of trash and debris.

3.11 GROUND SURFACE PREPARATION

- A. When existing ground surface has a density less than that specified under "Compaction" for the particular area classification, break up the ground surface, pulverize, moisture condition to the optimum moisture content, and compact to required depth and percentage of maximum density.

3.12 PLACEMENT AND COMPACTION

- A. Place backfill and fill 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.
- B. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content. Compact each layer to required percentage of maximum dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
- C. Place backfill and fill materials evenly adjacent to structures, to required elevations. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around structure to approximately same elevation in each lift.

3.13 GRADING

- A. Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.
- B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes, and as follows:
- C. Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.14 COMPACTION AFTER GRADING

- A. After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

3.15 MAINTENANCE

- A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
- B. Reconditioning Compacted Areas: Where subsequent construction operations or adverse weather disturbs completed compacted areas, scarify surface, re-shape, and compact to required density prior to further construction.

3.16 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.
- 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.

3.17 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 31 16

TERMITE CONTROL

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Soil treatment for control of all species of subterranean termites including Formosan termites.

1.02 ACTION SUBMITTALS

- A. Product Data: Manufacturer's technical product data and application instructions prior to application for Project Engineer's approval. Include the EPA-Registered Label for termiticide products.
- B. Sample Warranty: Submit sample copies of the Termite Soil Treatment Guarantee form prior to application for Project Engineer's approval.
- C. Quality Control: Submit identification of at least 3 projects of similar scope along with name, address, and telephone number of the Architect, Owner and General Contractor.

1.03 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Soil Treatment Application Report: Include the following:
 - 1. Date and time of application.
 - 2. Moisture content of soil before application.
 - 3. Termiticide brand name and manufacturer.
 - 4. Quantity of undiluted termiticide used.
 - 5. Dilutions, methods, volumes used, and rates of application.
 - 6. Areas of application.
 - 7. Water source for application.

1.04 QUALITY ASSURANCE

- A. In addition to the requirements of these Specifications, comply with manufacturer's instructions and recommendations for the Work, including preparation of substrate and application.

- B. Installer Qualifications: Engage a professional pest control operator, licensed by the State of Mississippi, Mississippi Department of Agriculture and Commerce, Bureau of Plant Industry, and in accordance with regulations of governing authorities for application of soil treatment solution.
 - 1. The pest control operator is to have the aforementioned valid license, the company technician is to have a valid identification card for pest control, and the company vehicle is to be clearly marked with the company name.
 - 2. The professional pest control operator specializing in Soil Treatment for Termite Control, with 5 years minimum experience, shall have completed work similar to that indicated for this Project and have a record of successful in-service performance.
- C. Regulatory Requirements: Formulate and apply termiticides and termiticide devices according to the EPA-Registered Label.
- D. Comply with Mississippi Regulations Governing Pest Control Operators in following the labels of the termiticide.
- E. Preinstallation Conference: Conduct conference at Project site.

1.05 PROJECT CONDITIONS

- A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.
- B. Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.
- C. Remove all non-pressure treated wood contacting soil. Remove grade stakes prior to applying horizontal barrier and all form boards, stakes and concrete over pour prior to applying vertical soil treatment.

1.06 WARRANTY

- A. Soil Treatment Special Warranty: Furnish 3 copies of written warranty certifying that the applied soil poisoning treatment will prevent the infestation of subterranean termites, including Formosan termites, and that termite contractor will re-treat the soil and also repair or replace damage caused by termite infestation WITHOUT EXPENSE to the Owner.
 - 1. Warranty Period: Provide warranty for a period of 5 YEARS from the date of treatment, signed by the Applicator and the Contractor.

1.07 MAINTENANCE SERVICE

- A. Continuing Service: Beginning at Final Completion, provide 12 months' continuing service including monitoring, inspection, and re-treatment for occurrences of termite activity. Provide a standard continuing service agreement. State services, obligations, conditions, terms for agreement period, and terms for future renewal options.

