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SM No. CBWO5231510011

PROPOSAL AND CONTRACT DOCUMENTS

FOR THE CONSTRUCTION OF

12

Construction of District 5 Warehouse, known as State Project Nos. BWO-5231-51
(001) & LWO-5001-51(008) / 503006301 & 302 in Newton County.

Project Completion: 05/15/2019

(STATE DELEGATED)

SECTION 900
OF THE CURRENT
2017 STANDARD SPECIFICATIONS
FOR ROAD AND BRIDGE CONSTRUCTION
JACKSON, MISSISSIPPI

**BIDDER CHECK LIST
(FOR INFORMATION ONLY)**

- _____ First sheet of SECTION 905--PROPOSAL has been completed.
- _____ Second sheet of SECTION 905--PROPOSAL has been completed and signed.
- _____ All unit prices and item totals have been entered in accordance with Subsection 102.06 of the Mississippi Standard Specifications for Road and Bridge Construction.
- _____ Addenda, if any, have been acknowledged. Second sheet of Section 905 listing the addendum number has been substituted for the original second sheet of Section 905. Substituted second sheet of Section 905 has been properly completed, signed, and added to the proposal.
- _____ Proposal bid sheet(s) of SECTION 905--PROPOSAL has been inserted into the proposal package.
- _____ Equal Opportunity Clause Certification, when included in contract, has been completed.
- _____ The Certification regarding Non-Collusion, Debarment and Suspension, etc. has been completed.
- _____ A certified check, cashier's check or bid bond payable to the State of Mississippi in the principal amount of 5% of the bid has been included with project number identified on same. A bid bond has been signed by the bidder and has also been signed or countersigned by a Mississippi Agent or Qualified Nonresident Agent for the Surety with Power of Attorney attached.
- _____ Non-resident Bidders: ON STATE FUNDED PROJECTS ONLY, a copy of the current laws regarding any preference for local Contractors from State wherein domiciled has been included. See Subsection 103.01, Mississippi Standard Specifications for Road and Bridge Construction, and Section 31-7-47, MCA, 1972 regarding this matter.

Return the proposal and contract documents in its entirety in a sealed envelope. DO NOT remove any part of the contract documents; exception - an addendum requires substitution of second sheet of Section 905. A stripped proposal is considered as an irregular bid and will be rejected.

Failure to complete any or all of the applicable requirements will be cause for the proposal to be considered irregular.

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LWO-5001-51(008)/503006302 - Newton**

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09/26/2017 02:46 PM

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 901 - ADVERTISEMENT

Electronic bids will be received by the Mississippi Transportation Commission at 10:00 o'clock A.M., Tuesday, October 24, 2017, from the Bid Express Service and shortly thereafter publicly read on the Sixth Floor for:

Construction of District 5 Warehouse, known as State Project Nos. BWO-5231-51(001) & LWO-5001-51(008) / 503006301 & 302 in Newton 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.

Bid proposals must be purchased online at <https://shopmdot.ms.gov>. Specimen proposals may be viewed and downloaded online at no cost at <http://mdot.ms.gov> or purchased online. Proposals are available 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. 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. 416

CODE: (SP)

DATE: 9/26/2017

SUBJECT: Contract Time

PROJECT: BWO-5231-51(001) / 503006301 & LWO-5001-51(008) / 503006302 -- Newton County

The calendar date for completion of work to be performed by the Contractor for this project shall be **May 15, 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 **November 14, 2017** and the effective date of the Notice to Proceed / Beginning of Contract Time will be **March 15, 2018**.

Should the Contractor request a Notice to Proceed earlier than **March 15, 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. 907-102-1

CODE: (SP)

DATE: 09/21/2017

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.

907-102.06--Preparation of Proposal. Delete the first, second, third, and fourth paragraphs of Subsection 102.06 on page 15, and substitute the following.

The bidder's complete original proposal shall be submitted upon the forms (Certification of Performance, Certification Regarding Non-Collusion, etc.) furnished by the Department and shall include printed bid sheets. In case of discrepancy between a unit price and the extension, the unit price will govern and the extension along with the total amount of the proposal will be corrected.

Bid sheets along with a completed proposal package (with all forms completed and signed) will constitute the official bid and shall be signed on the last sheet of the bid sheets and delivered to the Department in accordance with the provisions of Subsection 907-102.09. Bids submitted using any other form, format or means will result in an irregular bid.

The bid sheets should be stapled together in order beginning with page 1, signed and included in the bid proposal package in the sealed envelope.

907-102.09--Delivery of Proposals. Delete the paragraph in Subsection 102.09 on page 17, and substitute the following.

Unless otherwise specified, each proposal shall be submitted sealed in a special envelope furnished by the Department. The blank spaces on the envelope shall be filled in correctly to clearly indicate its contents. When an envelope other than the special one furnished by the Department is used, it shall be of the same general size and shape and be similarly marked to clearly indicate its contents. Proposal Forms are non-transferrable and no name or names of interested parties may be shown other than those to whom the proposal was issued. When sent by mail, the sealed proposals shall be mailed to the Department at the address and in care of the official in whose office the bids are to be received. All proposals shall be filed prior to the time and place specified in the Notice to Contractors. Proposals received after the time for opening of bids will be returned to the bidder unopened.

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. 907-242-1

CODE: (SP)

DATE: 09/07/2017

SUBJECT: District Warehouse Building

PROJECT: BWO-5231-51(001) / 503006301 & LWO-5001-51(008) / 503006302 -- Newton County

Section 907-242, District Warehouse Building, 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-- DISTRICT WAREHOUSE BUILDING

The specification format for this item of work is different than normal. The Contractor shall perform the District Warehouse Building 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 MDOT Standard Specification.

DOCUMENT 00 01 07

SEALS PAGE
08/11/2017

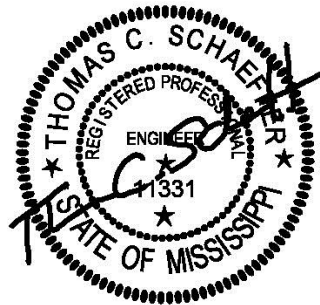
Architectural
JBHM Architects, P.A.
308 East Pearl Street, Suite 300
Jackson, MS 39201
(601) 352-2699



Civil
Neel-Schaffer, Inc.
125 South Congress Street, Suite 1100
Jackson, MS 39201
(601) 948-3071



Structural
Structural Design Group, Inc.
220 Great Circle Road #106
Nashville, TN 37228
(615) 255-5537



Plumbing / Mechanical
GSK Mechanical, Inc.
201 Park Court, Suite A
Ridgeland, MS 39157
(601) 605-2930



Electrical
Schultz & Wynne, P.A.
4523 Office Park Drive
Jackson, MS 39206
(601) 982-3313



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PROJECT: DISTRICT 5 WAREHOUSE 2017

PROJECT NUMBER: BWO-5231-51(001) 503006
 LWO-5001-51(008) 503006

DATE: AUGUST 11, 2017

DESCRIPTION A: This Work shall consist of minor site work and all construction work necessary in constructing a Warehouse for District Five at Newton, Newton County, Mississippi, Project No. BWO-5231-51(001) 503006, 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 building or structures for District Five at Newton, Newton County, Mississippi, Project No. LWO-5001-51(008) 503006. 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 a complete building including all code compliance. Omission of items or instruction necessary or considered standard good practice for the proper installation and construction of the building shall not relieve the Contractor of furnishing and installing such items and conforming to the building codes having jurisdiction.

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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, Article 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, Subsection 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.msbcoc.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 2017 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. Cellulose Thermal Insulation
 - b. Metal Building System
 - c. Thin-Set Tiling
 - d. Plumbing Items
 - e. Heating, Ventilating and Air Conditioning Items
 - f. Security and Surveillance Items
 - g. 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 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)

DISTRICT 5 WAREHOUSE
7759 HIGHWAY 80 WEST
NEWTON COUNTY, MISSISSIPPI

BWO-5231-51(001) 503006

LWO-5001-51(008) 503006

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)

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- 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.

Init.

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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 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

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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, 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.

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§ 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 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.

§ 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.

§ 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.

§ 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.

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.

§ 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.

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

- .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.

§ 6.1.2 The Contractor, including his subcontractors, shall keep informed of the progress and the detailed work of the Owner or other Contractors and shall immediately notify the Project Engineer and Architect of lack of progress or delays by other Contractors which are affecting Contractor's Work. Failure of Contractor to keep informed of the progress of the work of the Owner or other Contractors and / or failure of Contractor to give notice of lack of progress or delays by the Owner or other Contractors shall be deemed to be acceptance by Contractor of the status of progress by other Contractors for the proper coordination and completion of Contractor's Work. If, through acts or neglect on the part of the Contractor, the Owner or any other Contractor or subcontractor shall suffer loss or damage or assert any claims of whatever nature against the Owner, the Contractor shall defend, indemnify and hold harmless the Owner from any such claims or alleged damages, and the Contractor shall resolve such alleged damages or claims directly with the other Contractors or subcontractors.

§ 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.

§ 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;
- .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.

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.

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§ 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.

§ 8.3.4 This provision specifies the procedure for the determination of time extensions for unusually severe weather. In order for the Owner and Architect to award a time extension under this clause, the following conditions must be satisfied:

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.

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

(Paragraph deleted)

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§ 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.

§ 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 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

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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.

§ 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

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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

(Paragraph deleted)

§ 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.

§ 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

- .1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents; or
- .3 terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

§ 9.11 LIQUIDATED DAMAGES

§ 9.11.1 Time being of the essence and a matter of material consideration thereof, a reasonable estimate in advance is established to cover losses incurred by the Owner if the project is not substantially complete on the date set forth in the Contract Documents. The Contractor and his Surety will be liable for and will pay the Owner liquidated damages for each calendar day of delay until the work is substantially complete as follows:

For More Than	To and Including	Per Calendar D
\$ 0	100,000	\$ 150
100,000	500,000	360
500,000	1,000,000	540
1,000,000	5,000,000	830
5,000,000	10,000,000	1,200
10,000,000	20,000,000	1,800
20,000,000	-----	3,500

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, or the Project Engineer and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

(Paragraphs deleted)

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- .1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- .2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- .3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- .4 Claims for damages insured by usual personal injury liability coverage;
- .5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- .6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- .7 Claims for bodily injury or property damage arising out of completed operations; and
- .8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal

Init.

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)

Contractor Insurance Option Number 1:		
Bodily Injury & Property Damage.....	\$ 500,000.00	Per Occurrence
(Combined Single Limit)		
Contractor Insurance Option Number 2:		
Bodily Injury	\$ 250,000.00	Per Person
Bodily Injury	\$ 500,000.00	Per Accident
Property Damage	\$ 100,000.00	Per Occurrence

- .4 **EXCESS LIABILITY:**
 (Umbrella on projects over \$500,000)

Bodily Injury & Property Damage.....	\$ 1,000,000.00	Aggregate
(Combined Single Limit)		

- .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.....	\$ Equal to Value of Work
Or	
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

§ 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 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.

§ 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
- .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.

§ 15.1.5.2 ADVERSE WEATHER DELAYS

- .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.

§ 15.1.5.3 Claims for increase in the Contract Time shall set forth in detail the circumstances that form the basis for the Claim, the date upon which each cause of delay began to affect the progress of the Work, the date upon which each cause of delay ceased to affect the progress of the Work and the number of days' increase in the Contract Time claimed as a consequence of each such cause of delay. The Contractor shall provide such supporting documentation as the Owner may require including, where appropriate, a revised construction schedule indicating all the activities affected by the circumstances forming the basis of the Claim.

§ 15.1.5.4 The Contractor shall not be entitled to a separate increase in the Contract Time for each one of the causes of delay which may have concurrent or interrelated affects on the progress of the Work, or for concurrent delays due to the fault of the Contractor

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Project Engineer will serve as the Initial Decision Maker. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise,

or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

(Paragraphs deleted)

§ 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.

§ 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

Init.

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.

§ 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.

(Paragraph deleted)

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 a Warehouse for District Five at Newton, Newton 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 Warehouse.
 2. 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.
- H. Submit an updated copy of Contractor's construction schedule (01 32 00) showing the sequence, commencement and completion dates, and move-out and move-in dates of Owner's personnel for all phases of the Work.

1.03 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.
- B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1.04 COORDINATION WITH OCCUPANTS

- A. 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. 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.

1.05 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work to normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated.
- C. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.

1.06 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.

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, structural Consultant, Mechanical / Electrical Consultants, one sent to Contract Administration for use in reviewing requests for Permission to Sub-Contract (CAD-720 Form), one sent to the Project Engineer, and one returned to the Contractor.
- C. Form of Submittal: Submit typewritten Schedule of Values on AIA Document G703-1992, using Table of Contents of this Specification as basis for format for listing costs of Work for Sections under Divisions 02 - 49. Identify each line item with number and title as listed in Table of Contents of this Specification.
- D. Preparing Schedule of Values:
 - 1. Itemize separate line item costs for each of the following general cost items: Performance and Payment Bonds, field supervision and layout, temporary facilities and controls, and closeout documents.
 - 2. Itemize separate line item cost for Work required by each Section of this specification. Breakdown installed cost with overhead and profit.
 - 3. Each line item, which has installed value of more than \$20,000, break down costs to list major products for operations under each item; rounding figures to nearest dollar. Make sum of total costs of all items listed in schedule equal to total Contract Sum.

E. Preparing Schedule of Unit Material Values:

1. Submit separate schedule of unit prices for materials to be stored on which progress payments will be made. Make form of submittal parallel to Schedule of Values with each line item identified same as line item in Schedule of Values. Include in unit prices only: Cost of material, delivery and unloading site, and sales tax.
2. Make sure unit prices (if required) multiplied by quantities equal material cost of that item in Schedule of Values.

F. Review and Re-submittal: After Project Engineer / 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 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 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 Five. The Work includes a Warehouse for District Five at Newton, Newton 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-5231-51(001) 503006
Warehouse
In Newton, Newton 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 MSDS (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, MDOT Architect's and reference during normal working hours.

3.02 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 01 42 00

REFERENCES

PART 1 - GENERAL

1.01 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Reviewed": When used to convey MDOT Architect's action on Contractor's submittals, applications, and requests, "reviewed" is limited to MDOT Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Installer": An installer is Contractor or another entity engaged by Contractor, as an employee, subcontractor, or contractor of lower tier, to perform a particular construction operation, including installation, erection, application, and similar operations.
- J. "Experienced": The term "experienced," when used with the term "installer," means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.
 - 1. Using a term such as "carpentry" does not imply that accredited or unionized individuals of a corresponding generic name, such as "carpenter", must perform certain construction activities. It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
- K. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.02 INDUSTRY STANDARDS

A. Identification and Purpose:

1. Identification: Throughout the Contract Documents are references to nationally known and recognized Codes, Reference Standards, Reference Specifications, and similar documents that are published by Regulatory Agencies, Trade and Manufacturing Associations and Societies, Testing Agencies and others. References also include certain Project Documents or designated portions.
2. Purpose: All named and otherwise identified "Reference Standards" are "by reference" hereby incorporated into these Specifications as though fully written and hereby serve to establish specific requirements and pertinent characteristics for materials and workmanship as well as methods for testing / reporting on compliance thereto.

B. Procedures and Responsibilities:

1. Compliance with Laws and Codes of governmental agencies having jurisdiction shall be mandatory and take precedence over the requirements of all other Reference Standards. For products or workmanship specified by Associations, Trade, or Federal Standards, comply with the requirements of the standard, except when supplemented instructions indicate a more rigid standard and / or define more precise requirements.
 - a. Should specified reference standards conflict with regulatory requirements or the Contract Documents, request Project Engineer's / MDOT Architect's clarification before proceeding.
2. The Contractor (including any and all Parties furnishing and / or installing any portion of The Work) shall be familiar with the indicated codes and standards. It shall be the Contractor's responsibility to verify the detailed requirements of the specifically named codes and standards and to verify (and provide written certification, when required) that the items procured for use in this Work (and their installation, as applicable) meet or exceed the specified requirements.
3. The contractual relationship of the Parties to the Contract shall not be altered from the requirements of the Contract Documents by mention or inference otherwise in any reference document.

C. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated or when earlier editions are specifically required by Codes.

D. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.03 ABBREVIATIONS AND ACRONYMS

- ### A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

AABC	Associated Air Balance Council; www.aabc.com .
AAMA	American Architectural Manufacturers Association; www.aamanet.org .
AASHTO	American Association of State Highway and Transportation Officials www.transportation.org .
ACI	American Concrete Institute (Formerly: ACI International); www.concrete.org
ACPA	American Concrete Pipe Association; www.concrete-pipe.org .
AEIC	Association of Edison Illuminating Companies, Inc. (The); www.aeic.org .
AGA	American Gas Association; www.aga.org .
AHAM	Association of Home Appliance Manufacturers; www.aham.org .
AHRI	Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org .
AI	Asphalt Institute; www.asphaltinstitute.org .
AIA	American Institute of Architects (The); www.aia.org .
AISC	American Institute of Steel Construction; www.aisc.org .
AISI	American Iron and Steel Institute; www.steel.org .
AMCA	Air Movement and Control Association International, Inc.; www.amca.org .
ANSI	American National Standards Institute; www.ansi.org .
AOSA	Association of Official Seed Analysts, Inc.; www.aosaseed.com .
APA	APA - The Engineered Wood Association; www.apawood.org .
APA	Architectural Precast Association; www.archprecast.org .
API	American Petroleum Institute; www.api.org .
ARI	Air-Conditioning & Refrigeration Institute (See AHRI)
ARI	American Refrigeration Institute (See AHRI)
ASCE	American Society of Civil Engineers; www.asce.org .
ASCE/SEI	American Society of Civil Engineers / Structural Engineering Institute (See ASCE)
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org .
ASME	ASME International (American Society of Mechanical Engineers); www.asme.org .
ASSE	American Society of Sanitary Engineering; www.asse.org .
ASTM	ASTM International (American Society for Testing and Materials International); www.astm.org .
AWI	Architectural Woodwork Institute; www.awinet.org .
AWPA	American Wood Protection Association (Formerly: American Wood-Preservers' Association); www.awpa.com .
AWS	American Welding Society; www.aws.org .
AWWA	American Water Works Association; www.awwa.org .
BHMA	Builders Hardware Manufacturers Association; www.buildershardware.com .
CFSEI	Cold-Formed Steel Engineers Institute; www.cfsei.org .
CGA	Compressed Gas Association; www.cganet.com .
CIMA	Cellulose Insulation Manufacturers Association; www.cellulose.org .
CISCA	Ceilings & Interior Systems Construction Association; www.cisca.org .
CLFMI	Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org .
CRI	Carpet and Rug Institute (The); www.carpet-rug.org .
CRRC	Cool Roof Rating Council; www.coolroofs.org
CRSI	Concrete Reinforcing Steel Institute; www.crsi.org .
CSA	CSA International (Formerly: IAS - International Approval Services); www.csa-international.org
CSI	Construction Specifications Institute (The); www.csinet.org .
DASMA	Door and Access Systems Manufacturers Association; www.dasma.com .

DHI	Door and Hardware Institute; www.dhi.org .
ECA	Electronic Components Association; (See ECIA).
FM Approvals	FM Approvals LLC; www.fmglobal.com .
FM Global	FM Global (Formerly: FMG - FM Global); www.fmglobal.com .
GA	Gypsum Association; www.gypsum.org .
GANA	Glass Association of North America; www.glasswebsite.com .
HMMA	Hollow Metal Manufacturers Association (See NAAMM)
HPVA	Hardwood Plywood & Veneer Association; www.hpva.org .
ICBO	International Conference of Building Officials (See ICC)
ICC	International Code Council; www.iccsafe.org .
ICRI	International Concrete Repair Institute, Inc.; www.icri.org .
IES	Illuminating Engineering Society (Formerly: Illuminating Engineering Society of North America); www.ies.org .
IGMA	Insulating Glass Manufacturers Alliance; www.igmaonline.org .
IGSHPA	International Ground Source Heat Pump Association; www.igshpa.okstate.edu .
ISO	International Organization for Standardization; www.iso.org .
LPI	Lightning Protection Institute; www.lightning.org .
MBMA	Metal Building Manufacturers Association; www.mbma.com .
MCA	Metal Construction Association; www.metalconstruction.org .
MFMA	Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org .
MIA	Marble Institute of America; www.marble-institute.com .
MMPA	Moulding & Millwork Producers Association (Formerly: Wood Moulding & Millwork Producers Association); www.wmmpa.com .
MPI	Master Painters Institute; www.paintinfo.com .
NAIMA	North American Insulation Manufacturers Association; www.naima.org .
NCMA	National Concrete Masonry Association; www.ncma.org .
NEBB	National Environmental Balancing Bureau; www.nebb.org .
NECA	National Electrical Contractors Association; www.necanet.org .
NEMA	National Electrical Manufacturers Association; www.nema.org .
NETA	InterNational Electrical Testing Association; www.netaworld.org .
NFPA	NFPA (National Fire Protection Association); www.nfpa.org .
NFRC	National Fenestration Rating Council; www.nfrc.org .
NHLA	National Hardwood Lumber Association; www.nhla.com .
NLGA	National Lumber Grades Authority; www.nlga.org .
NSPE	National Society of Professional Engineers; www.nspe.org .
NSSGA	National Stone, Sand & Gravel Association; www.nssga.org .
NTMA	National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com .
PDI	Plumbing & Drainage Institute; www.pdionline.org .
RFCI	Resilient Floor Covering Institute; www.rfci.com
SDI	Steel Door Institute; www.steeldoor.org .
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org .
SPIB	Southern Pine Inspection Bureau; www.spib.org .
SRCC	Solar Rating and Certification Corporation; www.solar-rating.org .
SSINA	Specialty Steel Industry of North America; www.ssina.com .
SSPC	SSPC: The Society for Protective Coatings; www.sspc.org .
SWPA	Submersible Wastewater Pump Association; www.swpa.org .
TCNA	Tile Council of North America, Inc.; www.tileusa.com .
TIA	Telecommunications Industry Association (Formerly: TIA/EIA – Telecommunications Industry Association/Electronic Industries Alliance);

	www.tiaonline.org .
TMS	The Masonry Society; www.masonrysociety.org .
TPI	Truss Plate Institute; www.tpinst.org .
TPI	Turfgrass Producers International; www.turfgrasssod.org .
UL	Underwriters Laboratories Inc.; http://www.ul.com .
WCMA	Window Covering Manufacturers Association; www.wcmanet.org .
WDMA	Window & Door Manufacturers Association; www.wdma.com .
WWPA	Western Wood Products Association; www.wwpa.org .

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

DIN	Deutsches Institut fur Normung e.V.; www.din.de .
IAPMO	International Association of Plumbing and Mechanical Officials; www.iapmo.org .
ICC	International Code Council; www.iccsafe.org .
ICC-ES	ICC Evaluation Service, LLC; www.icc-es.org .

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

COE	Army Corps of Engineers www.usace.army.mil . ;
CPSC	Consumer Product Safety Commission; www.cpsc.gov .
DOC	Department of Commerce National Institute of Standards and Technology; www.nist.gov .
DOE	Department of Energy; www.energy.gov .
EPA	Environmental Protection Agency; www.epa.gov .
FG	Federal Government Publications; www.gpo.gov/fdsys .
GSA	General Services Administration; www.gsa.gov .
HUD	Department of Housing and Urban Development; www.hud.gov .
LBL	Lawrence Berkeley National Laboratory Environmental Energy Technologies Division; www.eetd.lbl.gov .
OSHA	Occupational Safety & Health Administration; www.osha.gov .
TRB	Transportation Research Board; National Cooperative Highway Research Program; www.trb.org .
USDA	Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov .
USDA	Department of Agriculture; Rural Utilities Service; www.usda.gov .
USPS	United States Postal Service; www.usps.com .

- E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list.

CFR	Code of Federal Regulations; ; Available from Government Printing Office; www.gpo.gov/fdsys .
DOD	Department of Defense; Military Specifications and Standards Available from Department of Defense Single Stock Point; www.quicksearch.dla.mil .
FED-STD	Federal Standard (See FS)
FS	Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil . Available from Defense Standardization Program; www.dsp.dla.mil Available from General Services Administration; www.gsa.gov . Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb .
MILSPEC	Military Specification and Standards (See DOD)
USAB	United States Access Board; www.access-board.gov .
USATBCB	U.S. Architectural & Transportation Barriers Compliance Board (See USAB)

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 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 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.

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.
 - 1. Connect temporary sewers to municipal system (or) private system indicated 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. General: Comply with requirements specified in other Sections.
- B. 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 Final 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 Final 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.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
 - 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 - 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
1. Operation and maintenance documentation directory.
 2. Emergency manuals.
 3. Operation manuals for systems, subsystems, and equipment.
 4. Product maintenance manuals.
 5. Systems and equipment maintenance manuals.

1.02 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
1. MDOT Architect will comment on whether content of operations and maintenance submittals are acceptable.
 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to MDOT Architect.
 - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.
 2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. MDOT Architect will return one copy.
- C. Manual Submittal: Submit each manual in final form prior to requesting Final Inspection and at least 15 days before commencing demonstration and training. MDOT Architect 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 MDOT 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.
- 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 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 100 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.
- 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 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 05 50 00 METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. All miscellaneous metal work. The Work includes, but is not limited to, steel pipe railings, pipe bollards (exterior locations), and miscellaneous framing & supports (e.g. sign storage, tool storage, etc.).

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.

1.2 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

2.1 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. All 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

2.2 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.

2.3 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 1-1/2 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. 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.
- D. 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.
- E. 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.

2.4 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.

2.5 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.

2.6 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.

2.7 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

3.1 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.

3.2 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.

3.3 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.

3.4 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 05 51 00 METAL STAIRS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Preassembled steel stairs with concrete-filled treads.
2. Steel tube railings attached to metal stairs.
3. Steel tube handrails attached to walls adjacent to metal stairs.
4. Supplementary items required for proper installation.

1.2 ACTION SUBMITTALS

- A. Product Data: For metal pan stairs.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 QUALITY ASSURANCE

- A. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.
 1. Preassembled Stairs: Commercial class.

PART 2 - PRODUCTS

2.1 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. Alfab, Inc., Enterprise, AL. Tel. (334) 347-9516.
 2. American Stair, Inc., Willow Springs, IL. Tel. (312) 839-5880.
 3. Sharon Companies Ltd. (The), Medina, OH. Tel. (800) 792-0129.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design metal stairs, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

- B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
1. Uniform Load: 100 lbf/sq. ft..
 2. Concentrated Load: 300 lbf applied on an area of 4 sq. in..
 3. Uniform and concentrated loads need not be assumed to act concurrently.
 4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
 5. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.
- C. Structural Performance of Railings: Railings 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.
- D. Seismic Performance: Metal stairs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
1. Component Importance Factor is 1.5.

2.3 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- C. Steel Plates, Shapes, and Bars: ASTM A 36
- D. Steel Tubing: ASTM A 500 (cold formed) or ASTM A 513.
- E. Rolled-Steel Floor Plate: ASTM A 786, rolled from plate complying with ASTM A 36 or ASTM A 283, Grade C or D.
- F. Steel Bars for Grating Treads: ASTM A 303 steel strip, ASTM A 1011 or ASTM A 1018.
- G. Wire Rod for Grating Crossbars: ASTM A 510.
- H. Cast Iron: Either gray iron, ASTM A 48, or malleable iron, ASTM A 47, unless otherwise indicated.
- I. Uncoated, Cold-Rolled Steel Sheet: ASTM A 1008, either commercial steel, Type B, or structural steel, Grade 25, unless another grade is required by design loads; exposed.

- J. Uncoated, Hot-Rolled Steel Sheet: ASTM A 1011, either commercial steel, Type B, or structural steel, Grade 30, unless another grade is required by design loads.

2.4 MISCELLANEOUS MATERIALS

- A. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.
- B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187. Apply bituminous paint to concealed surfaces of cast-metal units set into concrete.
- C. Apply clear lacquer to concealed surfaces of extruded units set into concrete.
- D. Fasteners: Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.
- E. Shop Primers: Provide primers that comply with Section 09 90 00 "Painting and Coatings".
- F. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
- G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- H. Concrete Materials and Properties: Comply with requirements in Section 03 30 00 "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
- I. Welded Wire Fabric: ASTM A 185, 6 by 6 inches, W1.4 by W1.4, unless otherwise indicated.
- J. Precast Concrete Treads: Comply with requirements in Section 03 30 00 "Cast-in-Place Concrete" for normal-weight, ready-mixed concrete with a minimum 28-day compressive strength of 5000 psi and a total air content of not less than 4 percent or more than 6 percent. Reinforce with galvanized, welded wire fabric, 2 by 2 inches by 0.062-inch- diameter wire; comply with ASTM A 185 and ASTM A 82, except for minimum wire size.

2.5 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
 - 1. Join components by welding unless otherwise indicated.
 - 2. Use connections that maintain structural value of joined pieces.
- B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.

- D. Form bent-metal corners to smallest radius possible without impairing work.
- E. Weld connections 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. Weld exposed corners and seams continuously unless otherwise indicated.
 - 5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for [Type 1 welds: no evidence of a welded joint. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.
- F. Fabricate joints that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

2.6 STEEL-FRAMED STAIRS

- A. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," Commercial Class, unless more stringent requirements are indicated.
- B. Stair Framing:
 - 1. Fabricate stringers of steel plates or channels. Provide closures for exposed ends of channel stringers.
 - 2. Construct platforms of steel plate or channel headers and miscellaneous framing members as needed to comply with performance requirements.
 - 3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.
 - 4. Where stairs are enclosed by gypsum board shaft-wall assemblies, provide hanger rods or struts to support landings from floor construction above or below.
 - 5. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.
- C. Metal-Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.067 inch.
 - 1. At Contractor's option, provide stair assemblies with metal-pan subtreads filled with reinforced concrete during fabrication. (or)
 - 2. Provide epoxy-resin-filled treads, reinforced with glass fibers, with slip-resistant, abrasive surface.

2.7 STAIR RAILINGS

- A. Steel Tube Railings: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.
 - 1. Rails and Posts: 1-1/2-inch- diameter top and bottom rails and 1-1/2-inch-square posts.
 - 2. Picket Infill: 1/2-inch- square pickets spaced less than 4 inches clear.
- B. Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 2 welds: completely sanded joint, some undercutting and pinholes okay as shown in NAAMM AMP 521.
- C. Form changes in direction of railings by bending.
- D. Form curves by bending members in jigs to produce uniform curvature without buckling.
- E. Close exposed ends of railing members with prefabricated end fittings.
- F. Provide wall returns at ends of wall-mounted handrails.
- G. Connect posts to stair framing by direct welding.
- H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work.
- I. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, to transfer wall bracket loads through wall finishes. Size fillers to suit wall finish thicknesses.

2.8 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal stairs after assembly.
- C. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning" or SSPC-SP 3, "Power Tool Cleaning" as standard with manufacturer.
- D. Apply shop primer to uncoated surfaces of metal stair components. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- B. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.
- C. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication.
- D. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.
- E. Place and finish concrete fill for treads and platforms to comply with Section 03 30 00 "Cast-in-Place Concrete."
- F. Install precast concrete treads with adhesive supplied by manufacturer.
- G. Attach handrails to wall with wall brackets. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.

3.2 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

END OF SECTION

SECTION 05 59 15

METAL REBOUNDING BOLLARDS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Surface mounted rebounding metal bollards complete with accessories, mounting hardware and anchor bolts as indicated on the Drawings including indications of interior locations.
- B. Related Section: Section 05 50 00 – Metal Fabrications for exterior concrete filled fixed steel bollards.

1.02 REFERENCES

- A. ASTM International (ASTM):
 1. ASTM A36 - Standard Specification for Carbon Structural Steel.
 2. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 3. ASTM A312 - Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
 4. ASTM A536 - Standard Specification for Ductile Iron Castings.
 5. ASTM D1654 - Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
- B. International Standards Organization (ISO): Test Method UNE-EN-ISO 11925-2.
- C. Society for Protective Coatings (SSPC) Quality Standards: Q195 SSPC, Q235 SSPC and Q235 SSPC.

1.03 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's specifications; certified test data, where applicable; and installation and maintenance instructions for required products, including finishes.
- B. Shop Drawings: Submit shop drawings showing mounted items and coordination required for work specified in other Sections; indicate construction and installation details.
- C. Samples: Furnish one sample for each product specified, representing colors and finishes to be installed.

1.04 INFORMATIONAL SUBMITTALS

- A. Sample warranties.
- B. Maintenance data.

1.05 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Company specializing in manufacturing products specified in this Section with minimum 5 years documented experience.
- B. Installer's Qualifications: Acceptable to manufacturer with documented experience on at least 3 projects of similar nature in past 5 years.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in labeled protective packages. Store and handle in strict compliance with manufacturers' instructions and recommendations.

1.07 WARRANTY

- A. Manufacturer shall guarantee materials and workmanship against defects for a period of two years after Final Completion. Within the warranty period, the manufacturer shall, at its option, repair or replace defective products with new.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by SlowStop Bollards (Impact Recovery Systems), 4955 Stout Dr., San Antonio, TX 78219; Toll Free Tel: 800-736-5256; Tel: 210-736-4477; Fax: 210-734-6448; Email: <mailto:info@impactrecovery.com>; Web: www.slowstop.com ; www.impactrecovery.com .
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. IdealSheild, Detroit, MI. Tel (866)825-8659.
 - 2. Post Guard Products, Farmington Hills, MI. Tel (866) 737-8900.
- C. Substitutions shall fully comply with specified requirements and Section 01 25 00-Substitution Procedures and 01 60 00 - Product Requirements.

2.02 METAL BOLLARDS

- A. Metal Bollards: Metal bollards and mounting hardware as manufactured by SlowStop Bollards, model as listed below.
 - 1. Materials:
 - a. Ductile Cast Iron: ASTM A536, Grade 60/40/18.
 - b. Steel: ASTM A36.
 - c. Elastomer: Natural Rubber ASTM D2240 Shore A 60 (plus or minus 5).
 - d. Caps: Black plastic.
 - 2. Mounting System: Surface (flange), bollard attached to the surface by mechanical anchoring.
 - 3. Installation Hardware:
 - a. Provide galvanized carbon steel 5/8" by 5-1/2 inches long concrete screw anchor bolts and other types of hardware as recommended by manufacturer for substrates and installation condition.
 - b. Provide hardware for standard permanently fixed installation.
 - 4. Working Temperature: Minus 40 degrees F - Plus 140 degrees F

5. Rebounding Bollards:
 - a. Post: Galvanized steel pipe, size as indicated on Drawings.
 - b. Footing: Concrete as specified in Division 03.
 6. Upright Finish:
 - a. Type: Polyester powder coat finish utilizing an epoxy prime coat and a polyester top coat.
 - b. Performance: 1000 hours salt-spray resistance as per ASTM D 1654.
 - c. Color: Yellow RAL 1023.
 7. Base Finish:
 - a. Type: Environmental Friendly KTL Finish with UV Gloss.
 - b. Performance: 1000 hours salt-spray resistance as per ASTM D 1654.
 - c. Color: Black
 8. Kinetic energy resistance testing by accredited laboratory.
- B. Metal Bollard: 5" SlowStop Rebounding Bollards (Model: SS5Y-42).
1. Size: 42 inches high by 5.56 inches diameter.
 2. Design: Cylindrical.
 3. Energy Absorption: 9,536 ft-lb.
 4. Material: Steel Post and Ductile Cast Iron Base.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Notify Project Engineer and MDOT Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions for placement.
- B. Do not proceed with installation until substrates have been properly prepared and deviations from manufacturer's recommended tolerances for placement and location of embedded items and condition of substrate are corrected.

3.02 PREPARATION

- A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions. Commencement of installation constitutes acceptance of conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's written instructions.
 1. Layout and mark and mark final location using the base as a guide. Remove base. Note keep the bollard 0.32 x height away from solid object to allow for tilting.
 2. Place the elastomer in the center of the location and place adapter on top of elastomer.
 3. Fit base over the adapter so that it rests on the adapter flange and covers the elastomer.
 4. Again using the base as a guide, drill six holes deep enough to complexly sink the anchors. Clean out the holes from concrete dust.
 5. Tighten the concrete screw anchors in a star pattern, compressing the elastomer and making the base flush to the concrete. Anchors shall be tightened flush to base.
 6. Insert the tube into the adapter and firmly tighten set-screws to hold it in place.

7. Place the cap in the tube and gently pound it in place using a mallet.
8. Do not fill the bollard with concrete. The system is designed for the pipe to be the first point of bending.

3.04 CLEANING AND PROTECTION

- A. Cleaning: Immediately prior to Final Completion, clean bollards in accordance with manufacturer's instructions to remove dust, dirt, adhesives, and other foreign materials.
- B. Protect installed products until Final Completion.
- C. Touch-up, repair or replace damaged products before Final completion.

END OF SECTION

SECTION 06 10 00 ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Wood blocking and nailers.
3. Wood furring and grounds.
4. Wood sleepers.
5. Plywood

B. Related Sections:

1. Section 03 10 00 - Concrete Forming and Accessories.
2. Section 06 40 00 - Architectural Woodwork.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.03 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.

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 DELIVERY, STORAGE AND PROTECTION

- A. Keep materials dry during delivery and storage. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber and plywood, and provide air circulation within stacks. 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.

1.06 PROJECT CONDITIONS

- A. Installer must 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. 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: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

2.02 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA 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 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, stripping, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.

4. Wood framing members that are less than 18 inches above the ground in crawl spaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.03 FIRE-RETARDANT-TREATED MATERIALS

- A. 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.
 3. Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D 5664, and design value adjustment factors shall be calculated according to ASTM D 6841 For enclosed roof framing, framing in attic spaces, and where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to maximum moisture content of 15 percent.
- C. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
- D. Application: Treat items indicated on Drawings, and the following:
 1. Framing for raised platforms.
 2. Concealed blocking.
 3. Plywood backing panels.

2.04 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions: Standard, Stud, or No. 3 grade of any species.
- B. Other Framing: Construction or No. 2 grade and any of the following species:
 1. Hem-fir (north); NLGA.
 2. Douglas fir-larch; WCLIB or WWPA.
 3. Mixed southern pine; SPIB.
 4. Spruce-pine-fir; NLGA.
 5. Douglas fir-south; WWPA.
 6. Hem-fir; WCLIB or WWPA.
 7. Douglas fir-larch (north); NLGA.
 8. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

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 Standard, Stud, or No. 3 grade lumber of any species.
- C. For utility shelving, provide lumber with 15 percent maximum moisture content of eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Standard or No. 3 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
- D. For concealed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades:
1. Mixed southern pine, No. 2 grade; SPIB.
 2. Eastern softwoods, No. 3 Common grade; NELMA.
 3. Northern species, No. 3 Common grade; NLGA.
 4. Western woods, Standard or No. 3 Common grade; WCLIB or WWPA.

2.06 PLYWOOD

- 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. Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.
- C. Exposed Plywood: Where plywood will be exposed to view, provide 5/8 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.
- D. Plywood Subfloor: Refer to Structural Drawings.

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 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 MISCELLANEOUS MATERIALS

- A. Flexible Flashing: Self-adhesive butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit.
- B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
- D. Cut, join, and tightly fit framing around other Work. Do not splice structural members between supports unless otherwise indicated.
- E. Comply with AWWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- F. Securely attach 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 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 wet enough 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 40 00 ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 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 - Paints and Coatings
 5. Section 12 36 65 - Quartz Agglomerate Countertops

1.2 DEFINITIONS

- A. Terms used in this Section are in accordance with terminology of the Architectural Woodwork Institute, Architectural Woodwork Quality Standards, Eighth Edition, Version 1.0, 2003

1.3 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. Lumber for transparent finish, for each species and cut, finished on one side and one edge.
 2. Veneer leaves representative of and selected from flitches to be used for transparent-finished cabinets.
 3. Lumber and panel products with shop-applied opaque finish, for each finish system and color, with exposed surface finished.
 4. Thermoset decorative panels, for each color, pattern, and surface finish.
 5. Exposed cabinet hardware and accessories, one unit for each type and finish.

1.4 QUALITY ASSURANCE

- A. Unless otherwise shown or specified, comply with specified provisions of the Architectural Woodwork Institute (AWI) 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. Comply with the indicated standards as applicable for the following types of architectural woodwork
 - 1. Lumber: AWI Section 100.
 - 2. Standing and running trim: AWI Section 300.
 - 3. Cabinets and Countertops: AWI Section 400, A, B, C.
 - 4. Shelving: AWI Section 600.
 - 5. Miscellaneous work: AWI Section 700.
 - 6. Finishing: AWI Section 1500.
 - 7. Installation of woodwork: AWI Section 1700.

1.5 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.

1.6 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

2.1 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.

2.2 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 AWI 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.

2.3 ARCHITECTURAL WOODWORK TYPES

- A. Wood Cabinets: Custom Grade. On exposed portions provide solid wood and plywood (no plywood substitutes) meeting the requirements for the specified Quality Grade.
 - 1. Exposed surfaces: Birch.
 - 2. Semi-Exposed surfaces: Birch.
 - 3. Concealed surfaces: Birch
- 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: As indicated in material schedule and millwork elevations.

2.4 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.

2.5 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.

2.6 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

3.1 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.

3.2 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.

3.3 PREPARATION FOR SITE FINISHING

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

3.4 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 21 28

CELLULOSE THERMAL INSULATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Building insulation for interior walls.
 - 1. Pneumatically sprayed damp into open wall cavities.

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.
- 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 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 21 29

SPRAYED INSULATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Spray-applied cellulose thermal insulation of floor deck and floor joists in building Mezzanine floor space..
- B. Related Items:
 - 1. Ducts, piping conduit or other suspended equipment shall not be positioned until after the application of sprayed insulation.

1.02 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's technical data, installation instructions and manufacturer's certificate that the product meets or exceeds the specified requirements.

1.03 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Submit manufacturer's written certification that product contains no asbestos, fiberglass or other man made mineral fiber and copy of manufacturer's ISO 9001: 2008 Certification.
- B. Research/evaluation reports.

1.04 QUALITY ASSURANCE

- A. Manufacturer: Shall be ISO 9001: 2008 Certified and subscribe to independent laboratory follow-up inspection services of Underwriters Laboratories or Factory Mutual. Each bag shall be labeled accordingly.
 - 1. Manufacturer shall be in compliance with the 2012 International Building Code

- B. Applicator: Shall be licensed by the manufacturer.

1.05 DELIVERY, STORAGE AND HANDLING:

- A. Deliver in original, unopened containers bearing the name of the manufacturer, product identification and references to U.L. testing.
- B. Store materials dry, off the ground and under cover. Protect liquid adhesive from freezing.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A. Specifications are based on products manufactured by International Cellulose Corporation, 12315 Robin Boulevard, Houston, TX 77045, Phone: (800) 444-1252 Fax: (713) 433-2029. Contact International Cellulose Corporation for approved applicators.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Fiberlite Technologies, Inc., Joplin, MO. Tel. (800) 641-4296
 - 2. ThermoCon, Inc., Monroe, LA. Tel: (800) 854-1907.
- 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 SPRAY-APPLIED CELLULOSE INSULATION

- A. Self-Supported, Spray-Applied Cellulose Insulation:
 - 1. Type: K-13 Spray-On-System.
 - 2. Color: One of seven standard colors as selected by MDOT Architect
 - 3. Application: At minimum thickness to provide an R-value of 20.
 - 4. Cohesive Strength: At time of application per Method WS-2000: > 700 Grams.
 - 5. ASTM Requirements:
 - a. Comply with ASTM E-84/U.L. 723, Tested at minimum of 5 inch thickness Class 1, Class A Flame Spread 5, Smoke Development 5
 - b. Comply with ASTM E-1042.
 - c. Non corrosive per ASTM C-739.
 - d. Bond Deflection per ASTM E-759: 6 inches Deflection in 10 feet Span; No Spalling or Delamination.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine surfaces and report unsatisfactory conditions in writing. Do not proceed until unsatisfactory conditions are corrected.

3.02 PREPARATION

- A. Provide masking, drop cloths or other satisfactory coverings for materials/surfaces that are not to receive insulation to protect from over-spray.
- B. Coordinate installation of sprayed cellulose fiber with work of the other trades.
- C. Prime surfaces as required by the manufacturers' instructions or as determined by examination.