PART 2 - PRODUCTS

2.01 SOIL TREATMENT SOLUTION

- A. Termiticide: Use an emulsible concentrate insecticide for dilution with water specially formulated to prevent infestation by subterranean termites as recommended by the Southern Forest Experiment Station, Forest Insect Laboratory at Gulfport, Mississippi, and registered by the Bureau of Plant Industry for use in structural pest control work. Fuel oil will not be permitted as a diluent. Provide a working solution of one of the following chemical elements:
1. Horizontal Barrier: Cypermethrin, Prevail or Talstar.
 2. Vertical Barrier: Fipronil.
- B. Other solutions may be used as recommended by Applicator and if acceptable to local and state governing authorities. Use soil treatment solutions that are not injurious to plants.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil per termiticide label requirements, interfaces with earthwork, slab and foundation work, landscaping, utility installation, and other conditions affecting performance of termite control.
- B. Proceed with application only after unsatisfactory conditions have been corrected.

3.02 APPLICATION, GENERAL

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.03 APPLYING SOIL TREATMENT

- A. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. 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.
1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.
- B. Prior to each application, the applicator shall notify the Contractor of the intended application and instruct the responsible person to notify construction workers and other site individuals to leave the treated area and not to return until chemical has been installed into the soil.
1. Post warning signs in areas of application warning workers that soil poisoning has been applied. Remove signs when areas are covered by other construction.

- C. Application: Mix soil treatment termiticide solution to a uniform consistency. Use COLOR DYE MARKING AGENT to insure the area is treated. 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: Underground-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: 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; around interior column footers, piers, and chimney bases; and along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
- D. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
 - 1. Allow a minimum of 12 hours for drying after application, before beginning concrete placement or other construction activities.
- E. 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.
- F. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-290-1

CODE: (SP)

DATE: 01/17/2017

SUBJECT: Flagpole

Section 907-290, Flagpole, 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 907-290 - FLAGPOLE

907-290.01--Description. This work shall consist of furnishing all materials and erecting a ground set fixed type aluminum flagpole with external halyards and accessories as indicated on the Plans/Drawings, or as 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. The flagpole shall be spiral wrapped with protective covering and packed in a protective shipping tube or container. The flagpole and accessories shall be protected on site from damage or moisture.

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 an approved cone tapered, single section aluminum flagpole, having a nominal 30-foot exposed height when measured from the ground. The pole shall be complete with a 14-gauge, 6-inch diameter aluminum ball with a gold anodized finished finial. The pole shall be cast aluminum with double revolving, stainless steel ball bearings, non-fouling truck assembly, tiedown cleat with matching (material) cover capable of being padlocked in position over the tiedown cleat, two No. 10 (5/16") polypropylene braided white halyards with solid bronze swivel snaps per halyard, and ornamental base collar. Lightning ground rod shall be 18 inches long and have a 3/4-inch diameter. Lightning ground cable shall be No.6 AWG copper, soft drawn.

The pole shall be made from 6063T6 extruded aluminum tubing with approximately one inch every five to six feet straight taper, with a butt diameter of approximately six inches and top diameter of approximately three and one half inches and have an approved clear anodized finish.

Performance: Pole without flag shall resist without permanent deformation a 110 miles per hour wind velocity, be non-resonant, and have a safety design factor of 2.5.

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. The flagpole installation shall be electrically grounded. Foundation plate and centering wedges for the flagpole base set shall be installed in the concrete base and fastened. Foundation tube shall be filled with sand and compacted.

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 provided in Subsection 907-290.04, 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. 907-626-5

CODE: (SP)

DATE: 07/27/2017

SUBJECT: Thermoplastic Blue ADA 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.

907-626.04--Method of Measurement. Delete the second paragraph of Subsection 626.04 on page 495 and substitute the following.

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 four inches in width will be converted to equivalent lengths of 4-inch stripe.

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 four inches in width will be converted to equivalent lengths of 4-inch widths. Cold Plastic Legend, Handicap Symbol of the color specified will be measured per each as determined by actual count in place.

After the last sentence of the last paragraph of Subsection 626.04 on page 495, add the following.

Cold Plastic Legend, Handicap Symbol of the color specified will be measured per each as determined by actual count in place.