3.03 INSTALLATION

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Thickness will be determined as the minimum thickness measured as per ASTM E-605 field test procedure.
- C. Extend insulation to envelop entire area to be insulated.
- D. Cure insulation with continuous natural or mechanical ventilation.
- E. Remove and dispose of over-spray and all debris caused by the application.

3.04 PROTECTION

- A. Protect finished installation until properly cured and inspected by the Project Engineer.

END OF SECTION

SECTION 07 26 00

VAPOR RETARDERS

PART 1 - GENERAL

1.1 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.

1.2 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 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.

2.2 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) = .01Perms.
 2. Dry Tensile Strength: ASTM D-882 = (80 lb f/in min)-MD & (78 lbf/in min.) CD.
 3. Puncture Resistance: ASTM D-1709, Method B = 4,900 Grams.

2.3 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®".

2.4 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

3.1 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.

3.2 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.

3.3 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

1.1 SUMMARY

A. Related Requirements:

1. Wood nailers, curbs, and blocking.
2. Materials and installation of sheet metal flashing and trim integral with roofing.
3. Sheet metal flashing and trim integral with metal wall panels.

1.2 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
3. Review requirements for insurance and certificates if applicable.
4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

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

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.

3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
10. Include details of special conditions.
11. Include details of connections to adjoining work.
12. Detail formed flashing and trim at scale of not less than 3 inches per 12 inches.

- C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

1.5 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.7 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. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from Date of Completion.

PART 2 - PRODUCTS

2.1 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 NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 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. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - 2. Obtain field measurements for accurate fit before shop fabrication.
 - 3. 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.
 - 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
- C. 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.

- D. 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.
- E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49] 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.
- H. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength
- I. Do not use graphite pencils to mark metal surfaces.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 - 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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, 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.
 6. Do not use graphite pencils to mark metal surfaces.
- 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 uncoated-aluminum and stainless-steel 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 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 .
- 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.
1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

3.3 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at centers.
- C. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.
- D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints minimum of 4 inches. Secure in waterproof manner by means of unless otherwise indicated.
- E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with sealant and clamp flashing to pipes that penetrate roof.

3.4 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.5 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. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.
- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 84 00 FIRESTOPPING

PART 1 - GENERAL

1.1 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.

1.2 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.

1.3 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.

1.4 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

2.1 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.,
 1. 3M Fire Protection Products, Saint Paul, MN. Tel. (800) 328-1687.
 2. USG Corporation, Chicago, IL. Tel. (880) 874-4968.

2.2 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.

2.3 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.

2.4 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

3.1 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.

3.2 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.

3.3 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.

3.4 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 Intertek ETL SEMKO-listed systems are indicated, they refer to design numbers in Intertek ETL SEMKO's "Directory of Listed Building Products" under "Firestop Systems."
- C. 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."
- D. Sealants: Equal to Hilti, Inc. FS-One.
- E. Caulking and Putty: Equal to 3M Brand Fire Barrier CP- 25 Caulk and Putty 303.
- F. Penetration Sealants: Equal to 3M Fire Barrier Penetration Sealing Systems 7902 and 7904 series as required.
- G. Insulation: Equal to United States Gypsum Company "Thermafiber" Safing Insulation, 4 pcf density, unfaced.
- H. 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

1.1 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.

1.2 RELATED SECTIONS

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

1.3 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.

1.4 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.

1.5 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.

1.6 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.

1.7 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.

1.8 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.

1.9 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

2.1 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.

2.2 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.
- 2.3 SILICONE JOINT SEALANTS
- A. Silicone Joint Sealant: ASTM C 920.
- 2.4 URETHANE JOINT SEALANTS
- A. Urethane Joint Sealant: ASTM C 920.
- 2.5 LATEX JOINT SEALANTS
- A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
- 2.6 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.
- 2.7 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.
- 2.8 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.
- 2.9 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

3.1 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.

3.2 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.
- 3.3 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.
- 3.4 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.

3.5 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 metal panels, 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

1.1 SUMMARY

- A. Section includes hollow-metal work, including but not limited to, the following:
1. Interior and exterior hollow metal doors and frames.
 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. Section 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.

1.2 DEFINITIONS

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

1.3 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, glazing beads.
- D. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.

1.5 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.

1.6 PRODUCT IDENTIFICATION

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

1.7 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

2.1 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.

2.2 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.

2.3 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.
- 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.
 - 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.
 - 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.
- 2.4 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 on 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.

2.5 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.

2.6 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 2.09(B) through 2.09(D) are from finished floor and shall comply with ADA and AHJ requirements.

2.7 STEEL FINISHES

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

1. Shop Primer: SDI A250.10.

2.8 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.

2.9 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

3.1 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.
- 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.
- 3.2 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

1.1 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.
- 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.

1.2 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.

1.3 INFORMATIONAL SUBMITTALS

- A. Manufacturer's sample warranty.

1.4 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."

1.5 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.

1.6 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

2.1 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. Jeld-Wen Windows and Doors, Klamath Falls, OR. Tel. (541) 885-7412.
 2. Marshfield Door Systems, Inc., Marshfield, WI. Tel. (800) 869-3667.
 3. TruStile Doors, LLC, Denver, CO. Tel. (888) 286-3931.
 4. VT Industries, Inc., Holstein, IA. Tel. (800) 827-1615.
- 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.

2.2 DOOR CONSTRUCTION, GENERAL

- A. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.
- B. 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.
- C. 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.

D. 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 midrail 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.

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

2.3 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. 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.

2.4 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, 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.

2.5 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

3.1 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.

3.2 PREPARATION

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

3.3 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.

3.4 ADJUSTING AND CLEANING

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

3.5 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 22 00 FIBERGLASS (FRP) DOORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Fiberglass reinforced plastic (FRP) Doors

1.2 RELATED SECTIONS

- A. Division 08 Section "Hollow Metal Doors and Frames" for HM frames.
- B. Division 08 Section "Door Hardware" for door hardware and weather-stripping

1.3 QUALITY ASSURANCE

- A. General: Provide fiberglass reinforced door and frame units made of components of standard construction furnished by one manufacturer as coordinated assemblies.
- B. Manufacturer: Company specializing in the manufacture of fiberglass doors and frames with a minimum of five years documented experience.
- C. Construction: Verify that FRP doors and frames are manufactured utilizing pultruded fiberglass components for flexibility, durability, superior strength and chemical resistance. Press-molded doors and frames will not be accepted.
- D. Resins: Resins shall comply with USDA and FDA standards for incidental food contact.
- E. Flame Spread Rating: Flame retardant structural shapes meet the minimum flame spread rating less than or equal to 25 when tested according to ASTM E84.
- F. Impact Strength: FRP doors and panels 10.32 foot-pounds per inch of notch, ASTM D-256.
- G. Tensile Strength:
 - 1. FRP doors and panels 12,000 psi, ASTM D-638.
 - 2. FRP frames 30,000 psi, ASTM D-638.
- H. Flexural Strength: FRP doors, panels, and frames 25,000 psi, ASTM D-790.
- I. Compressive Strength:
 - 1. FRP doors and panels 18,000 psi, ASTM D-695.
 - 2. FRP frames 30,000 psi, ASTM D-695.
- J. Water Absorption: FRP doors, panels, and frames .27 %, ASTM D-570.
- K. Hardware Reinforcements: FRP doors and frames fabricated with a minimum screw holding strength of 1,000 lbs. Tested with a #12 x 1-1/4" hinge screw.

- L. Warranty: Warranty fiberglass doors and frames for life of the initial installation against failure due to corrosion. Additionally, warranty fiberglass doors and frames for a period of 10 years against failure due to materials and workmanship, from date of substantial completion.

1.4 SUBMITTALS

- A. Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, and finishes.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.
- B. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage exists. Minor damages may be repaired provided refinished items match new work and are acceptable to the Architect. Remove and replace damaged items that cannot be repaired as directed.
- C. Store doors and frames at building site under cover. Avoid using non-vented plastic or canvas covers that could create a humidity chamber.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 1. Edgewater FRP Door – 175 N. Western Ave. Neenah, Wisconsin 54956, Phone: 920-886-1995 Fax: 920-886-1998 (Basis-of-Design)
 2. Tiger Door – 1181 Garden Street, Greensburg, Pennsylvania 15601, Phone: 888-891-4416
 3. Chem-Pruf Doors – 5224 FM 802 Brownsville, Texas 78521, Phone: 800-444-6924 Fax: 956-544-7943

2.2 DOORS

- A. Exterior Doors: Provide doors complying with requirements indicated below:
 1. E-P series (Extra Heavy Duty) from the “Cutting Edge” product line (seamless).
 2. Doors to have full height heavy duty vertical fiberglass stiffeners 6 inches on center for superior strength.
 3. Expanded polystyrene solid foam core.

2.3 FABRICATION

- A. General: Fabricate fiberglass door units to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer’s plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.

- B. Core Construction: Manufacturer's standard core construction that complies with the following:
 - 1. E-P (premier) series to have full height vertical fiberglass stiffeners, 6 inches on center. Voids to be filled with expanded polystyrene foam.
 - 2. Hollow/honeycomb core will not be accepted.
- C. Stiles and Rails: Fabricate doors utilizing heavy duty pultruded fiberglass tubular members.
- D. Door Faces: Laminated composite faces shall be urethane fused to the stile and rail assembly, including the vertical stiffeners and core material, utilizing a two-part 100 percent reactive urethane adhesive, and then cured under pressure until completely bonded.
- E. Clearances: Not more than 1/8 inch (3.2 mm) at jambs and heads, except not more than 1/4 inch (6.4 mm) between pairs of doors. Not more than 3/4 inch (19 mm) at bottom, with standard being 5/8 inch (15.9 mm) at bottom.
- F. Door Edges: Lock stile to be factory beveled 1/8" in 2" for rub-free operation. Square lock-edge will not be accepted.
- G. Tolerances: Maximum diagonal distortion – 1/16 inch (1.6 mm) measured with straight edge, corner-to-corner.
- H. Hardware Reinforcement: Fabricate all hardware reinforcements utilizing premium high density polyethylene (HDPE) and fiberglass blocking. Any form of wood or metal reinforcements will not be accepted.
- I. Exposed Fasteners: Unless otherwise indicated, provide stainless steel, countersunk flat or oval heads for exposed screws and bolts.
- J. Thermal-Rated (insulating) Assemblies: At exterior locations and elsewhere shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies, with an "R" value of 11-12.
- K. Hardware Preparations: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Doors and frames must be factory pre-drilled for all mortised hardware preps. Pilot and through-bolt holes for all surface mounted hardware to be drilled at the project site during installation.
- L. Hardware Locations: Locate hardware as indicated on shop drawings or if not indicated, according to manufacturer's standard locations.
- M. Astragals: Fabricate astragals for pairs of doors utilizing fiberglass materials in either flat or "T" configuration – where indicated.

2.4 HARDWARE

- A. Hardware: All hardware shall be furnished under Section 08 71 00 unless stated otherwise.

PART 3 – EXECUTION

3.1 GENERAL

- A. General: Install fiberglass doors and accessories according to Shop Drawings, manufacturer's data, and as specified.
- B. Factory Finished Doors: Restore finish before installation if fitting or machining is required at Project site.
- C. Door Installation: Fit fiberglass doors accurately in frames. Shim as necessary.

3.2 ADJUSTING AND CLEANING

- A. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.
- B. Cleaning: Clean fiberglass door assemblies in accordance with manufacturer's recommended procedure.

END OF SECTION

SECTION 08 33 23

OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 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.

1.2 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.

1.3 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: Uniform pressure (velocity pressure) of 20 lbf/sq. ft. (87 MPH) acting inward and outward in the fully closed position unless otherwise indicated or required by local AHJ.

1.4 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.

1.5 INFORMATIONAL SUBMITTALS

1.6 CLOSEOUT SUBMITTALS

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

1.7 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

1.8 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.

1.9 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

2.1 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.

2.2 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.

2.3 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.

2.4 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.
- F. Curtain Wear Straps: Polyester.

2.5 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.

2.6 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.

2.7 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

3.1 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.

3.2 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.

3.3 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.

3.4 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 43 13

ALUMINUM-FRAMED STOREFRONTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Aluminum-framed storefront system with tubular aluminum sections with supplementary internal support framing as required, shop fabricated, factory finished, glass and glazing, intermediate rails / muntins, related flashing, anchorage and attachment devices.
- B. Related Sections:
 - 1. Section 08 80 00 - Glazing.
 - 2. Section 09 05 15 - Color Design.
 - 3. Section 12 21 31 - Horizontal Louver Blinds: Attachments to framing member.

1.02 PREINSTALLATION MEETINGS

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

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product. Submit component dimensions; describe components within assembly, anchorage, fasteners, and glass.
- B. Shop Drawings: Include plans, elevations, sections, full-size details, and attachments to other work.
 - 1. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
- C. Samples: For each exposed finish required.
- D. Delegated-Design Submittal: For aluminum-framed storefronts 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:** An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. **Design structural support framing components** under direct supervision of a professional engineer experienced in design of this Work and licensed at the place where the Project is located.
- 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 PROTECTION

- A. Deliver, store, protect, and handle products to and on project site per manufacturer's instructions.
- B. Store products on minimum 4-inch high wood blocking and cover. Do not use non-vented plastic or canvas that could create a humidity chamber.

1.08 FIELD CONDITIONS

- A. **Ambient Conditions:** Do not install sealant or glazing materials when ambient temperature is less than 40 degrees F during and 48 hours after installation.

1.09 WARRANTY

- A. **Special Warranty:** Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts 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.
- B. **Special Finish Warranty:** Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. **Warranty Period:** 20 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 aluminum-framed storefronts.

- B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
1. Aluminum-framed storefronts 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.
- C. Wind Loads: Provide framing system; include anchorage, capable of withstanding wind load design pressure as required by IBC 2012 Building Code and local Authorities having jurisdiction, whichever are more stringent.
- D. Air Infiltration: 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 psf.
- E. Water Resistance: The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a minimum static air pressure differential of 8 psf as defined in AAMA 501.
- F. Uniform Load: A static air design load based on loads shown on Structural Drawings (without steel reinforcing) shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of 1/180 of the span of any framing member. At a 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 0.4 percent of their clear spans shall occur.

2.02 MANUFACTURERS

- A. Manufacturers: Drawings and Specifications are based on products manufactured by Kawneer Co., 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 shall fully comply with specified requirements and Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.03 MATERIALS

- A. Framing Members: Aluminum Storefront Framing: Kawneer series IR 501 - 2 1/2 inches by 5 inches nominal dimensions; Non-Thermal; Center Glazed; Interior Structural Silicone Glazed; Screw Spline Fabrication
1. Material Standard: ASTM B 221; 6063-T6 alloy and temper
 2. Member Wall Thickness: Each framing member shall provide structural strength to meet specified performance requirements.
 3. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data. .
- B. Accessories:
1. Fasteners-Storefront: Shall be 300 Series Stainless Steel.
 2. Gaskets: Exterior Glazing gaskets shall be extruded EPDM rubber. Interior Spacer shall be compatible with Silicone Sealant.
 3. Perimeter Anchors: Aluminum. When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.
 4. Intermediate Rails / Muntins: As indicated on Drawings.
- C. Aluminum Framing and Components:
1. Material Standard: Extruded Aluminum; ASTM B221; 6063-T6 alloy for extruded structural members.
 2. Member Wall Thickness: Each framing member shall provide structural strength to meet specified performance requirements.
 3. Glass: Specified in Section 08 80 00.
 4. Glazing Materials: Specified in Section 08 80 00.
 5. Flashing: Minimum 0.032-inch-thick aluminum.
 6. Sealant and Backing Materials:
 - a. Sealant used within system (Not Used for Glazing): Manufacturer's standard materials to achieve weather, moisture, and air infiltration requirements.
 - b. Perimeter Sealant: Specified in Section 07 92 00.

2.04 FABRICATION

- A. General:
1. Fabricate components 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.
 5. Reinforce interior horizontal head rail to receive blind track brackets and attachments.
 6. Reinforce framing members for imposed loads.

2.05 ALUMINUM FINISHES

- A. High-Performance Organic Finish: Two-coat fluoropolymer (Kynar 500) finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat.
 - 1. Color and Gloss: As selected by MDOT Architect from manufacturer's full range of standard colors. Refer to Section 09 05 15 - Color Design. For color selection.
- B. Extent of Finish:
 - 1. Apply factory coating to all surfaces exposed at completed assemblies.
 - 2. Apply finish to surface cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
 - 3. Apply touch-up materials recommended by coating manufacturer for field application to cut ends and minor damage to factory applied finish.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General:
 - 1. Comply with manufacturer's written instructions.
 - 2. Do not install damaged components.
 - 3. Fit joints to produce hairline joints free of burrs and distortion.
 - 4. Rigidly secure nonmovement joints.
 - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
 - 6. Seal perimeter and other joints watertight unless otherwise indicated.
- B. Metal Protection:
 - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
 - 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Set continuous sill members and flashing in full sealant bed as specified in Section 07 92 00 "Joint Sealants" to produce weathertight installation.
- D. Install components plumb and true in alignment with established lines and grades.
- E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.
- F. Install glazing as specified in Section 08 80 00 "Glazing."

3.02 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.

3.03 PROTECTION AND CLEANING

- A. Protection: Protect installed product's finish surfaces from damage during construction. Protect aluminum 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 prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.1 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.
- 1.2 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. Divisions 26 and 28 Sections for electronic door hardware.

1.3 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 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.

1.4 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 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. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- F. 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.
- G. 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.
- H. Keying Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination."

1.5 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.

1.6 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

2.1 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/Ruswin, Sargent, Schlage.
 4. Flushbolts and Accessories – Hager, Ives, Rockwood.
 5. Locksets – Baldwin, Corbin/Ruswin, Sargent, Schlage.
 6. Deadbolts – Baldwin, Corbin/Ruswin, Sargent, Schlage.
 7. Exit Devices – Precision, Sargent, Von Duprin.
 8. Door Closers – Corbin/Ruswin (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.

2.2 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.

2.3 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.

2.4 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.

2.5 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.

2.6 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

3.1 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. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room. Verify location with Project Engineer / MDOT Architect.
 - 1. Configuration: Provide [one power supply for each door opening] [least number of power supplies required to adequately serve doors] with electrified door hardware.
- J. 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.
- K. 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.
- L. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- M. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- N. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.
- O. 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).

3.2 FIELD QUALITY CONTROL

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

3.3 DOOR HARDWARE SCHEDULE

See Following Pages

Hardware Set 1

Doors: 106A, 107A

Each to Receive:

3	EA	Hinge	TA2314 x NRP 4-1/2" x 4-1/2" US32D	McKinney
1	EA	Mortise Lock	8204 LNL US26D	Sargent
1	EA	Electric Strike	1006CLB 630	HES
1	EA	Surface Closer	TB 1431 PS EN	Sargent
1	EA	Mop Plate	K1050 8" x 34" US32D	Rockwood
1	EA	Threshold	2005AV 36"	Pemko
1	EA	Gasketing	303AV 36" x 84"	Pemko
1	EA	Request to Exit	PIR-IS-310	Honeywell
1	EA	Door Contact	1076	Honeywell
1	EA	Power Supply	BPS-24-1	Securitron

CARD READER/KEYPAD TO BE PROVIDED BY THE OWNER.

Hardware Set 2

Doors: 111D

Each to Receive:

3	EA	Hinge	TA2314 x NRP 4-1/2" x 4-1/2" US32D	McKinney
1	EA	Rim Exit Device	43 55 56 8804 862 US32D	Sargent
1	EA	Surface Closer	TB 1431 PS EN	Sargent
1	EA	Mop Plate	K1050 8" x 34" US32D	Rockwood
1	EA	Threshold	2005AV 36"	Pemko
1	EA	Gasketing	303AV 36" x 84"	Pemko
1	EA	Door Contact	1076	Honeywell
1	EA	Electric Power Transfer	CEPT-10	Securitron
1	EA	Power Supply	BPS-24-1	Securitron

CARD READER/KEYPAD TO BE PROVIDED BY THE OWNER.

Hardware Set 3

Doors: 111E

Each to Receive:

3	EA	Hinge	TA2314 x NRP 4-1/2" x 4-1/2" US32D	McKinney
1	EA	Rim Exit Device	16 43 8804 862 US32D	Sargent
1	EA	Surface Closer	TB 1431 PS EN	Sargent
1	EA	Mop Plate	K1050 8" x 34" US32D	Rockwood
1	EA	Threshold	2005AV 36"	Pemko
1	EA	Gasketing	303AV 36" x 84"	Pemko

Hardware Set 4

Doors: 101, 102, 103, 104

Each to Receive:

3	EA	Hinge	TA2714 4-1/2" x 4-1/2" US26D	McKinney
1	EA	Cylindrical Lock	28 10G05 LL US26D	Sargent
1	EA	Wall Stop	409 US32D	Rockwood
3	EA	Silencer	608-RKW	Rockwood

Hardware Set 5

Doors: 106B

Each to Receive:

3	EA	Hinge	TA2314 x NRP 4-1/2" x 4-1/2" US32D	McKinney
1	EA	Mortise Lock	8204 LNL US26D	Sargent
1	EA	Electric Strike	1006CLB 630	HES
1	EA	Surface Closer	TB 1431 O EN	Sargent
1	EA	Mop Plate	K1050 8" x 34" US32D	Rockwood
1	EA	Wall Stop	409 US32D	Rockwood
1	EA	Threshold	271A 36"	Pemko
1	EA	Gasketing	303AV 36" x 84"	Pemko
1	EA	Sweep	315CN 36"	Pemko
1	EA	Request to Exit	PIR-IS-310	Honeywell
1	EA	Door Contact	1076	Honeywell
1	EA	Power Supply	BPS-24-1	Securitron

CARD READER/KEYPAD TO BE PROVIDED BY THE OWNER.