907-626.05--Basis of Payment. Add the following to the list of pay items on page 496.

907-626-G Thermoplastic Detail Stripe, Blue-ADA - per linear foot

907-626-H: Thermoplastic Legend, Handicap Symbol, Color - per each

SECTION 905 - PROPOSAL

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.

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.

Proposal(Sheet 2-1)

Benton

Construction of Ashland Maintenance Area Headquarters Building, with other Structures, and Site Work, known as State Project Nos. BWO-2214-05(001), BWO-2215-05(001), BWO-2217-05(001), & LWO-2096-05(002) / 502996301, 302, 304, & 305 in Benton County.

Line no.	Item Code	Adj Code	Quantity	Units	Description[Fixed Unit Price]
Roadway Items					
0010	201-A001		1	Lump Sum	Clearing and Grubbing
0020	202-B126		2,485	Linear Feet	Removal of Fence, All Types
0030	203-A001	(E)	13,947	Cubic Yard	Unclassified Excavation, FM, AH
0040	203-EX020	(E)	12,165	Cubic Yard	Borrow Excavation, AH, FME, Class B9
0050	209-A004		16,000	Square Yard	Geotextile Stabilization, Type V
0060	213-C001		2	Ton	Superphosphate
0070	216-A001		790	Square Yard	Solid Sodding
0080	217-A001		1,000	Square Yard	Ditch Liner
0090	219-A001		15	Thousand Gallon	Watering (\$20.00)
0100	220-A001		4	Acre	Insect Pest Control (\$30.00)
0110	223-A001		4	Acre	Mowing (\$50.00)
0120	225-A001		4	Acre	Grassing
0130	225-B001		1	Ton	Agricultural Limestone
0140	225-C001		8	Ton	Mulch, Vegetative Mulch
0150	226-A001		4	Acre	Temporary Grassing
0160	234-A001		3,000	Linear Feet	Temporary Silt Fence
0170	237-A001		400	Linear Feet	Wattles, 12"
0180	249-B001		27	Cubic Yard	Remove and Reset Riprap
0190	403-A003	(BA1)	147	Ton	12.5-mm, ST, Asphalt Pavement
0200	403-A006	(BA1)	220	Ton	19-mm, ST, Asphalt Pavement
0210	407-A001	(A2)	150	Gallon	Asphalt for Tack Coat
0220	503-C003		428	Linear Feet	Saw Cut, 2-inch
0230	601-A001	(S)	83	Cubic Yard	Class "B" Structural Concrete
0240	602-A001	(S)	4,440	Pounds	Reinforcing Steel
0250	603-CA026	(S)	56	Linear Feet	24" Reinforced Concrete Pipe, Class III
0260	603-CB004	(S)	2	Each	24" Reinforced Concrete End Section
0270	607-B026		4,380	Linear Feet	72" Type I Chain Link Fence, Class I, With Top Guard
0280	607-G094		4	Each	Gate, 13' x 6' Chain Link
0290	607-P1018		438	Each	Line Post, 9' x 2" Galvanized Steel
0300	607-P1030		8	Each	Line Post, 14' x 2" Galvanized Steel
0310	607-P2012		68	Each	Brace Post, 9' x 2 1/2" Galvanized Steel
0320	607-P3008		8	Each	Gate Post, 9' x 2 1/2" Galvanized Steel
0330	608-B001	(S)	159	Square Yard	Concrete Sidewalk, With Reinforcement
0340	609-B002	(S)	153	Linear Feet	Concrete Curb, Header

Section 905

BWO-2214-05(001)/ 502996301000, BWO-2215-05(001)/ 502996302000,
BWO-2217-05(001)/ 502996304000 & LWO-2096-05(002)/ 502996305000

Benton

Proposal(Sheet 2-2)