Hardware Set 6

Doors: 107B, 107C

Each to Receive:

3	EA	Hinge	TA2714 4-1/2" x 4-1/2" US26D	McKinney
1	EA	Mortise Lock	8255 LNL US26D	Sargent
1	EA	Surface Closer	TB 1431 P9 EN	Sargent
1	EA	Mop Plate	K1050 8" x 34" US32D	Rockwood
1	EA	Wall Stop	409 US32D	Rockwood
1	EA	Threshold	271A 36"	Pemko
1	EA	Gasketing	303AV 36" x 84"	Pemko
1	EA	Sweep	315CN 36"	Pemko

Hardware Set 7

Doors: 108, 109

Each to Receive:

3	EA	Hinge	TA2714 4-1/2" x 4-1/2" US26D	McKinney
1	EA	Cylindrical Lock	28 10U15 LL US26D	Sargent
1	EA	Deadbolt	3216 US26D	Hager
1	EA	Surface Closer	TB 1431 O EN	Sargent
1	EA	Mop Plate	K1050 8" x 34" US32D	Rockwood
1	EA	Wall Stop	409 US32D	Rockwood
3	EA	Silencer	608-RKW	Rockwood

Hardware Set 8

Doors: 110

Each to Receive:

3	EA	Hinge	TA2714 4-1/2" x 4-1/2" US26D	McKinney
1	EA	Cylindrical Lock	28 10U15 LL US26D	Sargent
1	EA	Surface Closer	TB 1431 O EN	Sargent
1	EA	Mop Plate	K1050 8" x 34" US32D	Rockwood
1	EA	Wall Stop	409 US32D	Rockwood
3	EA	Silencer	608-RKW	Rockwood

END OF SECTION

SECTION 08 80 00 GLAZING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Glass and glazing for doors, windows, 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 51 13 - Aluminum Windows.

1.2 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.

1.3 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.

1.4 INFORMATIONAL SUBMITTALS

- A. Preconstruction adhesion and compatibility test report.

1.5 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."

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 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.

1.8 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

2.1 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. Guardian Industries Corp., Carleton, MI. Tel. (800) 521-9040
 4. Old Castle Building Envelops, Santa Monica, CA. Tel. (866) 653-2278.
 5. Safti First, San Francisco, CA. Tel. (888) 653-3333.
 6. Viracon, Inc., Owatonna, MN. Tel. (800) 533-2080.
 7. Vitro Architectural Glass (formerly PPG Glass), Tel. (888) 774-4332.
- B. Substitutions shall fully comply with specified requirements and Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.2 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.

2.3 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.

2.4 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

2.5 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.

2.6 FIRE RATED GLASS

- A. Clear, wireless, minimum 1/4 inch thick safety glass equal to "Firelite Plus" as manufactured by Technical Glass Products, conforming to applicable U.L. fire ratings as indicated or required for rated wall or adjacent door and frame assembly.

2.7 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.

2.8 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

3.1 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.

3.2 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.

3.3 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.

3.4 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.

3.5 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

1.1 SUMMARY

- A. Section Includes: Extruded aluminum 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.

1.2 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 performance requirements, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS

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

1.4 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

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

2.2 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 30 lbf/sq. ft. acting inward or outward.
- C. 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.

2.3 FIXED, EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal, Drainable-Blade Fixed Louver:
 - 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.

2.4 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.

2.5 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.

2.6 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.

2.7 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.

2.8 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

3.1 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	COLOR DESCRIPTION
• 05 50 00 - Misc. Steel	PPG 1023-5 Stone Gray	(dark Brown)
• 05 50 00 - Bollards		(Safety Yellow)
• 06 40 00 - Arch. Wdwrk. (PL01)	Wilsonart, Satin Stainless 4830K-18	(Silver)
• 06 40 00 - Arch. Wdwrk. (PL02)	Nevamar, Graphite Blue, S3023T	(Blue)
• 06 40 00 - Arch. Wdwrk. (PL03)	Formica, Maple Woodline 6925-NT	(Light Wood)
• 06 40 00 - Arch. Wdwrk. (PL05)	Nevamar, Fine Sycamore W8351-T	(Light Wood)
• 06 40 00 – Pl. Lam Cntrtp (PL04)	Formica, Graystone 464-58	(Light grey)
• 07 92 00 - Joint Sealants	Pecora-Match adjacent lighter color	Full Range
• 08 11 13 - HM Frames (Ext)		TBD
• 08 11 13 - HM Frames (Interior)	BM Gray Owl 2137-60	(Light grey)
• 08 14 29 - Prefinished Wood Doors	To be selected from manufacturer's full range	
• 08 22 00 - FRP Doors	Edgewater FRP Door No. 06A	(Dark Bronze)
• 08 33 23 - OH Coiling Door	RAL 7022	(Med Bronze)
• 08 43 13 - Al framed SF	Kawneer Med Bronze	(Med Bronze)
• 08 71 00 - Door Hardware	Chrome	(Silver)
• 08 91 19 - Fixed Louvers	To be selected from manufacturer's full range	
• 09 29 00 - Gypsum Board(Walls)		
• 09 29 00 - Gypsum Board(Ceilings)		(White)
• 09 31 13 - Ceramic Tile Floor (FT01)	Daltile, Keystones, D208 Suede Gray Speckled, 2" x 2"	(Gray)
• 09 31 13 - Ceramic Tile Wall (WT01)	American Olean, Urban Canvas, Matte, Designer White, 0061, 4 ¼" x 8 ½"	(White)
• 09 31 13 - Grout (Floors)	Laticrete, Sterling Silver 78	(Gray)
• 09 31 13 - Grout (Walls)	Laticrete, Sterling Silver 78	(Gray)
• 09 65 00 - Rubber Base (RB01)	Johnsonite, Burnt Umber	(Dark Gray)
• 09 68 18 - Modular Flooring (CP01)	J&J Kinetex, Strata, 1852 Sediment	(Dark Gray)
• 09 68 18 - Modular Flooring (CP02)	J&J Kinetex, Timber, 1923 Aspen	(Dark Gray)
• 09 68 18 - Modular Flooring (CP03)	J&J Incognito Modular, 1837 Operative	(Dark Gray)
• 09 90 00 - Paints (PT01)	Interior Typical – BM Gray Owl 2137-60	(Light Grey)
• 09 90 00 – Paints (PT02)	Interior Accent – BM Wolf Gray 2127-40	(Blue)
• 09 90 00 – Conc. Floors		(Clear)
• 10 11 00 - Tackboard	Claridge-Cork	(TBD)
• 10 14 00 - Specialty Signs (Int-border) ASI Sign		(TBD)
• 10 14 00 - Specialty Signs (Int-background) ASI Sign		(TBD)
• 10 14 00 - Specialty Signs (Int-copy) ASI Sign		(TBD)
• 10 26 13 - Corner Guards / Chairrail	To be selected from manufacturer's full range	
• 10 56 13 - Met Stor Shelves	To be selected from manufacturer's full range	
• 10 56 15 - HD Met Stor Shelves	To be selected from manufacturer's full range	
• 10 73 16 - Canopies	Mapes Med Bronze	(Med Bronze)
• 11 31 15 - Appliances (Range)	GE Stainless steel	
• 11 31 15 - Appliances (Microwave)	GE Stainless steel	(Silver)
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- 11 31 15 - Appliances (Refrigerator) GE Stainless steel (Silver)
- 12 21 13 - Horiz Lvr Blinds (Windows) Selected from manufacturer's full range
- 12 36 65 - Quartz Agg. Countertops (QZ01) Caesarstone, 4003 Sleek Concrete (Gray)
- 12 36 65 - Quartz Agg. Countertops (QZ02) Zodiaq, Storm Grey (Gray)
- 13 34 19 - Roof Panels Ceco Med Bronze (Med Bronze)
- 13 34 19 - Wall Panels Metalspan Brownstone (Brown)
- 13 34 19 - Trim, Gutters, & DS Ceco Med Bronze (Med Bronze)
- 13 34 19 - Rigid Frame & Misc stl PPG 1023-5 Stone Gray (Dark Brown)

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

1.1 SUMMARY

- A. Section Includes: Thin-set ceramic glazed mosaic floor tile, glass mosaic wall tile, special shapes 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 selections).
 - 3. Section 09 29 00 - Gypsum Board (for cement based backer board).

1.2 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.

1.3 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.

1.4 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.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver packaged materials and store in original containers with seals unbroken and labels intact until time of use, in accordance with manufacturer's directions.

1.6 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

2.1 ACCEPTABLE MANUFACTURERS

- A. Equivalent tile products by the following manufacturers are acceptable:
 - 1. American Olean Tile Company, Lansdale, Pennsylvania.
 - 2. Bliss Glass & Stone.
 - 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.

2.2 MATERIALS

- A. General: Comply with ANSI standard referenced with products and materials indicated for setting and grouting. Refer to material schedule for basis-of-design.
- B. Ceramic Floor Tile: 2 inches by 2 inches by 1/4 inch, unglazed, color to be selected from standard colors available.
- C. Glazed Wall Tile (Field): Size 2 1/8 inches by 8 1/2 inches by 5/16 inch, bright glaze, colors to be selected from standard colors available..
 - 1. Internal and Exterior Corners: Field-butted square, except use square corner, combination angle and stretcher type cap.
- D. Granite 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 shall be black with minimal veining.

- E. 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.
- F. 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.
- G. 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 from manufacturer's full range.
- H. Accessories: Use an L shaped, slim line profile made of aluminum.
 - 1. Equivalent products by Blanke Corp are acceptable.
 - 2. Color to be brushed chrome anodized aluminum or equivalent.

PART 3 - EXECUTION

3.1 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.

3.2 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.

3.3 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. Ceramic Mosaic Tile: 1/16 inch.
 2. Quarry Tile: 1/4 inch.
 3. Paver Tile: 1/4 inch.
 4. Glazed Wall Tile: 1/16 inch.
 5. Decorative Thin 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.
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- 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.

3.4 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

1.1 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 09 29 00 – Gypsum Board.
- 2. Division 23 for Mechanical Requirements.
- 3. Division 26 for Electrical Requirements.

1.2 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.

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Evaluation reports.
- C. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 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.

1.6 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.

1.7 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.

1.8 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

2.1 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.

2.2 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.

2.3 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.

2.4 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.

2.5 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

3.1 COORDINATION

- A. Mechanical and electrical work above suspended ceiling shall be strictly coordinated with the work in this Section.

3.2 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.

3.3 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.

3.4 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.
- 3.5 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 13

RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Resilient wall base, and accessories.
- B. Related Sections:
 - 1. 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 product and accessories indicated.
- B. Samples: Full-size units by 6" long of each color of resilient wall base required.

1.03 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.04 QUALITY ASSURANCE

- A. Wherever possible, provide resilient wall base, 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.
- C. Fire- Test-Response Characteristics:
 - 1. As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 2. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.05 PROJECT CONDITIONS

- A. Continuously heat areas to receive resilient wall base 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 manufacturer but not less than 48 hours.
 - 2. Maintain a minimum lighting level of 50 fc during installation.
 - 3. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

- A. Drawings and Specifications are based on products manufactured by Mannington Commercial, P.O. Box 12281, 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. Azrock Commercial Flooring, Florence, AL. Tel. No. (800) 558-2240.
 - 3. Flexco, Inc. Tuscumbia, AL. Tel. (800) 633-3151.
 - 4. Johnsonite, Chagrin Falls, OH. Tel. No. (800) 899-8916.
- 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 RESILIENT BASE

- 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 as available.
 - 1. Size: Resilient Wall Base shall be 4 inches high, 0.125-inch gage, length 120 feet, standard top-set cove.
 - 2. Color: As selected by Architect from full range of colors.

2.03 ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION**3.01 EXAMINATION**

- A. Installer shall examine the areas and conditions under which resilient wall base 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. Acclimate wall base and accessories to job site conditions for at least 48 hours prior to installation

- B. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- C. Immediately before installation, clean substrates to be covered by resilient wall base.

3.03 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.

3.04 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient wall base.
- B. Cleaning: Remove excess adhesive or other surface blemishes, using neutral type cleaners as recommended by resilient wall base manufacturer.
- C. Protection: Protect installed resilient wall base from damage by covering with protection paper.

END OF SECTION

SECTION 09 68 18 TEXTILE COMPOSITE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Textile composite flooring modules as shown on the drawings and schedules and as indicated by the requirements of this section.

1.2 RELATED SECTIONS

- A. Division 3 Concrete - not included work this section.
- B. Division 7 Thermal and Moisture Protection - not included work this section.

1.3 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

1.4 SUBMITTALS

- A. Submit to Architect and/or Owner two (2) 6.5" x 6.5" (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 1.3 G

1.5 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.

1.6 SUBSTITUTIONS

- A. Comply with Project Manual Section 01 25 00 – Substitution Procedures and Section 01 60 00 – Product Requirements..

PART 2 PRODUCTS

2.1 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

2.2 FLOORING MATERIALS

- A. Kinetex flooring modules (tiles) CP01:
1. Product: Strata Plank 1826
 2. Color: Sediment 1852
 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" x 36" (approx. (45.72cm x 45.72 cm)
 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% recycled content
16. NSF/ANSI 140 Platinum Certified
17. Closed-loop recyclable

B. Kinetex flooring modules (tiles) CP02:

1. Product: Strata Plank 1825
2. Color: Aspen 1923
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: 12" x 48" (approx. 30.48 cm x 30.48 cm)
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% 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: Operative 1837
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: 29 oz./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" x 24" (approx. (60.96cm x 60.96 cm)
- 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

2.3 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

2.4 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

3.1 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).

3.2 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.

3.3 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" x 1/32" x 1/32" U- notched trowel or applied using a 3/8" 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 x 1/16 x 1/16 "U" or "V" notch trowel or spread using a 3/8" 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.

3.4 INSTALLATION OF ACCESSORIES

- A. Install accessories as required by drawings and per manufacturer's specifications.

3.5 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

1.1 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.

1.2 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.

1.3 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.

1.4 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.

1.5 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.

1.6 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.

1.7 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

2.1 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.

2.2 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.

2.3 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

3.1 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.

3.2 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 contaminates 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.

3.3 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.

3.4 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.

3.5 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.

3.6 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.

3.7 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 and steel stairs and handrails)
 - 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
 - a. Prime Coat: #068 Moore's Hi-build Acrylic Masonry Primer
 - b. Topcoat: #056 Moorlastic Elastomeric Waterproofing Coating
(Comply with manufacturer's instructions for coverage and uniform color.)
 - 4. Exterior Concrete Stairs
 - a. Prime Coat: TuffCrete Solvent Acrylic Concrete Stain and Waterproofing Sealer
 - b. Topcoat: TuffCrete Solvent Acrylic Concrete Stain and Waterproofing Sealer
- 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 and steel stairs and handrails)
 - 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
 - a. Prime Coat: F/C #697 100 % Acrylic Latex Bonding Primer (1.7 mils DFT)
 - b. Intermediate Coat: F/C #200 Line 100% Acrylic Latex Flat (1.9 mils DFT)
 - c. Topcoat: F/C #200 Line 100% Acrylic Latex Flat (1.9 mils DFT)
 4. Exterior Concrete Stairs
 - a. Prime Coat: F/C #7500 Porch & Patio Satin Enamel (1.5 mils DFT)
 - b. Topcoat: F/C #7500 Porch & Patio Satin Enamel (1.5 mils DFT)
- 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 and steel stairs and handrails)
 - 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
 - a. Prime Coat: PPG Perma Crete High Build 100% Acrylic Primer, 4-2 Series (2.6-3.2 mils dry)
 - b. Topcoat: PPG Perma Crete High Build 100% Acrylic Topcoat, 4-22 Series (3.2-5.8 mils dry) OR PPG Perma Crete Acrylic Texture Coating, 4-50 Fine Texture (6.8-9.3 mils dry)
 4. Exterior Concrete Stairs
 - a. Prime Coat: PPG Perma Crete Color Seal WB Acrylic Concrete Stain, 4-4210.
 - b. Topcoat: PPG Perma Crete Color Seal WB Acrylic Concrete Stain, 4-4210.; Anti-slip additive to the topcoat. Note-New concrete must be etched prior to application.
- 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
 - a. Prime Coat: Rust-Oleum Zinsser Water Tite Flexible Primer & Finish, (5-6 mils dry)
 - b. Topcoat: Rust-Oleum Zinsser Water Tite Flexible Primer & Finish (5-6 mils dry)

4. Exterior Concrete Stairs
 - a. Prime Coat: Rust-Oleum Semi Transparent Concrete Stain Water Based
 - b. Topcoat: Rust-Oleum Semi Transparent Concrete Stain Water Based; Slip Resistant Additive to the topcoat. Note-New concrete must be etched prior to application.
- 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
 - a. Prime Coat: S-W Loxon® XP Waterproofing, A24 Series (6.4-8.3 mils dry)
 - b. Topcoat: S-W Loxon® XP Waterproofing, A24 Series (6.4-8.3 mils dry)
 4. Exterior Concrete Stairs
 - a. Prime Coat: H&C Concrete Stain Solid Color Water Based
 - b. Topcoat: H&C Concrete Stain Solid Color Water Based; H&C SharkGrip Slip Resistant Additive to the topcoat. Note-New concrete must be etched prior to application.

3.8 INTERIOR PAINTING SCHEDULE

- F. 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 (Epoxy)
 - a. Prime Coat: #253 Super Spec Latex Primer Undercoater
 - b. Intermediate Coat: #V341 Waterborne Epoxy
 - c. Topcoat: #V341 Waterborne Epoxy
 4. 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
 5. Gypsum Drywall (Under vinyl wall covering)
 - a. Prime Coat: #203 Universal Wall Grip Primer
 6. 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

7. 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
 8. 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
 9. Concrete Floor Sealer (Clear)
 - a. Prime Coat: TuffCrete Solvent Acrylic Stain Clear
 - b. Topcoat: TuffCrete Solvent Acrylic Stain Clear.
- G. 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 (Epoxy)
 - a. Prime Coat: F/C #380 Perfik-Seal Interior Latex Primer/Sealer (1.8mils DFT)
 - b. Intermediate Coat: F/C #1200WB Tuff-Boy 100% Acrylic Waterborne Epoxy (2.0 mils DFT)
 - c. (2.0 mils DFT)
 - d. Topcoat: F/C #1200WB Tuff-Boy 100% Acrylic Waterborne Epoxy (2.0 mils DFT)
 - e. (2.0 mils DFT)
 4. 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)
 5. Gypsum Drywall (Under vinyl wall covering)
 - a. Prime Coat: F/C #699 Waterborne 100% Acrylic Enamel Undercoater (1.6 mils DFT)
 6. 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)
 7. 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)

8. 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)
 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.
- H. 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 (Epoxy- in Lab)
 - a. Prime Coat: PPG Speedhide Interior Latex Primer, 6-2 Series (1.0 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. 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)
 5. Gypsum Drywall (Under vinyl wall covering)
 - a. Prime Coat: PPG Seal Grip Interior Acrylic Primer Finish, 17-951 (1.2 mils dry)
 6. 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)
 7. 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

8. 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)
 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.
- I. 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 (Epoxy- in Lab)
 - 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. 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)
 5. Gypsum Drywall (Under vinyl wall covering)
 - a. Prime Coat: Rust-Oleum Zinsser Shieldz Universal Wallcovering Primer (1.0-1.5 mils dry)
 6. 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)
 7. 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

8. 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)
 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. .
- J. 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 (Epoxy- in Lab)
 - 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/ B60V15 (2.5-3.0 mils dry)
 - c. Topcoat: S-W Waterbased Catalyzed Epoxy, B70W211/ B60V15 (2.5-3.0 mils dry)
 4. 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)
 5. Gypsum Drywall (Under vinyl wall covering)
 - a. Prime Coat: S-W Multi-Purpose Interior / Exterior Primer / Sealer, B51W450 (1.2 mils dry)
 6. 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)
 7. 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

8. 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)
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 units 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 # 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.
- 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. Informational and directional signage.
 - 3. Free standing Signage.
 - 4. 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 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. 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.
- B. Truss Emblem Signage (Exterior): Wall mounted, Helvetica Medium styles, size as shown on Drawings.

2.03 . 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. 4: 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 – TRUSS EMBLEM SIGNAGE

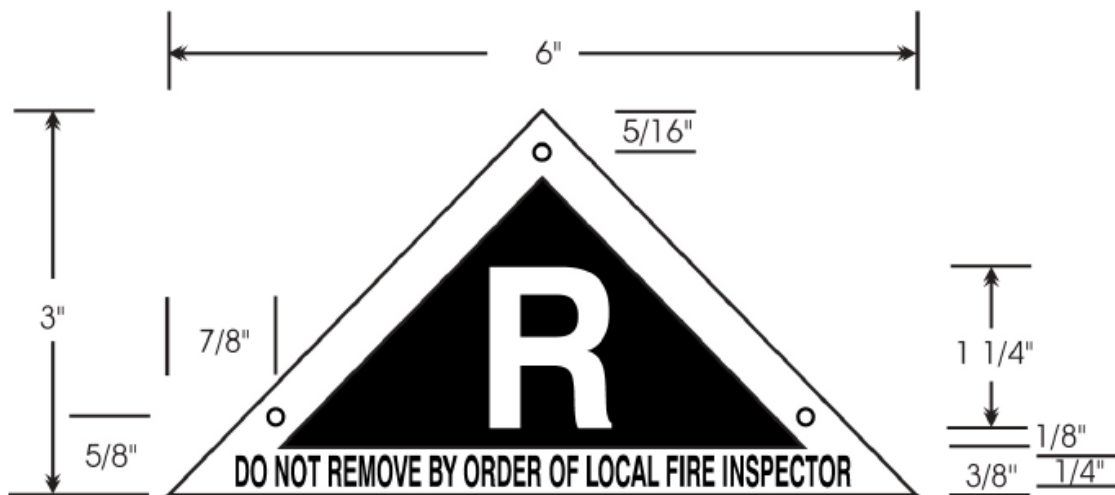
- A. Install signs using mounting methods indicated and according to manufacturer's written instructions.
- B. Permanently affix emblem to the exterior of the building to the left of the main entrance door at a height of 5'-0" above the finish floor or grade.
- C. Mounting Method-Through Fasteners: Drill 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.

3.05 SCHEDULES – INTERIOR SIGNAGE

- A. Sign Type No. 1: Offices, Single Occupant (4)
Break Room (1)
Parts Storage Room (1)
- B. Sign Type No. 2: Toilet Room (1 men's and 1 Ladies)
- C. Sign Type No. 3: Office (Parts Room)

3.06 SCHEDULES – EXTERIOR SIGNAGE

- A. Truss Emblem Signage:



END OF SECTION

SECTION 10 26 13 CORNER GUARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Vinyl / Acrylic surfaced mounted Corner Guards.

1.2 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.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.4 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

2.1 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

3.1 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

1.1 SUMMARY

A. Section Includes:

1. Mirrors
2. Toilet Paper Dispenser
3. Grab Bars
4. Paper Towel Dispenser
5. Clothes Hook
6. Mop Holder
7. Under Lavatory Guards (required where hot water line is exposed).

1.2 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.

1.3 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 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.

1.6 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.

1.7 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

2.1 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 polished plate glass, electrolytically plated mirrors with 1/2 inch stainless steel channel frame. Mirrors shall be 24 inches by 36 inches equal to Bradley model 780-2436. Locate at each toilet lavatory mounted in locations shown.
- C. Toilet Paper Dispenser: Provide recessed 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 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 and Broom Holsers: 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.

2.2 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

3.1 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.

3.2 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(s) equal to J.L. Industries stainless steel recessed type cabinet complying with ADA requirements. Provide Fire-FX option where located in a fire rated wall. 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 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(s) from damage until acceptance by Owner.

END OF SECTION

SECTION 10 44 16

FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Portable multi-purpose, dry-chemical and class K wet chemical fire extinguishers including cabinets, accessories and mounting brackets.

1.2 ACTION SUBMITTALS

- A. Product Data: Manufacturer's technical data and installation instructions for all portable fire extinguishers required.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.4 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

2.1 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.

2.2 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 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 Break Room.

2.3 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.

2.4 EXTINGUISHER CABINETS

- A. Equal to J.L. Industries Cosmopolitan 1032F17 with ADAC option. Provide Fire-FX option where located in a fire rated wall. 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 recessed model 2032F17 including ADAC option with flush pull handle. Provide Fire-FX option where located in a fire rated wall. Cabinet shall accommodate the Saturn 15 extinguisher. Provide black die-cut letters, vertical.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install items included in this section in locations and at mounting heights indicated, or if not indicated, at heights to comply with 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. A minimum of six units are required unless additional units are indicated otherwise on Drawings. Units shall be required within 20' of all Mechanical Rooms and exits. Type K units shall be required in Break Room.

END OF SECTION

SECTION 10 56 13

METAL STORAGE SHELVING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Metal storage shelving, Axle Racks 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: For (3 copies) 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, AXLE RACKS AND SAFETY CABINETS

- A. Metal Storage Shelving: Equal to Penco Products Closed Clipper Heavy Duty Steel Shelving Unit Model No. 1H8026, 36 inches wide, 36 inches deep, and 87 inches high with 6 shelves.
 - 1. Quantity: As show on Drawings in Parts Room a5.
- B. Axle Rack: Equal to Jarke Brand model CR-7, height 7 feet, arm length 16 inches, capacity per arm 1000 pounds, number of arms: 24, base length: 45 inches, capacity per unit: 24,000 pounds. Quantity required as indicated on the Drawings.
- C. 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.

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 56 15 HEAVY DUTY METAL STORAGE SHELVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Metal storage shelving as indicated on the Drawings.

1.2 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: For (3 copies) each exposed product.

PART 2 - PRODUCTS

2.1 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.

2.2 STORAGE SHELVING

- A. Shelving Unit: Heavy Duty Hi-Performance open type prefinished metal shelving complete with hardware and end kit. Equal to Penco Model No. 1H7095, 48 inches wide, 24 inches deep, and 87 inches high with 5 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.

PART 3 - EXECUTION

3.1 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 or floor as required so that units will not move or fall.

3.2 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 56 30

PALLET STORAGE SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Metal pallet storage system as shown on the Drawings.
- B. Related Sections: Section 09 05 15 – Color Design.

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: For (3 copies) each exposed product.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by Interlake Material Handling and Nashville Wire Products. Local supplier is MSC Industrial Supply Co., Jackson, MS. Tel. (800) 844-3971.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. C & H Distributors, LLC, Milwaukee, WI Tel. (800) 558-9966.
 - 2. Penco Products Inc., Oaks, PA. Tel. (610) 666-0500.
 - 3. Wireway / Husky, Denver, NC. Tel. (800) 438-5629.
- 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 PALLET STORAGE SYSTEM

- A. Pallet Rack Upright: Pre-finished metal columns and braces complete with required accessories and hardware, Product No. SF4-4814, 45,000 lbs. capacity, 14'-0" high, by 4'-0" deep.
- B. Pallet Rack Beam: Pre-finished metal beams complete with required accessories and hardware, Product No. 2SB5-120-248, 11,000 lbs. capacity, 10'-0" wide by 4'-0" deep.
- C. Pallet Supports for 5 inch Beams: Pre-finished metal supports complete with required accessories and hardware: Product No. SPEC-SCS5-48-C3, 1,700 lbs. capacity, 4'-0" deep.
- D. Welded Wire Decking: Galvanized metal welded wire decking complete with required accessories and hardware, 3100 lb capacity, 48 inches by 46 inches.

- E. 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.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install units plumb and level, in locations and with mountings as indicated or as directed by the Project Engineer.
- B. Securely attach all components together in accordance with manufacturer's installation instructions.
 - 1. Securely fasten units to adjacent units and to wall or floor as required so that units will not move or fall.
- C. Repair and refinish damaged products. Restore finishes so there is no evidence of corrective Work. Return items to shop that cannot be satisfactorily repaired or refinished in field, make required alterations and refinish entire unit, or provide new units, at Contractor's option.

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

1.1 SUMMARY

- A. Section Includes: Extruded aluminum wall-supported 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 19 – Metal Building Systems.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- 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 (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.

1.3 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

2.1 PERFORMANCE REQUIREMENTS

- A. Installed products shall comply with the 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.

2.2 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by Mapes Industries, Inc., 2929 Cornhuskers Hwy, Lincoln, NE 68504. Tel. (800) 228-2391.

- 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. Mason - Florida, LLC, Leesburg, FL. Tel. (877) 577-0300.
 - 4. Peachtree Protective Covers, Inc., Hiram, GA. Tel. (800) 341-3325.
- C. Substitutions shall fully comply with specified requirements and Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements.

2.3 MATERIALS

- A. Canopy sections shall consist of 3003-H14 or 5005-H14 roll-formed aluminum, combined with 6063-T6 extruded aluminum intermediate supports.
 - 1. Fasteners shall be stainless steel or cadmium plated as provided by the manufacturer.
- B. Roof deck shall be roll-formed interlocking self-flashing .032 inch thick aluminum of "W" profile.
 - 1. Deck sections shall be designed to the proper length to withstand the design load as determined by the local code.
 - 2. Deck width shall be 12 inches on center and 2-1/2 inches deep.
- C. Hanger rods shall be galvanized steel pipe with cast and cadmium-plated clevis and reducers at ends for attachment to the wall eyebolts and canopy decking.
- D. Water drainage shall be accomplished as a spill out on the front corners.

2.4 MANUFACTURED UNITS

- A. Equal to "Lumishade" all weather aluminum hangar rod canopy with roll-formed interlocking deck members and style "J", 1/8 inch thick by 8 inches high heavy extruded aluminum, fascia.

2.5 FINISHES

- A. Powder Coated Finish: Color to be selected by the Project Engineer / MDOT Architect from manufacturer's complete selection of standard colors. Refer to Section 09 05 15 – Color Design for color selected.

PART 3 - EXECUTION

3.1 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.

3.2 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.

3.3 CLEAN-UP

A. After work is complete, remove all waste materials and dispose of it 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 GS E23GSKSS 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 J VX5300SJSS, stainless steel, complete with 120V, 2.5 amp power/rating, convertible venting type with vertical exhaust and with optional damper accessory JXDA22, incandescent 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 ICE 1406A with IFQ2 water filter system by Ice-O-Matic. Power supply shall be 208-230/60/1. Ice Storage Bin Model B100 – 854 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 as per 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 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. Substitutions shall fully comply with specified requirements and 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 36 65 - QUARTZ AGGLOMERATE COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Quartz agglomerate countertops.
- 2. Quartz agglomerate backsplashes.

- B. Related Requirements:

- 1. Division 06 Sections for descriptions of carpentry work for supporting countertops in this section.

1.3 ACTION SUBMITTALS

- A. Product Data: For countertop materials.

- B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

- 1. Show locations and details of joints.
- 2. Show direction of directional pattern, if any.

- C. Samples for Initial Selection: For each type of material exposed to view.

- D. Samples for Verification: For the following products:

- 1. Countertop material, 6 inches square.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For quartz agglomerate countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

- B. Installer Qualifications: Fabricator of countertops.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.8 COORDINATION

- A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 – PRODUCTS

2.1 QUARTZ AGGLOMERATE COUNTERTOP MATERIALS

- A. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with ICPA SS-1, except for composition.

- 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Cambria.
 - b. E. I. du Pont de Nemours and Company.
 - c. Caesarstone.

- 2. Colors and Patterns: As indicated in material schedule.

2.2 COUNTERTOP FABRICATION

- A. Fabricate countertops according to quartz agglomerate manufacturer's written instructions and the AWI/AWMAC/WI's "Architectural Woodwork Standards."

- B. Configuration:

- 1. Front: Straight, slightly eased at top.
- 2. Backsplash: Straight, slightly eased at corner.
- 3. End Splash: Matching backsplash.

- C. Countertops: 3/4-inch-thick, quartz agglomerate with front edge built up with same material.

- D. Backsplashes: 3/4-inch-thick, quartz agglomerate.

- E. Fabricate tops with shop-applied edges and backsplashes unless otherwise indicated. Comply with quartz agglomerate manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

- 1. Fabricate with loose backsplashes for field assembly.

- F. Joints: Fabricate countertops without joints.

- G. Joints: Fabricate countertops in sections for joining in field.

- 1. Joint Locations: Not within 18 inches of a sink or cooktop and not where a countertop section less than 36 inches long would result, unless unavoidable.

H. Cutouts and Holes:

1. Undercounter Plumbing Fixtures: Make cutouts for fixtures using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
 - a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch into fixture opening.
 - b. Provide vertical edges, rounded to 3/8-inch radius at juncture of cutout edges with top surface of countertop, slightly eased at bottom, and projecting 3/16 inch into fixture opening.
 - c. Provide 3/4-inch full bullnose edges projecting 3/8 inch into fixture opening.
2. Counter-Mounted Cooktops: Prepare countertops in shop for field cutting openings for cooktops. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.

2.3 INSTALLATION MATERIALS

A. Adhesive: Product recommended by quartz agglomerate manufacturer.

1. Adhesives shall have a VOC content of 70 g/L or less.
2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers".

B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to receive quartz agglomerate countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.
- B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz agglomerate manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

- C. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- D. Secure countertops to subtops with adhesive according to quartz agglomerate manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz agglomerate manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
 - 1. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
- F. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. LWO-5001-51(008) 503006
- G. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Pre-drill holes for screws as recommended by manufacturer.
- H. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
 - 1. Seal edges of cutouts in particleboard subtops by saturating with varnish.
- I. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION

SECTION 13 34 19 METAL BUILDING SYSTEMS

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.
2. Exterior Walls: Insulated panels with vapor seal cavity and concealed clips attached to framing.
3. Roof system: Standing-seam roof with insulated panels, and concealed clips.
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."
- 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 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. Siding Panels: Provide panel layouts and details of edge conditions, joints, corners, custom profiles, supports, anchorage, trim, flashing, closures, and special details.
 - 3. 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 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 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer, with 5 years minimum experience, who specializes in erection of building similar to that required and is certified by the building manufacturer as qualified for erection of the manufacturer's products.
- B. Manufacturer's Qualifications: Provide buildings manufactured by a firm with 10 years experience in manufacturing buildings similar to those indicated. The manufacturer shall be IAS Accredited (Class MB).
- C. Welders' Qualifications: Qualify welding processes and welding operations in accordance with the AWS D1.1 "Structural Welding Code".
 - 1. Certify that each welder employed in unit of work of this section has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone re-certification.
 - 2. Testing for re-certification is Contractor's responsibility.

1.05 WARRANTIES

- A. Paint Finish: Paint finish shall have a 20-year guarantee against cracking, peeling and fade (Not to exceed 5 NBS vertical / 6 NBS non-vertical units per ASTM D2244-93).
- B. Weather Tightness: The entire installation (sub-framing, clips, panels, fasteners, rakes, eaves, ridge/valley flashing conditions, roof to wall conditions as well as all materials specified as supplied by the manufacturer) shall be guaranteed weather tight for a minimum of 20 YEARS. This warranty shall be identified as neither Non-Depreciating, Non-prorated nor have exclusions that identify, valleys, curbs, and flashings. 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. Warranty period begins at the Date of Completion as determined by MDOT.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and specifications are based on products manufactured by Ceco Building Division, P. O. Box 6500, Columbus, MS 39703. Tel. (662) 328-6722.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. ACI Building Systems, Inc., Batesville, MS Tel. 662-563-4574.
 - 2. Kirby Building Systems, Starkville, MS. Tel.: (662) 323-8021.
 - 3. MBCI, Hernando, MS. Tel. (800) 206-6224
 - 4. VP Buildings, Memphis, TN. Tel. (800) 238-3246.
- C. Substitutions shall fully comply with specified requirements and Section 01 62 14 - Product Options and Substitution Procedures.

2.02 METAL MATERIALS

- A. Hot-Rolled Structural Steel Shapes: ASTM A 36 or A 529.
- B. Steel Members Fabricated from Plate or Bar Stock: ASTM A 529, A 570, or A 572. Provide 42,000 psi minimum yield strength.
- C. Steel Members Fabricated by Cold Forming: ASTM A 607, Grade 50.
- D. Cold-Rolled Carbon Steel Sheet: ASTM A 366 or ASTM A 568.
- E. Hot-Rolled Carbon Steel Sheet: ASTM A 568 or ASTM A 569.
- F. Structural Quality Zinc-Coated (Galvanized) Steel Sheet: ASTM A 446 with G90 coating complying with ASTM A 525.
- G. Aluminum-Zinc Alloy Coated (Galvalume) Steel Sheet: ASTM A792.
- H. Aluminum Sheets: ASTM B 209 for Alclad alloy 3003 or 3004 temper required to suit forming operations.
- I. Bolts for Structural Framing: ASTM A 307 or ASTM A 325 as necessary for design loads and connection details.
- J. Mastic: Non-staining saturated vinyl polymer as recommended by panel manufacturer for sealing laps.

2.03 PAINT MATERIALS

- A. Comply with performance requirements of federal specifications indicated.
- B. Shop Primer for Ferrous Metal: Fast-curing, lead-free, universal primer. Comply with Federal Specification TT-P-645.
- C. Shop Primer for Galvanized Metal Surfaces: Zinc dust- zinc oxide primer. Comply with Federal Specification TT-P-641.

- D. Unpainted Galvalume: Unpainted Galvalume shall conform to ASTM A792-89 with a coating class of AZ- 55, chemically treated and lightly oiled. All 24 gage unpainted Galvalume used for roof applications shall be grade 80, except when used for trim it shall be grade 50B. All unpainted Galvalume 24-gage and thicker shall be grade 50B.
- E. Painted Galvalume: Galvalume used as a substrate for factory applied baked on paint shall conform to ASTM A792-89 with a coating class of AZ-50 or heavier, minimum spangle, chemically treated and lightly oiled, as specified by the coater. All painted Galvalume shall be grade 50B.
1. The paint system shall be applied as follows: Topcoat shall consist of a primer 0.20 - 0.25 mil thick and a top coat 0.70 - 0.80 mil thick, for total film thickness of 1.0 mil. The reverse coat shall consist of a primer 0.20 - 0.25 mil thick and a wash coat backer 0.30 - 0.40 mil thick, for a total film thickness of 0.50 - 0.65 mil.
 2. Finish system shall conform to all tests for adhesion, flexibility, and longevity as specified by the finish supplier.

2.04 STRUCTURAL FRAMING

- A. Rigid Frames: Factory welded, shop painted, built-up "I-beam" shape or open-web type consisting of tapered or parallel flange beams and STRAIGHT columns with attachment plates, bearing plates, and splice members. Factory drilled for field-bolted assembly. Provide length of span and spacing indicated.
- B. Primary End-wall Framing: Provide the following frame members fabricated for field-bolted assembly.
1. End-wall Columns: Shop-painted, built-up factory-welded "I"-shape or cold-formed "C" sections, fabricated from 14-gage (0.0747-inch) steel.
 2. End-wall Beams: Shop-painted "C"-shape roll-formed sections fabricated from 14-gage (0.0747-inch) steel.
- C. Secondary Framing: Provide the following:
1. Roof Purlins, Sidewall and Endwall Girts: 16 -gage (0.598-inch) shop-painted roll-formed steel "C" or "Z" sections. Fabricate purlin spacers from 14-gage cold-formed galvanized steel sections. Purlins to be 8 inches deep minimum. Girts to be 10 inches deep.
 2. Eave Struts: Unequal flange 16-gage (0.0598-inch) shop-painted roll-formed steel "C" sections formed to provide adequate backup for both wall and roof panels.
 3. Flange and Sag Bracing: 1-5/8 inch by 1-5/8 inch angles fabricated from 16-gage (0.0598-inch) shop-painted roll- formed steel.
 4. Base or Sill Angles: 14-gage (0.747-inch) cold-formed galvanized steel sections.
 5. Secondary endwall structural members, except columns and beams, shall be fabricated from 14-gage (0.0747-inch) shop-painted roll- formed steel.
- D. Wind Bracing: Provide portal beam wind bracing at rigid frame members. Use manufacturer's standard detail.
- E. 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.

- F. Extra Materials: 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.
- G. 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.

2.05 ROOFING AND SIDING PANELS

- A. Roof Panel: IBL (Insulated BattenLok®) Metal Roof Panel) formed as an insulated panel system with the following properties:
 - 1. Panel Thickness: 4 inches
 - 2. R-values by ASTM C518 at 40 degrees F: R = 31.8
 - 3. Panel Widths: 42 inches
 - 4. Panel Lengths: As indicated on Drawings.
 - 5. Insulation Material: Non-CFC foamed-in-place Polyurethane foam cured to achieve a minimum density of 2.0 pcf as determined by ASTM D 1622
 - 6. Joint Configuration: Concealed Clips
 - 7. Panel Exterior Face: 24 gage Galvalume®
 - 8. Panel Interior Face: 26 gage Galvalume®
 - 9. Exterior Profile: 2 inches high standing seam with a Mesa profile between seams
 - 9. Coatings: 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. Accessories: Fasteners, Sealants, Standard and Custom Trim as required for a complete system.
- B. Wall Panel: (CF Flute Insulated Metal Wall Panel) formed as an insulated panel system with the following properties:
 - 1. Panel Thickness: 2-1/2 inches
 - 2. R-values by ASTM C518 at 40 degrees F: R = 19.9
 - 3. Panel Widths: 42 inches
 - 4. Panel Lengths: As indicated on Drawings.
 - 5. Insulation Material: Non-CFC foamed-in-place Polyurethane foam cured to achieve a minimum density of 2.0 pcf as determined by ASTM D 1622
 - 6. Joint Configuration: Concealed Clips
 - 7. Panel Exterior Face: 26 gage Galvalume®
 - 8. Panel Interior Face: 26 gage Galvalume®
 - 9. Coatings: 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. Accessories: Fasteners, Sealants, Standard and Custom Trim as required for a complete system.

2.06 STRUCTURAL FRAMING

- A. Shop-fabricate framing components to indicated size and section with base plates, bearing plates, and other plates required for erection welded in place. Provide holes for anchoring or connections shop-drilled or punched to template dimensions.
- B. Shop Connections: Power-riveted, bolted, or welded shop connections.
- C. Field Connections: Provide bolted field connections.

2.07 FLASHING AND TRIM

- A. Flashing and trim shall be furnished at eaves, rake, corners, base, framed openings, and wherever necessary to seal against the weather and provide a finished appearance.
- B. Pipe flashing units shall be made of flexible rubber compound (EPDM or equal) formulated to provide maximum weathertightness. Unit shall be pre-molded to form a pipe collar. Bonded to base of collar shall be a 1/32 inch (plus or minus) thick, moldable aluminum ring. Pipe flashing shall be furnished with necessary sealant and screw fasteners to attach unit to roof panels and provide a weathertight assembly.

2.08 SHEET METAL ACCESSORIES

- A. Provide gutters formed in sections not less than 20 feet in length complete with required special pieces. Join sections with riveted and soldered or sealed joints. Provide required expansion joints with cover plate. Provide gutter supports spaced at maximum 48 inches on center, constructed of same metal as gutters. Provide aluminum wire ball strainers at each outlet. Gutters shall be, 26-gage, roll formed, galvanized steel, ASTM A653 with G90 coating and Kynar 500 (70 percent PVDF) finish. Color shall match roof fascia and rake. Gutters are box-shaped with face profile shaped to match rake trim.
- B. Provide downspouts formed in full-length sections complete with required special pieces. Downspouts shall be, 26-gage, roll formed (smooth, not corrugated), galvanized steel, ASTM A653 with G90 coating and Kynar 500 (70 percent PVDF) finish. Color shall match roof fascia and rake. Downspouts are rectangular-shaped and shall have a 45 degrees elbow at the bottom. Straps shall be spaced 5 feet on center maximum (minimum of 3 required per downspout) and be the same material and finish as downspout. Strap edges shall be rolled or smooth.
- C. Roof Curbs (for equipment) shall be prefabricated using minimum 18 gage AZ 55 prime galvalume steel, or heavier gage (as required). Fully mitered and welded corners. Integral base plates and water cricket or diverter. All welds prime painted after fabrication. Internally reinforced with steel angle on curbs on sides longer than 3'-0". Factory insulated curbs with 1-1/2 inches thick, 3 pounds density fiberglass insulation.
 - 1. Minimum height of curb shall be 8 inches above finished roof.
 - 2. Slope roof curb to match roof pitch and provide a level top

2.09 FASTENERS

- A. Wall and roof fasteners shall comply with manufacturer's recommendations for proper application and wind loads as required by code or AHJ.