Line no.	Item Code	Adj Code	Quantity	Units	Description	Fixed Unit Price
0350	620-A001		1	Lump Sum	Mobilization	
0360	626-B003		260	Linear Feet	6" Thermoplastic Traffic Stripe, Continuous White	
0370	626-G001		125	Linear Feet	Thermoplastic Detail Stripe, Blue-ADA	
0380	630-A001		8	Square Feet	Standard Roadside Signs, Sheet Aluminum, 0.080" Thickness	
0390	630-C001		9	Linear Feet	Square Tube Posts, 4.0 lb/ft	
0400	699-A001		1	Lump Sum	Roadway Construction Stakes	
0410	815-A002	(S)	100	Ton	Loose Riprap, Size 100	
0420	815-E001	(S)	80	Square Yard	Geotextile under Riprap	
0430	815-F002	(S)	40	Ton	Sediment Control Stone	
0440	907-290-A001		1	Each	Flagpole	
0450	907-607-PP002		1	Lump Sum	Fence Slats, Vinyl	
0460	907-626-H001		1	Each	Thermoplastic Legend, Blue-ADA Handicap Symbol	
0470	907-630-PP003		1	Each	Handicap Parking Sign, With Post	
ALTERNATE GROUP AA NUMBER 1						
0480	304-F001	(GT)	1,293	Ton	3/4" and Down Crushed Stone Base	
ALTERNATE GROUP AA NUMBER 2						
0490	304-F002	(GT)	1,293	Ton	Size 610 Crushed Stone Base	
ALTERNATE GROUP AA NUMBER 3						
0500	304-F003	(GT)	1,293	Ton	Size 825B Crushed Stone Base	
Building Items						
0510	907-242-A001		1	Lump Sum	Construction of Administration Building & Shop	
0520	907-242-A001		1	Lump Sum	Construction of Bulk Salt Storage	
0530	907-242-A001		1	Lump Sum	Construction of Equipment Shed	

SECTION 905 - COMBINATION BID PROPOSAL (Continued)

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.

COMBINATION BID PROPOSAL

This proposal is tendered as one part of a Combination Bid Proposal utilizing option ___* of Subsection 102.11 on the following contracts:

* Option to be shown as either (a), (b), or (c).

	<u>Project No.</u>	<u>County</u>	<u>Project No.</u>	<u>County</u>
1.	_____	_____	6.	_____
2.	_____	_____	7.	_____
3.	_____	_____	8.	_____
4.	_____	_____	9.	_____
5.	_____	_____	10.	_____

(a) If Combination A has been selected, your Combination Bid is complete.

(b) If Combination B has been selected, then complete the following page.

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.					

For Informational Purposes Only

SECTION 905 - COMBINATION BID PROPOSAL (Continued)

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.



TO: EXECUTIVE DIRECTOR, MISSISSIPPI DEPARTMENT OF TRANSPORTATION
JACKSON, MISSISSIPPI

CERTIFICATE

If awarded this contract, I (we) contemplate that portions of the contract will be sublet. I (we) certify that those subcontracts which are equal to or in excess of fifty thousand dollars (\$50,000.00) will be in accordance with regulations promulgated and adopted by the Mississippi State Board of Contractors on September 8, 2011.

I (we) agree that this notification of intent DOES NOT constitute APPROVAL of the subcontracts.

_____	_____
(Individual or Firm)	(Address)
_____	_____
(Individual or Firm)	(Address)
_____	_____
(Individual or Firm)	(Address)
_____	_____
(Individual or Firm)	(Address)

NOTE: Failure to complete the above DOES NOT preclude subsequent subcontracts. Subsequent subcontracts, if any, equal to or in excess of fifty thousand dollars (\$50,000.00) will be in accordance with regulations promulgated and adopted by the Mississippi State Board of Contractors on September 8, 2011.

Contractor _____

MISSISSIPPI DEPARTMENT OF TRANSPORTATION
CERTIFICATION

I, _____,
(Name of person signing bid)

individually, and in my capacity as _____ of
(Title of person signing bid)

(Name of Firm, partnership, or Corporation)

do hereby certify under 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. **BWO-2214-05(001)/ 502996301000, BWO-2215-05(001)/ 502996302000, BWO-2217-05(001)/ 502996304000 & LWO-2096-05(002)/ 502996305000**

in **Benton** _____ 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 are not currently under suspension, debarment, voluntary exclusion or determination of ineligibility; nor have a debarment pending; nor been suspended, debarred, voluntarily excluded or determined ineligible within the past three years by the Mississippi Transportation Commission, the State of Mississippi, any other State or a federal agency; nor been indicted, convicted or had a civil judgment rendered by a court of competent jurisdiction in any matter involving fraud or official misconduct within the past three years.