PART 3 - EXECUTION

3.01 ERECTION

- A. Primary Framing: Erect framing required true to line, plumb, level, rigid, and secure. Level base plates to true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use non-shrinking grout to obtain uniform bearing and maintain level baseline elevation. Moist-cure grout for 7 days after placement.
- B. Purlins and Girts: Rake or gable purlins shall have tight-fitting closure channels and fascias. Locate and space girts to suit door and window arrangements and heights. Secure purlins and girts to structural framing and hold rigidly to straight line by sag rods.
- C. Bracing: Use movement-resisting frames in lieu of sidewall rod bracing. Rod bracing allowable in roof.
- D. Framed Openings: Provide shapes of design and size to reinforce openings and carry loads and vibrations imposed, including equipment furnished under mechanical and electrical Work. Securely attach to building structural frame.
- E. Siding: Arrange and nest sidelap joints so prevailing winds blow over, not into, lapped joints. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line. Protect factory finishes from damage.
- F. Field cutting of exterior panels by torch is not permitted.
- G. 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 with blind rivets, bolts or self-tapping screws. Fasten flashiness, trim around openings, and similar elements with self-tapping screws. Fasten window and door frames with machine screws or bolts. When building height requires two rows of panels at gable ends, align lap of gable panels over wall panels at eave height.
 - 2. Attach panels using manufacturer's standard Concealed clips and fasteners, spaced in accordance with approved Shop Drawings.
 - 3. 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.
 - 4. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.
- H. Sheet Metal Accessories: Install gutters, downspouts, and other accessories for positive anchorage to building and weathertight mounting. Adjust operating mechanism for precise operation.

- I. Roof Panels: 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. Coordinate with mechanical and electrical so that all penetrations through roof occur in flat portion of panel with sufficient space adjacent to penetration to be properly flashed and waterproofed.
 2. Attach panels using manufacturer's standard concealed clips and fasteners, spaced in accordance with approved Shop Drawings.
 3. Provide weatherseal under ridge cap. Flash and seal roof panels at eave and rake with rubber, neoprene, or other closures to exclude weather.
 4. Install sealants for preformed roofing panels as specified on Shop Drawings.
 5. Do not allow traffic on completed roof. If required, provide cushioned walk boards.
 6. Protect installed roof panels and trim from damage caused by adjacent construction until completion of installation.
 7. Remove and replace panels or components that 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 20 00 10 MECHANICAL GENERAL PROVISIONS**PART 1 - GENERAL****1.01 SCOPE**

A, Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.

1.02 MECHANICAL SPECIFICATION SECTION INDEX*Division 20 – Plumbing and HVAC General Provisions*

Section 200010 – Mechanical General Provisions
 Section 200020 – Basic Mechanical Requirements
 Section 200030 – Mechanical Submittals and Shop Drawings
 Section 200035 – Mechanical Systems and Equipment Warranties
 Section 200040 – Mechanical Close-out Requirements
 Section 200050 – Basic Mechanical Materials and Methods
 Section 200060 – Pipes and Pipe Fittings
 Section 200100 – Valves
 Section 200120 – Piping Specialties
 Section 200140 – Supports and Anchors
 Section 200190 – Mechanical Identification
 Section 200250 – Mechanical Insulation

Division 22 – Plumbing

Section 220430 – Plumbing Specialties
 Section 220440 – Plumbing Fixtures, Trim and Accessories
 Section 220450 – Domestic Water Heaters and Accessories

Division 23 – Heating, Ventilating and Air Conditioning (HVAC)

Section 230670 – Packaged Air Conditioners
 Section 230675 – Variable Refrigerant Flow/Volume Air Conditioners
 Section 230860 – Fans
 Section 230885 – Air Cleaning/Treatment
 Section 230890 – Ductwork
 Section 230910 – Ductwork Accessories
 Section 230980 – Controls and Instrumentation
 Section 230990 – Testing, Adjusting and Balancing

1.03 ABBREVIATIONS

A/E	ARCHITECT; ENGINEER AND OTHER PROFESSIONALS OF RECORD for this project
A.P.D.	Air Pressure Drop
A.S.A.P.	As Soon As Possible
CFH	Cubic Feet Per Hour
CFM	Cubic Feet Per Minute
CO ₂	Carbon Dioxide
E.A.T.	Entering Air Temperature

E/A	Exhaust Air
E.S.P.	External Static Pressure
FT.	Foot or Feet
F.F.E.C.	Food Facilities Equipment Contractor
HVAC	Heating, Ventilating and/or Air Conditioning
HP	Horsepower
i.e.	That is
in. w.g.	Inches Water Gauge
L.A.T.	Leaving Air Temperature
N.C.	Normally closed
N.O.	Normally open
O/A	Outside Air
p.p.m.	Parts per Million
PVC	Poly Vinyl Chloride
R/A	Return Air
S/A	Supply Air
S.P.	Static Pressure
s/s	Stainless Steel
T/A	Transfer Air
TAB	Testing, Adjusting and Balancing
T.S.P.	Total Static Pressure
UL	Underwriters Laboratories
VOC	Volatile Organic Compound
vs.	Versus
W.P.D.	Water Pressure Drop

1.04 DEFINITIONS

- A. ARCHITECT: Architectural Design firm or ARCHITECT OF RECORD, meaning general building designer whose professional seal appears on the majority of general construction Contract Documents, or their authorized representative.

- B. ENGINEER (ENGINEER-OF-RECORD): ENGINEER whose professional stamp appears on Contract Drawings, etc. In general, unless specifically denoted otherwise, ENGINEER-OF-RECORD in Division 20, 21, 22 and 23 Specification Sections denotes MECHANICAL ENGINEER-OF-RECORD.
- C. Exposed, or exposed to view: Those installations which can be seen, in whole or part.
- D. Finished Spaces: Inside the building extents.
- E. Inspect and/or Inspection: Utilized for the PROFESSIONAL'S construction period services and defines as "visits by the PROFESSIONAL to the Project at appropriate intervals during construction to become generally familiar with the progress and quality of the CONTRACTOR'S work and to determine if the work is proceeding in accordance with the Contract Documents."
- F. Outside: Synonymous with outdoors, outside of building, exposed to weather, etc.
- G. Plans: Denotes general Construction Drawings prepared by the A/E.
- H. PROFESSIONAL: Authorized representative of ENGINEER-OF-RECORD'S firm.
- I. Provide: Unless specifically denoted otherwise, the CONTRACTOR referred to shall be responsible for furnishing, providing, installing, connecting, and making item or system fully functional in a safe manner as recommended by the manufacturer and by Industry Standards.

1.05 APPLICABLE STANDARDS

- A. The intent is that the complete installation shall comply with applicable laws and ordinances, utility company regulations, and applicable requirements from the latest edition of the following:

ANSI	- American National Standard Institute
ASHRAE	- ASHRAE guides, Latest Editions
ASME	- American Society of Mechanical Engineers
ASTM	- American Society of Testing Materials
ICC	- International Code Congress
NFPA	- National Fire Protection Association
OSHA	- Occupational Safety and Health Administration
SMACNA Association	- Sheet Metal and Air Conditioning Contractors National Association
UL	- Underwriters Laboratories

City of Newton, Mississippi, Fire, Building, Gas, Plumbing and Mechanical Codes and Regulations, and governing authority having jurisdiction.
- B. Other applicable building, safety or fire codes having jurisdiction over equipment, materials or methods. The decision of the ENGINEER will be final in event of dispute over Code to use or its interpretation.

1.06 GENERAL CONDITIONS

- A. The General Conditions, Information to Bidders, Special Conditions, and other pertinent documents issued by the ARCHITECT are a part of these Specifications and shall be complied with in every respect.
- B. By the act of submitting a bid, this CONTRACTOR agrees that all of the Contract Documents and each of the divisions of the complete Specifications have been reviewed and studied, and all requirements and coordination resulting there from are included.
- C. This CONTRACTOR shall conform to standards prescribed by City, County, and State regulations or ordinances having jurisdiction. Any changes that may be necessary to conform to such regulations or ordinances shall be made by this CONTRACTOR without extra costs to the OWNER. Where code requirements are less than those shown on the Plans or in the Specifications, the Plans and Specifications shall be followed. Where applicable, NFPA requirements shall be met.
- D. The CONTRACTOR shall comply with all applicable provisions of the William-Steiger Occupational Safety and Health Act (O.S.H.A.).
- E. Permits required for the installation of the work, as well as all authorized code inspections, including all fees and assessments, shall be borne by and arranged for by the CONTRACTOR. The CONTRACTOR shall verify specific mechanical related provisions for permitting in advance, especially where additional design/installation documentation may be required, and include provisions and/or cost of same in this bid.
- F. This CONTRACTOR shall provide all items, articles, materials, operations or methods listed, mentioned, or scheduled on the Drawings and/or herein including all labor, materials, equipment and incidentals necessary, required or implied, for the completion of the various systems.

1.07 EXPLANATION AND PRECEDENCE OF DRAWINGS

- A. For purposes of clearness and legibility, Drawings are essentially diagrammatic and, although size and location of equipment are drawn to scale whenever possible, the CONTRACTOR shall make use of all data in the contract documents and shall verify this information at building site.
- B. Do not scale drawings having 1/4" or smaller scale. The Drawings indicate required size and points of termination of pipes and ducts, and suggest proper routes of pipe to conform to structure, avoid obstructions and preserve clearances. Because of small scale, it is not intended that Drawings indicate all necessary offsets, and it shall be the work of this Section to install work in such a manner as to conform to structure, avoid obstructions, preserve headroom and keep openings and passageways clear without further instruction or cost to the OWNER.
- C. It is intended that all apparatus be located symmetrically with architectural elements, and shall be installed at exact height and locations as shown on the Architectural Drawings.
- D. The CONTRACTOR shall be solely responsible for taking his own measurements and installing his work to suit conditions encountered.

1.08 SPECIAL CONDITIONS, MECHANICAL

- A. The right is reserved to move any element as much as ten (10') feet at no increase in cost provided CONTRACTOR is notified before work in question is fabricated or installed.
- B. The CONTRACTOR shall fully inform himself regarding any and all peculiarities and limitations of spaces available for the installation of all work and materials furnished and installed under the contract. He shall exercise due and particular caution to determine that all parts of his work are made quickly and easily accessible. The CONTRACTOR shall be guided by the architectural details and conditions existing at the job, correlating this work with that of the other trades, and report to the OWNER any discrepancies or interferences that are discovered. Failure to report such discrepancies and interferences shall result in the correcting of these errors or omissions by the CONTRACTOR at his own expense. All work which deviates from the Drawings and Specifications without prior approval of the OWNER, shall be altered by the CONTRACTOR at his own expense to comply with the Drawings and Specifications as directed.
- C. If equipment or fixtures to be furnished by OWNER and/or OWNER'S vendor are not delivered prior to final acceptance, services shall be capped or plugged at walls or floor as directed by ARCHITECT, ready for future connection.
- D. The CONTRACTOR shall coordinate his work with that of the OWNER, in order that there will be no delay in the proper installation and completion of the work. If, in the opinion of the OWNER, any piping, equipment, etc., has been improperly placed or installed due to lack of coordination with the other trades, such piping and equipment shall be relocated as directed by the OWNER at the CONTRACTOR'S expense.

1.09 SITE SAFETY

- A. CONSULTANT'S site responsibilities are limited solely to the activities of CONSULTANT and CONSULTANT'S employees on site. These responsibilities shall not be inferred by any party to mean that CONSULTANT has responsibility for site safety. Safety in, on, or about the site is the sole and exclusive responsibility of the CONTRACTOR alone. The CONTRACTOR'S methods of work performance, superintendence of the CONTRACTOR'S employees and sequencing of construction are also the sole and exclusive responsibilities of the CONTRACTOR alone. The CONTRACTOR shall, to the fullest extent permitted by law, waive any claim against CONSULTANT and his employees and indemnify, defend, and hold CONSULTANT harmless from any claim or liability for injury or loss arising from CONSULTANT'S alleged failure to exercise site safety responsibility. The CONTRACTOR also shall compensate CONSULTANT for any time spent or expenses incurred by CONSULTANT in defense of any such claim. Such compensation shall be based upon CONSULTANT'S prevailing fee schedule and expense reimbursement policy. The term "any claim" used in this provision means "any claim in contract, tort or statute alleging negligence, errors, omissions, strict liability, statutory liability, breach of contract, breach of warranty, negligent misrepresentation, or other acts giving rise to liability."

PART 2 – PRODUCTS – NOT USED**PART 3 – EXECUTION****3.01 WORKMANSHIP, MATERIALS AND EQUIPMENT**

- A. All work shall be performed in a workmanlike manner and shall present a neat and mechanical appearance when completed. All materials shall be of type, quality and minimum rating prescribed herein or indicated on the Contract Drawings.
- B. If equipment or fixtures to be furnished by OWNER and/or OWNER'S vendor are not delivered prior to final acceptance, services shall be capped or plugged at walls or floor as directed by ARCHITECT, ready for future connection.

3.02 CLEAN-UP

- A. Do not allow mechanical related waste material or rubbish to accumulate in or about job site.
- B. At completion of work, remove all rubbish, tools, scaffolding and surplus materials from and about building, leaving work clean and ready for use without further cleaning required. Clean all equipment, piping, valves, fixtures, and fittings of grease, metal cuttings, insulation cement, dust, dirt, paper labels, etc.
- C. Any discoloration or other damage to parts of building, its finish or furnishings due to failure to properly clean or keep clean mechanical systems shall be repaired without additional cost to OWNER.
- D. All equipment, fixtures and installations, especially where installations are exposed to view, shall be thoroughly cleaned, polished, seams smoothed and/or sealed for a neat appearance.

3.03 INSPECTION OF PROPOSED CONSTRUCTION

- A. Prior to submitting his bid, the CONTRACTOR shall visit the site of the proposed construction and shall thoroughly acquaint himself with existing utilities, working conditions to be encountered, etc. No additional compensation shall be allowed for conditions increasing the CONTRACTOR'S cost which were not known or appreciated by him when submitting his proposal if the condition was obvious and could have been discovered by him if he had visited the project site and thoroughly informed himself of all existing conditions which would affect his work, including requirements of local authorities to meet their procedures, special requirements, codes, etc.

3.04 TEMPORARY ENVIRONMENTAL CONDITIONING

- A. Temporary heating, cooling and dehumidification capability shall be provided for this project beginning a **minimum** of 90 days prior to the original contract scheduled substantial completion date and maintained until the OWNER'S final acceptance of the project, or any phase thereof. The beginning of this temporary HVAC period is intended to align with general industry standard construction practice of providing a minimum suitable indoor environment for the installation and curing of adhesives, finishes, wall covering(s), tile ceiling/floors, etc. It is highly dependent upon the CONTRACTOR's comprehensive project coordination and scheduling efforts and shall be lengthened (begun earlier) should the CONTRACTOR install such systems and/or finishes which are recommended by the system and/or finish manufacturer to be installed and/or maintained in a minimum environmental condition. This interior space conditioning, known hereafter as "temporary HVAC", includes all areas of the project where the space will be similarly conditioned with heating, cooling and/or dehumidification capability after the project or any portion/phase thereof is completed.

- B. During this minimal temporary HVAC period, the interior space shall be continuously monitored and controlled to provide the following:
1. maximum 85 degrees Fahrenheit dry bulb temperature.
 2. minimum 60 degrees Fahrenheit dry bulb temperature.
 3. maximum 60% relative humidity.
- C. In effect, automatic controls for refrigeration, dehumidification, and heating shall be provided such that the indoor building environment, as described above, can be continually maintained. If a system and/or finish manufacturer recommends a more stringent requirement for conditioning, same shall be provided.
- D. The CONTRACTOR shall coordinate such temporary provisions with the all trades and utility companies to accomplish this requirement including adequate temporary power to equipment, etc. All cost and coordination for these temporary HVAC provisions shall be the responsibility of the CONTRACTOR and included in his base bid.
- E. While operating the systems, the intent is to protect the installations from dirt, dust, debris, etc. such that at substantial completion the systems are new, clean and ready for the OWNER's beneficial use. The CONTRACTOR is responsible for protection of the WORK to meet the design intent identified herein. The following minimum requirements shall be met: The CONTRACTOR is responsible for protection of the WORK to meet the design intent identified herein. The following minimum requirements shall be met:
1. The exterior building envelope is complete including installation of all permanent doors, windows, walls, louvers, roof openings, etc.
 2. ALL interior and exterior dust generating activities and subsequent cleanup is complete and approved by the ARCHITECT. Examples of this are exterior sitework around the building, interior sheet rock installation/finishing, floor grinding, spray application of paints/sealers, etc.
 3. HVAC Systems shall have pleated air filters of types indicated in Section *Air Cleaning/Treatment* installed, monitored and periodically replaced when loaded.
 4. All R/A grilles and/or openings into ductwork/plenums are fully covered, and protected with filter material of types indicated in Section *Air Cleaning/Treatment*. These filters shall be continually monitored and periodically replaced when loaded.
 5. There is no reduction in specified equipment warranty, capacity, performance, or life of the equipment.
 6. HVAC equipment manufacturer's recommendations don't indicate construction practices and installations are harmful to systems, equipment, etc.
- D. If new HVAC equipment cannot be utilized for providing indoor environmental control during construction for finishes, etc., the CONTRACTOR shall arrange for other temporary HVAC capacity as required.
- E. If the CONTRACTOR fails to adhere to these guidelines for operation of the permanent building mechanical systems, corrective action by the CONTRACTOR will be required. Corrective action will be determined by the ENGINEER but may include any combination of the following:

1. Cleaning or Replacing Ductwork should it be found with visible dust/debris. A third-party testing/inspection representative may be required depending upon the extent of contamination.
 2. Replacement or Cleaning of Equipment should it be found with visible dust/debris/damage. The respective equipment manufacturer's representative will be required to inspect and make written recommendations as to the corrective actions necessary to return the equipment to like new conditions.
- F. The CONTRACTOR will be solely responsible for and include all cost associated with any required corrective actions.
- G. However, permanent HVAC equipment, as described above, shall be fully operational during the last 30 days of the temporary HVAC period such that system performance and controls can be tested, adjusted and balanced per Section *Testing, Adjusting and Balancing*.

3.05 EXISTING UTILITIES AND SERVICES

- A. When encountered in work, protect existing active sewer, water, gas, electric, other utility services, structures; where required for proper execution of work, relocate them as directed. If existing active services are not indicated, contact PROFESSIONAL for instructions.
- B. When encountered in work area, whether or not indicated, cap or plug or otherwise discontinue existing inactive sewer, water, gas, electric, other utility service structures, of which action should be taken. If removal is required, request instructions from PROFESSIONAL.
- C. While work is in progress, except for designated short intervals during which connections are to be made, continuity of service shall be maintained to all existing utilities and systems. Interruptions shall be scheduled and coordinated with ARCHITECT and OWNER and approved in advance with the OWNER and serving utilities. If requested, downtime shall be limited to weekends and/or night periods to least disrupt normal use of these utilities. The CONTRACTOR shall be responsible for any interruptions to service and shall promptly repair any damages to existing systems caused by his operations.
- D. The accuracy of the location of existing underground, and otherwise concealed, HVAC, domestic, fire protection, sanitary and storm drainage utilities is not guaranteed. The CONTRACTOR shall, early in the project, prior to demolition of existing work and layout of new work, verify all underground and concealed work in the proximity of connections to existing services and routings.
- E. Immediately upon commencing construction, and prior to construction of any part of the facility involved in any way with utilities, the CONTRACTOR shall investigate thoroughly the size, capacity, arrangement and location of all mechanically related utilities. The CONTRACTOR shall immediately report any discrepancies or apparent problem involving the project that pertains to utilities. This applies to private as well as public utilities. This CONTRACTOR shall coordinate and utilize the services of public and private "locators" to ascertain the whereabouts of all underground utilities in the area where work is to be performed.

END OF SECTION

SECTION 20 00 20 BASIC MECHANICAL REQUIREMENTS**PART 1 – GENERAL****1.01 SCOPE**

- A. Furnish all labor, materials, services, and equipment required to complete the installation of complete and acceptable mechanical systems in accordance with these specifications and the contract drawings.

1.02 TESTS

- A. This CONTRACTOR shall conduct such tests as required to determine that systems and equipment, which he installs, conform to Specifications. CONTRACTOR shall supply all labor, materials, instruments, operations, etc., required to facilitate testing.
- B. Gauges, thermostats, and instruments used in testing shall be accurate, recently calibrated and approved by the PROFESSIONAL prior to test. Instruments installed permanently in systems as specified herein may be used in testing when approved by the ENGINEER.

PART 2 – PRODUCTS – NOT USED**PART 3 – EXECUTION****3.01 MISCELLANEOUS WORK REQUIRED**

- A. The CONTRACTOR shall provide foundations for equipment, chases, furring, framed openings in wall, partitions, etc., installation of wall louvers and grilles in doors, finish painting and all other similar work of a general construction nature. All roof flashing by CONTRACTOR.
- B. The CONTRACTOR shall bring adequate power to and make final connections to all equipment furnished under this Contract.
- C. All items of labor, materials and equipment not specifically stated herein or on Contract Drawings to be by others are required to make the systems complete and operative, shall be by this CONTRACTOR.

3.02 PROTECTION OF EQUIPMENT AND MATERIALS

- A. Responsibility for care and protection of equipment and materials under this Contract rests with this CONTRACTOR until equipment or materials have been tested and accepted.
- B. All pipe ends, valves, ductwork and parts of equipment left unconnected, permanently or temporary, shall be capped, plugged or properly protected at the end of each working day to prevent entry of foreign matter. During the construction process, cover ductwork exposed to weather and/or when not yet installed, with sheet metal caps screwed in place and sealed.
- C. Store equipment, ductwork including pipe and valves, off the ground and under cover. For storage outdoors, minimum 6-mil thick plastic shall be fitted to withstand splattering, ground water, precipitation and wind.
- D. Protect air handling unit coils by use of protective sheet metal panels or plywood.

- E. Damaged equipment shall be repaired or replaced at the option of the PROFESSIONAL. Finishes and/or scratched paint on equipment, etc., shall be repaired and repainted to match new condition(s).
- F. Do not bring insulated equipment or ductwork to job site until same can be adequately protected from wind, rain and damage, etc. In general, store ductwork in building(s) not yet fully enclosed, off the ground and under minimum 6-mil plastic sheeting, etc. This includes dual wall spiral and interior lined rectangular ductwork, and other similar equipment with liners, controls, etc., not recommended to be exposed to wind and water, etc. Such ductwork and equipment found damaged and/or damp shall be immediately replaced and shall not be utilized for this project.
- G. This CONTRACTOR shall protect his work at all times from danger by freezing, breakage, dirt, foreign materials, etc., and shall replace all work so damaged. The CONTRACTOR shall use every precaution to protect the work of others, and he will be held responsible for all damage to other work caused by his work or through the neglect of his workmen.

3.03 INSTALLATION COORDINATION

- A. The mechanical plans do not give exact elevations or locations of lines, nor do they show all the offsets, control lines, or other installation details. The CONTRACTOR shall carefully lay out his work at the site to conform to the structural conditions, to provide proper grading of lines, to avoid all obstructions, to conform to details of installation supplied by the manufacturers of the equipment to be installed, and to thereby provide an integrated, coordinated and satisfactory operating installation. In general ductwork has the right-of-way.
- B. If the CONTRACTOR proposes to install equipment, including piping and ductwork requiring space conditions other than those shown, or to rearrange the equipment, he shall assume full responsibility for the rearrangement of the space and shall have the ARCHITECT review the change before proceeding with the work. The request for such changes shall be accomplished by Shop Drawings of the space in question.
- C. The CONTRACTOR shall so coordinate the work of the several various trades that it may be installed in the most direct and workmanlike manner without hindering the other trades. Piping interferences shall be handled by giving precedence to pipe lines, which require a stated grade for proper operation. For example, sewer lines and condensate piping shall take precedence over water lines in determination of elevations. Where there is interference between sewer lines and condensate lines, the sewer lines shall have precedence and provisions shall be made in the condensate lines for looping them around the sewer lines. In all cases, lines requiring a stated grade for their proper operation shall have precedence over electrical conduit and ductwork.
- D. Piping, equipment, or ductwork shall not be installed in electrical equipment rooms or elevator machine rooms except as serving only those rooms. Outside of electrical equipment rooms, do not run piping or ductwork, or locate equipment, with respect to switchboards, panel boards, power panels, motor control centers or dry type transformers:
 - 1. Within 42" in front (and rear if free standing) of equipment; or
 - 2. Within 36" of sides of equipment.
 - 3. Clearances apply vertically from floor to structure/ceiling.

3.04 INSTALLATION DIRECTIONS

- A. Obtain manufacturer's printed installation directions to aid in properly executing work on equipment requiring such directions. Submit such directions and installation details to PROFESSIONAL for approval prior to time of installation for use in supervising work. If the manufacturer's installation instructions or details conflict with the Contract Document requirements, CONTRACTOR shall promptly make PROFESSIONAL aware in writing and request clarification.

3.05 MECHANICAL VERIFICATION AND INSPECTIONS

- A. The CONTRACTOR shall coordinate, with the A/E with a minimum ten (10) days advance notice, the inspection of mechanical sub-systems for the following:

1. in-wall piping/ductwork
2. above ceiling piping/ductwork

These inspections shall be coordinated prior to wall and/or ceiling/attic insulation installation, (concealment) etc., such that these mechanical installations can be easily visually inspected by A/E for general conformance with Contract requirements. These installations shall not be concealed until such time the A/E indicates these mechanical installations are acceptable. If a re-inspection is required, an A/E revisit and a follow-up inspection shall be similarly coordinated with sufficient advance notice as approved by the A/E. Therefore, it is pertinent for the CONTRACTOR to inspect these type installations himself and verify that these installations are complete and in conformance with specified standards to minimize any time delays and/or coordination of construction sequencing, etc.

- B. The CONTRACTOR should note the following requirement for administering the punch list(s) and mechanical closeout documents associated with a substantial completion and/or final, etc.

In general, the punch list(s) will be furnished with blanks for the CONTRACTOR and/or his Sub-Contractor(s) to initial and date, adjacent to each item, for coordination and verification efforts. The completed punch list shall be transmitted to A/E to allow them to thereafter schedule a follow-up visit for re-inspection and verification. It is, therefore, prudent for the CONTRACTOR, to administer the overall process, and verify that all punch list items are complete and in compliance with Contract requirements, prior to requesting a follow-up A/E inspection effort.

- C. The CONTRACTOR shall be liable for inspections and further administrative involvement required of the A/E after 30 days of the original scheduled completion date, and for re-inspections and involvement by the A/E caused by the CONTRACTOR'S negligence and failure to fully complete punch lists and Closeout Documents when required and/or requested.

END OF SECTION

SECTION 20 00 30**MECHANICAL SUBMITTALS AND SHOP DRAWINGS****PART 1 – GENERAL****1.01 SUBMITTALS AND SHOP DRAWINGS**

- A. The submittal data to be furnished for this project shall comply with the Specifications and Contract Documents in their entirety.
- B. CONTRACTOR shall submit to the ARCHITECT/ENGINEER list of materials, fixtures and equipment to be utilized for this project.
- C. Failure to submit data for approval within specified time limits will result in the CONTRACTOR being required to furnish equipment as called for by name.
- D. Reproduction of design documents in any portion for use in a submittal is not acceptable.
- E. Whether or not the CONTRACTOR is utilizing the equipment as called for by name or not, does not relieve the CONTRACTOR of providing submittals. Submittals shall be required for all equipment as directed herein and as directed by the PROFESSIONAL.
- F. CONTRACTOR shall not delegate the authority to material supply houses to present data for approval. This shall be done by the CONTRACTOR.
- G. Materials/equipment not initially submitted, incomplete, or rejected shall be revised and re-submitted within twenty (20) days. The same format is required for all resubmitted data.
- H. All Submittals and Shop Drawings shall be thoroughly reviewed for general conformance with Contract Documents and with other crafts/trades.
- I. The CONTRACTOR shall verify with local governing authority and provide all additional documentation required to obtain permanent permit for this project. This shall include, but not limited to, plumbing, HVAC and fire protection risers, details, calculations, etc. Should an ENGINEER'S stamp or specific designer's credentials also be required on this supplemental design and/or installation documentation, the CONTRACTOR shall comply. The cost of all such extended documentation shall be considered a normal part of the shop drawing for installation coordination documentation, and the full cost of same shall be included in the CONTRACTOR'S base bid.
- J. CONTRACTOR's Selection of Materials and Equipment:
 - 1. Where a definite material or brand name is specified, it is not the intent to discriminate against any product of another manufacturer. Reference to a specific manufacturer's product by name, make or catalog number is intended to establish standards of quality, design, dimensions and appearance.
 - 2. Open competition is expected, but in all cases, complete data must be submitted on all proposed substitutions and samples shall be submitted for comparison and test when requested by the PROFESSIONAL. Burden of "proof of equality" lies solely with the CONTRACTOR.

3. The products of particular manufacturers have been used as the basis of design in preparation of these documents. It shall be the responsibility of this CONTRACTOR to ascertain if the submitted materials and equipment will fit into the space allotted as conveniently as the materials and equipment utilized as the basis of design. Furthermore, the CONTRACTOR shall verify and maintain adequate access to equipment, valves, filters, lubrication outlets, etc. Any changes to the building or system design necessary shall be arranged for in writing before the materials and equipment is ordered. All costs involved in making such changes shall be borne by the CONTRACTOR. If such changes are deemed inadvisable by the PROFESSIONAL, the CONTRACTOR shall install items specified even though materials and equipment had been previously approved. PROFESSIONAL'S approval of materials and equipment other than the basis of design is for performance only.
 4. When submitting materials and equipment other than the basis of design, the CONTRACTOR should note the following minimum considerations: (1) capacities shown are absolute minimum and must be equaled, (2) physical size limitation for space allotted, (3) static and dynamic weight limitation, (4) structural properties, (5) noise level, (6) vibration generation, (7) interchangeability, (8) accessibility for maintenance and replacement, (9) compatibility with other materials, assemblies, and (10) similar items shall be same manufacture and style whenever possible.
 5. The availability of service is of prime importance to the OWNER and was a major consideration in selecting the materials and equipment that are listed as the basis for design. The CONTRACTOR is advised, therefore, to exercise caution in accepting prices in the "or equal" clause in this specification. Competent service must not only be available, but must, in the case of specialty HVAC equipment and control systems, be a direct arm of the manufacturer. Further, the service agency, as a representative of this manufacturer, must have been in continuous operation in this area sufficient time to indicate a degree of permanence as required by the PROFESSIONAL.
 6. All material and equipment, for which a U.L. Standard, and AGA approval, or an ASME requirement is established, shall be so approved and labeled or stamped.
- K. Submittal format and information shall be provided as follows:
1. Submittals for HVAC and plumbing data shall be bound into separate volumes, but no more than two (2) volumes, with each volume containing one copy of all specified submittals.
 2. All submitted equipment must be identified with same "Mark Numbers" as identified on Drawings or in Specifications.

3. Reference to all pertinent data such as electrical characteristics and horse power, capacities, construction material of equipment, UL labels where required, accessories specified, manufacturer, make and model number, weights where specified, size and characteristics of the equipment, name of the project and a space large enough to accept an approval stamp.
4. The bound submittals shall be provided with an identification tab for each and every Specification Section that requires submittals. Each item in each tabbed section shall be identified with the paragraph number relating to the item submitted by the use of a cover sheet or by high lighting the paragraph on the first page concerning the item.
5. Any deviation from any part of the Contract Documents shall be clearly and completely highlighted.
6. Each and every submittal shall be stamped by the CONTRACTOR confirming that the submittals have been checked for compliance with the Contract Documents.

1.02 SAMPLES AND MOCK-UPS OF PROPOSED INSTALLATION

A. Samples:

1. The CONTRACTOR shall furnish samples of equipment, components, control devices, etc. as requested by the PROFESSIONAL.
2. These samples are intended to demonstrate quality of construction of proposed installation materials and/or equipment.
3. In general, each substitution request made by the CONTRACTOR will likely require a sample be furnished for review. However, in some cases, samples will be requested of specified equipment, components, control devices, etc. in order to demonstrate to the Owner the particular installations proposed.

PART 2 – PRODUCTS – NOT APPLICABLE

PART 3 – EXECUTION

3.01 SUBMITTALS AND SHOP DRAWINGS

The following list of materials and equipment shall be submitted to PROFESSIONAL for approval:

A. SUBMITTALS ARE REQUIRED FOR THE FOLLOWING WITHIN 30 DAYS AFTER PROJECT "NOTICE TO PROCEED":

SECTION 200060 - PIPE AND PIPE FITTINGS

Sanitary Waste and Vent Piping Fittings and Connections
 Condensate Drain Piping Fittings and Connections
 Domestic Water Piping Fittings and Connections
 Natural Gas Piping Fittings and Connections
 Refrigerant Piping Fittings and Connections
 Equipment Utility and Relief Drain Piping Fittings and Connections

SECTION 200100 – VALVES

Manual "Circuit-Setter" Balancing Valves
Ball Valves
Gas Valves
Check Valves

SECTION 200190 - MECHANICAL IDENTIFICATION

Piping Markers
Underground Tracer Identification Tape

SECTION 200250 - MECHANICAL INSULATION

Insulation for all piping applications
Insulation for all ductwork applications

SECTION 220430 - PLUMBING SPECIALTIES

Cleanouts
Floor Drains

SECTION 220440 - PLUMBING FIXTURES, TRIM & ACCESSORIES

Plumbing Fixtures and Trim
Carriers
Handicapped Drain/Water Supply Insulation Protectors
Hose Bibbs
Water Hammer Arrestors

SECTION 220450 - DOMESTIC WATER HEATERS AND ACCESSORIES

Water Heaters and Installation Accessories
Potable Water Expansion Tanks

SECTION 230670 - PACKAGED AIR CONDITIONERS

Packaged Units
Warranty Information

**SECTION 230675 - VARIABLE REFRIGERANT FLOW/VOLUME AIR
CONDITIONERS**

ROOF TOP UNITS

Variable Refrigerant Equipment
Variable Refrigerant Piping Shop Drawings

SECTION 230860 - FANS

All Fans, Construction, Accessories, and Finishes

SECTION 230885 – AIR CLEANING/TREATMENT

Air Filters for Construction Period and Spares for Permanent use.

SECTION 230890 - DUCTWORK

Round to Rectangular Duct Adapters (Bell mouth)
Fabric Duct

SECTION 230910 - DUCTWORK ACCESSORIES

Air Distribution Devices

- B. **SUBMITTALS ARE REQUIRED FOR THE FOLLOWING WITHIN 60 DAYS AFTER PROJECT "NOTICE TO PROCEED":**

SECTION 230980 - CONTROLS AND INSTRUMENTATION

Sensors/Controllers
Wiring Diagrams and Shop Drawings
Sequence of Operation

SECTION 230990 - TESTING, ADJUSTING AND BALANCING

Testing, Adjusting and Balancing Agency, Certification Credentials, Sample Forms, Instrument List with Calibration History.

- C. **SUBMITTALS, WITHIN 7 DAYS OF REQUEST FOR SUBSTANTIAL COMPLETION INSPECTION, ARE REQUIRED AS FOLLOWS:**

SECTION 230990 - TESTING, ADJUSTING AND BALANCING

TAB Report – Preliminary with certification of mechanical systems safety and operating controls.

END OF SECTION

SECTION 20 00 35**MECHANICAL SYSTEMS AND EQUIPMENT WARRANTIES****PART 1 – GENERAL****1.01 SCOPE**

- A. Furnish all labor, materials, services, and equipment warranties as outlined herein for mechanical systems and equipment.

1.02 GUARANTEE AND WARRANTY

- A. See *Division 01* for warranty start date.
- B. **INDUSTRY STANDARD GUARANTEE:**
See Architectural Specifications.
- C. **Test Period:**
Each piece of equipment shall meet performance specifications after three months' actual operation to OWNER'S satisfaction.
- D. **CONTRACTOR** shall replace, or make good, any defect due to faulty workmanship or material, which shall develop within one year from the beginning of the warranty period. This guaranty shall cover both material and labor. Leaking pipe work is considered faulty workmanship. This warranty shall include repair, removal of defective parts and installation of replacements. The **CONTRACTOR** shall also be responsible for property damage that results from defects in materials, improper controls or setup, and/or installation during the warranty period.
- E. For first year after the warranty begins, **CONTRACTOR** shall provide, at no cost to the **OWNER**, any required maintenance and service necessary to assure the proper operation of the installations and systems. Latent defects arising during this period shall, upon notification by the **OWNER**, be promptly corrected at no additional cost to the **OWNER**. This shall include:
1. Refrigerant and Oil Replacement in Refrigeration Systems: Leaking refrigerant systems shall be repaired, proved tight, and charged with manufacturer's recommended refrigerant and lubricant, within any standard warranty period.
 2. Any adjustments and service required, excluding filter monitoring and replacement.
 3. Any necessary adjustments in system control set points when required, excluding filter monitoring.
- F. The **CONTRACTOR** shall make inspections at end of 6th and 11th months after beginning of warranty related to the HVAC control system. During these inspections, the **CONTRACTOR** shall verify all control settings and recalibrate controls and sensors to match requirements as can be coordinated with **PROFESSIONAL** based on historical trend by data and to optimize system performance. Temperature and safety controls shall be adjusted as necessary to insure continuous, trouble free, safe, and automatic operation of systems including gas burner, refrigerating equipment, etc.

G. Extended Equipment Warranties**1. Definitions and General Requirements**

- a. Extended warranties, defined as a warranty after the standard one (1) year warranty.
- b. "Comprehensive" is defined as a complete warranty except for acts of God and negligent maintenance or operation of the specified equipment as required of the OWNER.
- c. All comprehensive equipment warranties shall include all parts, labor, shipping, postage, freight, handling fees, etc., to accomplish any repair and/or replacement at no additional cost to OWNER. These warranty provisions will be binding on any CONTRACTOR and/or supplier/manufacturer unless specifically approved otherwise in writing by OWNER.
- d. Lack of specific action on any manufacturer's, supplier, and/or CONTRACTOR submitted alternate warranty shall not be construed as approval of same and shall not void the manufacturer and/or CONTRACTOR'S contractual obligation to provide specified warranty.
- e. Third party insurance and/or split CONTRACTOR labor/manufacturer's equipment/material warranties shall not be acceptable. Only manufacturer's comprehensive warranties shall be acceptable.

2. Extended Warranties Required

- a. Section *Packaged Air Conditioners* – 4 years compressor parts only non-prorated.
- b. Section *Variable Refrigerant Flow/Volume Air Conditioners* – 4 years compressor parts only non-prorated.

PART 2 – PRODUCTS – NOT USED**PART 3 – EXECUTION****3.01 GUARANTEE AND WARRANTY**

- A. All certificates shall first be presented to the ARCHITECT for approval. After approval, copies of the certification(s) shall be forwarded to the OWNER by the CONTRACTOR.

END OF SECTION

SECTION 20 00 40 - MECHANICAL CLOSE-OUT REQUIREMENTS**PART 1 – GENERAL – NOT USED****PART 2 – PRODUCTS – NOT USED****PART 3 – EXECUTION****3.01 AS-BUILT DRAWINGS**

Project Record Documents and As-Built Drawings:

- A. Maintain at job site a set of contract record documents kept current by indicating thereon all changes, substitutions, etc., between work as specified and as installed.
- B. Show on record documents actual air quantities, water flow rates, valve or damper positions after balancing, etc.; also show, by actual dimension, location of all new and known existing underground work.
- C. At the completion of the project, furnish the OWNER three (3) set(s) of bluelines and three (3) complete, clean sets of specifications showing installed location, size, etc., of all work and material as taken from record documents. All as-built (on record) drawings shall be labeled "As-Built Drawings," dated and certified accurate by CONTRACTOR with his signature, on front page of all Drawing Blueline sets and Specifications.

3.02 OPERATION AND MAINTENANCE MANUALS

- A. Submit three (3) complete sets of bound brochures in 8-1/2"x11" spring post binders, indexed and tabled by equipment type (Air Handler, Plumbing Fixtures, etc.).
- B. Include in these brochures written submittal data, manufacturers operating and maintenance procedures and recommendations, spare parts lists and suppliers and any interlocking control or wiring diagrams for all equipment. The information listed herein is to be bound in the following order:
 - 1. First sheet to list ARCHITECT, ENGINEER, CONTRACTOR and Sub-Contractors with addresses for each.
 - 2. Second sheet to list type of equipment with sequential number, the manufacturer, make, model and serial number of the actual equipment nameplate data rated horsepower, full load rated amps, voltage and phase.
 - 3. Next, actual copy of approved submittal data including all manufacturers published information on capacities, capacity curves or tables, accessory and control item lists, and other pertinent information as requested by ENGINEER. Cross-reference all equipment to Contract Documents.
 - 4. Next, copy of all spare parts list and suppliers' contact information.

5. Next, include the manufacturer's published operating and maintenance procedures.
 - a. Include instructions to stop and start each piece of equipment including reference to controls and interlocks and an itemized maintenance schedule detailing procedure and interval of periodic maintenance items. Start this log of the maintenance list(s) by accomplishing the initial required maintenance procedure(s) for each and every maintenance item.
 - b. Operating instructions shall also include recommended periodic maintenance and seasonal changeover procedures, and suggested procedures in operation of all systems in this particular building to promote energy conservation. These instructions must be written expressly for this project and shall refer to equipment, valves, etc., by mark number from project schedules. Operating instructions and procedures shall be submitted in draft form, for approval prior to final issue of complete brochures. Manufacturer's advertising literature or catalogs will not be acceptable for operating and maintenance instructions. Bulletins shall be clearly marked for the equipment furnished. Where a bulletin contains more information than that for the installed equipment, such extended information shall be deleted by crossing it out or by stripping it from the bulletin.
6. All system operating instructions that were earlier approved by PROFESSIONAL and utilized for OWNER personnel education shall also be inserted herein.
- C. This bound information will require the PROFESSIONAL'S signed approval before this contract is complete. **No exceptions will be granted.**
- D. A copy of HVAC and Plumbing equipment, and sprinkler system operation and maintenance (O & M) Manufacturer's recommended brochures shall be transmitted to the TAB Agent within ninety (90) days after Notice to Proceed such that TAB Agent shall utilize same in preparation of Owner's Personnel Education/Agenda.
- E. The manuals shall be previously approved by the PROFESSIONAL and transmitted to the OWNER at least one week prior to the final inspection.

3.03 OWNER EDUCATION

- A. OWNER Representative Education and Operating and Maintenance instructions
 1. During the last phase of the project, the CONTRACTOR, in conjunction with the applicable SUB-CONTRACTORS shall coordinate and facilitate the start-up, Testing, Adjusting and Balancing, and subsequent OWNER'S representatives' education and instruction.
 2. The OWNER education shall be administered by the CONTRACTOR, with special instructions from equipment technical representatives, CONTRACTOR qualified representatives, etc.