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.

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.

All of the foregoing is true and correct.

(1/2016 S)

SECTION 902

CONTRACT FOR BWO-2214-05(001)/ 502996301000, BWO-2215-05(001)/ 502996302000, BWO-2217-05(001)/ 502996304000 & LWO-2096-05(002)/ 502996305000

LOCATED IN THE COUNTY(IES) OF Benton

STATE OF MISSISSIPPI,
COUNTY OF HINDS

This contract entered into by and between the Mississippi Transportation Commission on one hand, and the undersigned contractor, on the other witnesseth;

That, in consideration of the payment by the Mississippi Transportation Commission of the prices set out in the proposal hereto attached, to the undersigned contractor, such payment to be made in the manner and at the time of times specified in the specifications and the special provisions, if any, the undersigned contractor hereby agrees to accept the prices stated in the proposal in full compensation for the furnishing of all materials and equipment and the executing of all the work contemplated in this contract.

It is understood and agreed that the advertising according to law, the Advertisement, the instructions to bidders, the proposal for the contract, the specifications, the revisions of the specifications, the special provisions, and also the plans for the work herein contemplated, said plans showing more particularly the details of the work to be done, shall be held to be, and are hereby made a part of this contract by specific reference thereto and with like effect as if each and all of said instruments had been set out fully herein in words and figures.

It is further agreed that for the same consideration the undersigned contractor shall be responsible for all loss or damage arising out of the nature of the work aforesaid; or from the action of the elements and unforeseen obstructions or difficulties which may be encountered in the prosecution of the same and for all risks of every description connected with the work, exceptions being those specifically set out in the contract; and for faithfully completing the whole work in good and workmanlike manner according to the approved Plans, Specifications, Special Provisions, Notice(s) to Bidders and requirements of the Mississippi Department of Transportation.

It is further agreed that the work shall be done under the direct supervision and to the complete satisfaction of the Executive Director of the Mississippi Department of Transportation, or his authorized representatives, and when Federal Funds are involved subject to inspection at all times and approval by the Federal Highway Administration, or its agents as the case may be, or the agents of any other Agency whose funds are involved in accordance with those Acts of the Legislature of the State of Mississippi approved by the Governor and such rules and regulations issued pursuant thereto by the Mississippi Transportation Commission and the authorized Federal Agencies.

The Contractor agrees that all labor as outlined in the Special Provisions may be secured from list furnished by

It is agreed and understood that each and every provision of law and clause required by law to be inserted in this contract shall be deemed to be inserted herein and this contract shall be read and enforced as though it were included herein, and, if through mere mistake or otherwise any such provision is not inserted, then upon the application of either party hereto, the contract shall forthwith be physically amended to make such insertion.

The Contractor agrees that he has read each and every clause of this Contract, and fully understands the meaning of same and that he will comply with all the terms, covenants and agreements therein set forth.

Witness our signatures this the ___ day of _____, _____.

Contractor(s)

By _____

MISSISSIPPI TRANSPORTATION COMMISSION

Title _____

By _____

Signed and sealed in the presence of:
(names and addresses of witnesses)

Executive Director

Secretary to the Commission

Award authorized by the Mississippi Transportation Commission in session on the ___ day of _____, _____, Minute Book No. _____, Page No. _____.

SECTION 903
PERFORMANCE AND PAYMENT BOND

CONTRACT BOND FOR: BWO-2214-05(001)/ 502996301000, BWO-2215-05(001)/ 502996302000, BWO-2217-05(001)/ 502996304000 & LWO-2096-05(002)/ 502996305000
LOCATED IN THE COUNTY(IES) OF: Benton

STATE OF MISSISSIPPI,
COUNTY OF HINDS

Know all men by these presents: that we, _____

(Contractor)

Principal, a _____

residing at _____ in the State of _____

and _____

(Surety)
residing at _____ in the State of _____,

authorized to do business in the State of Mississippi, under the laws thereof, as surety, effective as of the contract date shown below, are held and firmly bound unto the State of Mississippi in the sum of _____

(\$ _____) Dollars, lawful money of the United States of America, to be paid to it for which payment well and truly to be made, we bind ourselves, our heirs, administrators, successors, or assigns jointly and severally by these presents.

The conditions of this bond are such, that whereas the said _____

principal, has (have) entered into a contract with the Mississippi Transportation Commission, bearing the date of _____ day of _____ A.D. _____ hereto annexed, for the construction of certain projects(s) in the State of Mississippi as mentioned in said contract in accordance with the Contract Documents therefor, on file in the offices of the Mississippi Department of Transportation, Jackson, Mississippi.

Now therefore, if the above bounden _____ in all things shall stand to and abide by and well and truly observe, do keep and perform all and singular the terms, covenants, conditions, guarantees and agreements in said contract, contained on his (their) part to be observed, done, kept and performed and each of them, at the time and in the manner and form and furnish all of the material and equipment specified in said contract in strict accordance with the terms of said contract which said plans, specifications and special provisions are included in and form a part of said contract and shall maintain the said work contemplated until its final completion and acceptance as specified in Subsection 109.11 of the approved specifications, and save harmless said Mississippi Transportation Commission from any loss or damage arising out of or occasioned by the negligence, wrongful or criminal act, overcharge, fraud, or any other loss or damage whatsoever, on the part of said principal (s), his (their) agents, servants, or employees in the performance of said work or in any manner connected therewith, and shall be liable and responsible in a civil action instituted by the State at the instance of the Mississippi Transportation Commission or any officer of the State authorized in such cases, for double any amount in money or property, the State may lose or be overcharged or otherwise defrauded of, by reason of wrongful or criminal act, if any, of the Contractor(s), his (their) agents or employees, and shall promptly pay the said agents, servants and employees and all persons furnishing labor, material, equipment or supplies therefor, including premiums incurred, for Surety Bonds, Liability Insurance, and Workmen's Compensation Insurance; with the additional obligation that such Contractor shall promptly make payment of all taxes, licenses, assessments, contributions, damages,

any liquidated damages which may arise prior to any termination of said principal's contract, any liquidated damages which may arise after termination of the said principal's contract due to default on the part of said principal, penalties and interest thereon, when and as the same may be due this state, or any county, municipality, board, department, commission or political subdivision: in the course of the performance of said work and in accordance with Sections 31-5-51 et seq. Mississippi Code of 1972, and other State statutes applicable thereto, and shall carry out to the letter and to the satisfaction of the Executive Director of the Mississippi Department of Transportation, all, each and every one of the stipulations, obligations, conditions, covenants and agreements and terms of said contract in accordance with the terms thereof and all of the expense and cost and attorney's fee that may be incurred in the enforcement of the performance of said contract, or in the enforcement of the conditions and obligations of this bond, then this obligation shall be null and void, otherwise to be and remain in full force and virtue.

_____	_____
(Contractors) Principal	Surety
By _____	By _____
	(Signature) Attorney in Fact
	Address _____

Title _____	_____
(Contractor's Seal)	(Printed) MS Agent

	(Signature) MS Agent
	Address _____

	(Surety Seal)

	Mississippi Insurance ID Number



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 **Construction of Ashland Maintenance Area Headquarters Building, with other Structures, and Site Work, known as State Project Nos. BWO-2214-05(001), BWO-2215-05(001), BWO-2217-05(001), & LWO-2096-05(002) / 502996301, 302, 304, & 305 in Benton 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)

(Witness)

By: _____
(Name) (Title)

(Surety) (Seal)

(Witness)

By: _____
(Attorney-in-Fact)

(MS Agent)

Mississippi Insurance ID Number