- a. The instructions for the OWNER will include a complete walk-through of the facility, review of all mechanically related systems, and comprehensive education of the pertinent operating and maintenance requirements.
 - b. This shall include an overview of system components and descriptions, seasonal provisions/changes required, major valve location/function, safety provisions and concerns, normal operating and energy conservation techniques, actions to be taken with system failure or malfunction, start-up and shut-down instructions, reaction to fire and safety alarm annunciation, normal operating parameters, etc.
 - c. The education shall include all pertinent data from industry standards, minimal recommendations indicated herein and further as recommended by each manufacturer's O&M manuals.
 - d. All equipment and material suppliers will also be expected to participate. The CONTRACTOR shall schedule with the A/E and designated OWNER'S Representative(s).
 - e. Additional instruction and education sessions shall be provided subsequent to the initial session to provide additional instruction as required to fully educate the OWNER'S operators.
3. The CONTRACTOR shall submit to the PROFESSIONAL in draft form, an outline of the contents of this education, with agenda and list of pertinent personnel, a minimum of thirty (30) days prior to project completion date and scheduling said instruction with the OWNER and PROFESSIONAL.
 4. When the seminar and subsequent instruction periods are completed, CONTRACTOR shall furnish ARCHITECT a letter signed by the OWNER certifying that his representative(s) has received adequate instruction in operation of installed equipment and systems. This letter shall be furnished prior to final acceptance of this project.
- B. Some suggestions for pertinent subject matter to include in the administration of the education of OWNER'S operation and maintenance personnel, is as follows:
1. Nominal Split and Packaged Direct Expansion Cooling and Heating Systems:
 - a. Air filter size, monitoring and changeout (note that CONTRACTOR is to provide a schedule to OWNER, indicating all systems, filter grilles, etc., and matched sizes) and number of air filters.
 - b. Periodic bearing lubrication
 - c. Periodic belt monitoring and adjustment
 - d. Periodic evaporator and condenser coil inspection and cleaning
 - e. Periodic monitoring of refrigerant charge by (1) visual observation of site glass, and (2) discharge air temperature monitoring

- f. Normal temperature and fan controls setpoints for occupied and on occupied periods. (no lower than 65°F. during unoccupied periods)
 - g. Normal indoor humidity setpoints for all periods
 - h. Condensate drain periodic inspection and maintenance; including algaecide
 - i. Smoke detection and fire alarm interaction
2. Potable Water Heaters and Accessories:
- a. Normal setpoint and adjustment for water temperature from heater
 - b. Normal setpoint and seasonal adjustment for water temperature from mixing valve, along with safety/use instructions
 - c. Routine inspection of flue piping and discharge cap for soot build-up on gas fired hoods.
 - d. Function and periodic maintenance of T&P relief valve.
 - e. Function and periodic maintenance of anode rods.
 - f. Cleaning of filters and/or adjusting and maintaining tankless gas water heaters per manufacturer's recommendations.
3. Exhaust Fans:
- a. Periodic bearing lubrication
 - b. Periodic belt monitoring and adjustment
 - c. Periodic fan blade & grille inspection for excessive dust build-up, etc.
4. Controls:
- a. Describe setup and operation (including override functions) of programmable thermostats.
 - b. Calibration of sensors (temperature, humidity, etc.)
 - c. Describe purpose of duct smoke detection, HVAC unit shut-down, and remote smoke detector alarm panels and reset procedures.
5. General:
- a. Warranties: Explain the various warranties. Explain to OWNER his role during the warranty period(s), his limitations who he is to call when a problem tied to a warranty issue occurs, for both the one year standard warranty and extended warranties, etc.
 - b. Special tools and spare parts
 - c. Air filter spares

- d. Purpose of O & M Manuals (spare parts, O & M manufacturer's recommendations, trouble-shooting, etc.)
- e. Purpose of roof mounted hydrant.

3.04 CLOSEOUT DOCUMENTATION

- A. Seven (7) days prior to requesting a final inspection, the CONTRACTOR shall submit all O&M and closeout documentation to the ARCHITECT, to be turned over to the OWNER at the end of the project.
- B. The following checklist shall be utilized for compiling documentation and shall be included behind front cover of O&M manuals.
- C. CONTRACTOR shall initial and date each line item once completed and shall fax or email copy of the completed checklist to the PROFESSIONAL prior to final inspection request.

CLOSEOUT DOCUMENTATION CHECKLIST PLUMBING		
PROJECT NAME:		
INITIALS OF PERSON COMPLETING TASK	DATE TASK COMPLETED	DESCRIPTION OF CONTRACTOR'S SUBMITTAL
		Signed Letter Record of Owners Personnel O & M Education
		Plumbing Operation & Maintenance Manuals (3 each)
		As-Built Drawings with Contractor's Stamp (3 each)
		Potable Water Sanitation Report and Certification
		Pipe Test Log - Form in Section <i>Pipe and Pipe Fittings</i> to be comprehensively filled out.
		Keys to access doors per Section <i>Basic Mechanical Materials and Methods</i> (provide written receipts with Owner's acceptance).
		Keys to plumbing stops and hose bibb boxes per Section <i>Basic Mechanical Materials and Methods</i> and Section <i>Plumbing Fixtures, Trim and Accessories</i> (provide written receipts with Owner's acceptance).

CLOSEOUT DOCUMENTATION CHECKLIST MECHANICAL		
PROJECT NAME:		
INITIALS OF PERSON COMPLETING TASK	DATE TASK COMPLETED	DESCRIPTION OF CONTRACTOR'S SUBMITTAL
		Final TAB Report (3 each required)
		Signed Letter Record of Owners Personnel O & M Education
		Mechanical HVAC Operation & Maintenance Manuals (3 ea)
		As-Built Drawings with Contractor's Stamp (3 each)
		Extended Warranties: (See Section <i>Mechanical Systems and Equipment Warranties</i>)
		Provide list of all spare air filter sets per Section <i>Air Cleaning/Treatment</i> . List number, size, type and location/equipment match-up.
		Pipe Test Log - Form in Section <i>Pipe and Pipe Fittings</i> to be comprehensively filled out.
		Duct Test Log - Form in Section <i>Ductwork</i> to be comprehensively filled out.
		Keys to access doors per Section <i>Basic Mechanical Materials and Methods</i> (provide written receipts with Owner's acceptance).
		Keys to control panels and sensor/controller covers per Section <i>Basic Mechanical Materials and Methods</i> and Section <i>Controls and Instrumentation</i> (provide written receipts with Owner's acceptance).

END OF SECTION

SECTION 20 00 50 - BASIC MECHANICAL MATERIALS AND METHODS**PART 1 – GENERAL****1.01 SCOPE**

- A. Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.
- B. The requirements of this section apply to all sections of Division 20, 21, 22 and 23.
- C. Definitions:
 - 1. Exposed: Piping, ductwork, and equipment exposed to view in finished rooms, including mechanical and/or equipment rooms.
 - 2. Option or Optional: CONTRACTOR'S choice of an alternate material or method.

1.02 PRODUCTS CRITERIA

- A. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
- B. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
- C. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or otherwise permanently marked on each item of equipment.

1.03 FLAME SPREAD AND SMOKE DEVELOPED PROPERTIES OF MATERIALS

- A. Materials and adhesives used throughout the mechanical and electrical systems for insulation, and jackets or coverings of any kind, or for piping or conduit system components, shall have a flame spread rating not over 25 without evidence of continued combustion and with a smoke developed rating not higher than 50. If such materials are to be applied with adhesives, they shall be tested as applied with such adhesives, or the adhesives used shall have a flame spread rating not over 25 and a smoke developed rating not higher than 50. (Note: Materials need not meet these requirements where they are entirely located outside of a building and do not penetrate a wall or roof, and do not create an exposure hazard.)
- B. "Flame-Spread Rating" and "Smoke Developed Rating" shall be as determined by the "Method of Test of Surface Burning Characteristics of Building materials," NFPA No. 255, ASTM E84, Underwriter's Laboratories, Inc., Standard". Such materials are listed in the Underwriters' Laboratories, Inc., "Building Materials List" under the heading "Hazard Classification (Fire)".

1.04 HAZARDOUS MATERIALS

- A. No products shall be used that contain any known hazardous or carcinogenic materials. Products with asbestos or radioactive content shall not be used.
- B. Handling of any hazardous material is not covered in this specification Division.

1.05 EQUIPMENT FURNISHED BY OWNER

- A. The CONTRACTOR shall unload, uncrate, assemble, and connect any and all equipment shown on the Drawings or called out in the Specifications to be furnished by the OWNER for installation by the CONTRACTOR.
- B. The CONTRACTOR shall protect and take full charge of such equipment from the time the items are delivered to the job, set in place, connected, tested, adjusted, and placed into operation.

PART 2 – PRODUCTS

2.01 EQUIPMENT ACCESSORIES

- A. Provide removable guards to enclose all rotating or moving elements. Construct of galvanized steel to withstand 250 lbs. static load.
- B. Wall/Ceiling Access Doors
 - 1. Panels in non-rated applications shall be galvanized steel, 18-gauge frame, 16-gauge door with mounting accessories, piano hinges, screwdriver operated lock, and prime coat paint.
 - a. Acudor Model UF-5000 for acoustic tile or exposed masonry
 - b. Acudor Model PS-5030 for plaster finishes
 - c. Acudor Model UF-5000 (stainless steel) for ceramic or glazed structural tile.
 - 2. Panels in fire rated applications shall be painted steel type, 1 hour rated, piano hinged, exterior key lock, nominal size 24" x 36" at equipment installations as approved, Air Balance, Inc. - Model "F".

2.02 ROOF CURBS

- A. Curbs shall be constructed as required to hold top level. See detail on Drawings for more information on curb construction requirements.
- B. **All exposed roof mounted curbs and flashing shall be field and/or factory painted to match roof color.** (Color selection by ARCHITECT).
- C. Auxiliary supports under curbs shall be constructed as approved by ARCHITECT.

2.03 FIRE, SMOKE AND SOUND STOPPING

- A. UL listed penetration sleeve assembly and/or firestop that meets ASTM E-814 E119, and E84, as "3M" systems for the intended applications.
- B. All fire, smoke and sound stopping to be done by a separate licensed and certified Subcontractor as approved by Professional.

2.04 PIPE SLEEVES

- A. Galvanized sheet metal sleeves shall have lock seam joints and comply with the following minimum thickness:
 - 1. 24 Gauge for 3 inches and smaller.
 - 2. 22 Gauge for 4 inches to 6 inches inclusive.
 - 3. 20 Gauge for sizes over 6 inches.

- B. Galvanized steel sleeves shall be constructed from schedule 40 grade A53 pipe.
- C. PVC sleeves shall be constructed from solid core Schedule 40 PVC pipe.
- D. Water tight sleeves/seals shall be equal to "Link-Seal".

2.05 WALL, FLOOR, AND CEILING PLATES

- A. Chrome plated brass or chrome plated steel, one piece or split type with concealed hinge, with set screw for fastening to pipe, or sleeve.
- B. The thickness shall conform to the following requirements:
 - 1. Not less than 3/32-inch for floor plates.
 - 2. For wall and ceiling plates, not less than 0.025" for up to 3-inch pipe and 0.035" for larger pipe.
- C. All escutcheons shall be equal to Beacon, Caldwell or approved equal.

2.06 PROTECTIVE DRIP PANS

- A. Fabricate pans of 20-gauge galvanized sheet metal, stainless steel (if shown) or PVC, minimum two inches deep with rolled top edges.
- B. Solder all seams watertight, and cross brace pans to prevent sagging and warping.
- C. Provide dielectric union at copper pipe/galvanized pan connection point. Water heater drain pans shall have minimum one inch (1") drain outlet.

2.07 PAINTING OF MECHANICAL WORK

- A. See Division 09 for more information.

PART 3 – EXECUTION

3.01 EQUIPMENT ACCESSORIES

- A. Provide access panels, or doors, at concealed dampers, valves, vents, equipment, inspection points, etc., and where noted. Where ceiling is "lift out" construction, ceiling access panels are not required. Panels shall be 15" square, or larger as approved for service intended.
- B. CONTRACTOR shall provide substantial metal angle frame and support at all ceiling access doors.

3.02 ROOF CURBS

- A. All roof mounted equipment shall be furnished with a roof curb compatible with both the equipment configuration and roofing system. Curbs shall be installed level by either shimming or sloped curb construction. See detail on Drawings for more information on curb construction requirements.
- B. Provide auxiliary support under all roof mounted equipment under curb base and at all penetrations as approved by ARCHITECT.

3.03 FIRE, SMOKE AND SOUND STOPPING

- A. Fire and smoke stopping shall be provided and installed at all locations where mechanical Work passes thru rated assemblies. This includes all ductwork, piping and controls related conduit.

- B. Penetrations in “sound” walls shall be similarly acoustically sealed, both sides of wall with caulk or other approved material. New and existing walls extending to the roof/floor structure above are considered sound walls.

3.04 PIPE SLEEVES

- A. Pipe sleeves shall be constructed of galvanized sheet steel except where noted below or in individual work sections.
- B. Pipe sleeves shall be constructed of galvanized steel or schedule 40 PVC pipe when pipes are located within or passing through the following:
 - 1. concrete beams
 - 2. outside walls
 - 3. foundations
 - 4. footings
 - 5. waterproofed floors
 - 6. In locations where sleeve is extended above finished floor
- C. Where pipe motion due to expansion and contraction will occur, make sleeves of sufficient diameter to permit free movement of pipe.
- D. Where pipes are insulated, make sleeves of sufficient diameter to pass pipe insulations.
- E. Check floor and wall construction and finish to determine proper length of sleeves for various locations, make actual length to suit following:
 - 1. Terminate sleeve flush with walls, partitions, and ceilings.
 - 2. In areas where pipes are concealed as in chases, terminate sleeves flush with floor.
 - 3. In finished areas where pipes are exposed, extend sleeves 1/4" above finished floor except in kitchen, toilets, equipment rooms, and other areas where water may accumulate on floor, extend 1-1/2".
- F. Interior openings shall be caulked tight with fire, smoke or sound stopping material and sealant to prevent the spread of fire, smoke, and sound. Contractor shall coordinate specific requirements to ensure fire, smoke or sound ratings are maintained.
- G. For drilled penetrations in existing floors provide one inch angle rings set in silicone sealant and bolted to the floor in lieu of pipe sleeves with one inch extension above floor.
- H. Below grade exterior wall penetrations into habitable spaces, including crawlspaces shall include sleeves with water tight seals as “Link-Seal”.

3.05 WALL, FLOOR, AND CEILING PLATES

- A. Exposed piping passing through walls, floors and ceilings, shall be fitted with escutcheons.

- B. Inside diameter shall fit around insulation or around pipe when not insulated; outside diameter shall cover sleeve.
- C. Use plates that fit tight around insulation or pipes when not insulated.
- D. Plates shall cover openings around pipes/insulation and cover the entire pipe sleeve projection.

3.06 PROTECTIVE DRIP PANS

- A. Provide pitched drip pans where shown under all fluid conducting piping that is over electric switchgear, elevator controllers, busways or electric motor starters or as indicated. Pans shall extend minimum two inches beyond each side of the mechanical equipment, pipe or group of pipes being contained. Pans shall extend six inches beyond electrical equipment below.
- B. Pitch pans shall be routed to a drain connection with discharge piped utilizing $\frac{3}{4}$ " or larger of copper tube to the nearest available open drain or outside as directed by PROFESSIONAL. Open-end slices discharging to intercepting pans are not acceptable.
- C. Provide drip/overflow pans under water heaters, air conditioning equipment, pumps, etc., and where shown.

3.07 PAINTING OF MECHANICAL WORK

- A. All equipment shall present a clean painted appearance; touch-up or repair as required.
- B. All surfaces shall be properly prepared prior to painting. CONTRACTOR must contact PROFESSIONAL, such that all tests, installations etc., are approved prior to painting.
- C. The CONTRACTOR shall prime (where applicable) and paint the following mechanical related Work:
 - 1. New and modified piping outside and indoor exposed to view, including mechanical rooms, of the following types:
 - a. Natural Gas Piping
 - b. Domestic Water Piping
 - c. Sanitary Drain/Vent Piping
 - 2. All exposed ferrous metal non-galvanized hangers, auxiliary supports, braces, etc., in all locations.
 - 3. All exposed and exterior galvanized ductwork, plenums, access doors, and control conduit, fitting, boxes, etc.
 - 4. All insulated refrigerant piping, pumps, valve bodies, etc., where exposed to view outdoors.
 - 5. All new or modified fire hydrants, metal valve and metal box covers, post indicator valves, gas meter/regulators, and the like. This includes items provided and installed by others, and existing on site installations.

- D. Refer to Section *Mechanical Identification* for color-coding of piping, etc. All other metal structure and hangers to be color of adjacent finish.

3.08 WELDING

- A. Before any welding is performed submit a copy of the Welding Procedure Specification (WPS) together with the Procedure Qualification Record as required by Section IX of the ASME Boiler and Pressure Vessel Code for each and every welder intended for use on this project and with qualifications and certifications suitable for work classification intended.
1. Before any welder performs any welding, submit a copy of the Manufacturer's Record of Welder Operator Qualification Tests as required by Section IX of the ASME Boiler and Pressure Code. The letter or symbol (as shown on the qualification test form) shall be used to identify the work of that welder and shall be affixed, in accordance with appropriate construction code, to each completed weld. Submit certification according to Section *Mechanical Submittals and Shop Drawings* for each and every welder and welding associated with the project.
 2. The types and extent of non-destructive examinations required for pipe welds are shown in Table 146.4 of the Code of Pressure Piping ANSI/ASME B31.1.

3.09 TOOLS AND KEYS

- A. Furnish, and turn over to the OWNER, special tools not readily available commercially, that are required for disassembly or adjustment of equipment and machinery furnished.
- B. Provide OWNER, at end of project with spare keys to stops, hose bibbs, control cabinets, tamper-proof controls covers, etc. Provide the following spares, and label with function/locations:
1. Plumbing Stops - 8 keys
 2. Hose Bibbs - 8 keys
 3. Control Panels - 4 keys each panel
 4. Tamper-proof Controls Cover – 2 keys per cover
 5. Wall and Ceiling Access Doors – 2 keys per door

3.10 LUBRICATION

- A. During construction, all bearings and shafts shall be kept thoroughly greased and protected.
- B. After equipment has been operated seven days and before final acceptance, all bearings shall be inspected and filled to operating level with lubricant recommended by manufacturer. Tag each piece of equipment with cloth tag showing: proper type of lubricant, and period between lubrications, date of lubrication, and worker's initials. Have space for ten (10) lubrication notations.

3.11 WORK IN AND AT EXISTING BUILDING AND/OR BUILDING SITES

- A. Perform as described or shown on Contract Drawings, for relocation of existing equipment, alterations and restoration of existing building(s).

- B. As specified on Contract Drawings, make alterations to existing service piping at times that will least interfere with normal operation of the facility.
- C. It is important that CONTRACTOR thoroughly investigate existing conditions, utilities, services, finishes, sized, connections, etc., prior to bidding this project. The Designer's responsibility included only a cursory review of existing conditions and/or installations. It is the CONTRACTOR'S responsibility to coordinate a more thorough investigation and ascertain and confirm pertinent installation connections, etc., prior to his bid. This investigation shall be coordinated in a minimum seven (7) days advance of any published bid date such that the CONTRACTOR immediately thereafter can advise Designer in writing of any design discrepancies and/or changes required; otherwise, the CONTRACTOR shall be required to remedy any such peculiarities at his own expense and at no additional cost to the OWNER. It is the CONTRACTOR'S responsibility to verify existing size and/or location, etc., any time replacement and/or modifications to existing are included as a part of this project.
- D. Prior to excavation, investigation shall be made to the extent necessary to determine the location of existing underground services, structures and conflicts. Care should be exercised by the CONTRACTOR during excavation to avoid damage to existing structures.
- E. The CONTRACTOR shall be responsible for obtaining the services of an "Independent Locator" whose function shall include location and identification of all underground service wiring, piping, coax, fiber optics, etc. The CONTRACTOR shall make every effort to protect and avoid conflicts with existing installations. Damage caused to existing installation by CONTRACTOR, or his Sub-contractor, etc., shall be promptly remedied and put back into service, per serving utility requirements.
- F. When obstructions that are not shown on the Contract Drawings are encountered during the progress of work and interfere so that an alteration of the Drawings is required, the ENGINEER will alter the Drawings or order a deviation in line and grade or arrange for removal, relocation, or reconstruction of the obstructions.
- G. When crossing existing pipelines or other structures, alignment and grade shall be adjusted as necessary, with the approval of the PROFESSIONAL, to provide clearance as required by federal, state or local regulations or as deemed necessary by the ENGINEER to prevent future damage or contamination of either structure.

3.12 PROTECTION AND CLEANING

- A. Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations and as approved by the PROFESSIONAL. Damaged or defective items, in the opinion of the PROFESSIONAL, shall be replaced.
- B. Protect all finished parts of equipment, such as shafts and bearings where accessible, from rust prior to operation by means of protective grease coating and wrapping. Close pipe openings with caps or plugs during installation. Tightly cover and protect fixtures and equipment against dirt, water chemical, or mechanical injury. At completion of all work thoroughly clean fixtures, exposed materials and equipment.
- C. Do not store insulation materials in building until it is enclosed and dry. Wet insulation shall not be installed.

- D. Fixtures, piping, ducts, equipment, etc., shall be cleaned per manufacturer's printed instructions and PROFESSIONAL'S instructions.
- E. Piping shall be: (1) flushed with clean water, (2) "blown out" with steam or compressed air, or (3) "swabbed out" as required, except where specified otherwise. All temporary connections required for flushing shall be provided and subsequently removed by the CONTRACTOR. See Section *Pipe and Pipe Fittings* for further instructions.
- F. Before final building interior finish is applied:
 - 1. Interior of air handling equipment shall be thoroughly cleaned.
 - 2. Drain pans shall be cleaned and then flushed with water after which all fans will run with air filters in place, etc., for 24 hours.

3.13 CUTTING AND PATCHING

- A. Do not cut into any major structural element without written approval of the ARCHITECT.
- B. Cut required openings through existing masonry or reinforced concrete with diamond core drills. Use of pneumatic hammer type drills, impact type electric drills, and hand or manual hammer type drills, will be permitted only with approval of the ARCHITECT. Locate openings that will least affect structural slabs, columns, ribs or beams. Refer to the ARCHITECT for determination of proper design for openings through structural sections and opening layouts for approval prior to cutting or drilling into structure. After ARCHITECT'S approval, carefully cut openings through construction no larger than absolutely necessary for the required installation.
- C. Patching shall be (1) of quality equal to, and of appearance matching existing construction, and (2) shall restore all services and construction that remains in use, to its condition prior to this contract, unless otherwise noted.

3.14 FLASHING

- A. Where pipes, ducts, etc., pass through roof or walls, flash and caulk.
- B. Provide flashing or caulking as required at each opening through outside walls or roof. Flashing through roof of same materials and methods as under Moisture Protection Division; through walls shall be aluminum unless noted otherwise.

END OF SECTION

SECTION 20 00 60 - PIPES AND PIPE FITTINGS**PART 1 – GENERAL****1.01 SCOPE**

- A. Provide all material, equipment and labor, etc., required to complete installation specified and/or shown or scheduled on Contract Drawings.
- B. Work included: Pipes, fittings, unions, couplings, flanges, gaskets, and other materials and instructions.

1.02 PIPING SCHEDULE

- A. Piping systems for this project shall include the following:
 - 1. Sanitary Waste and Vent Piping.
 - 2. Condensate Drain Piping.
 - 3. Domestic Water Piping.
 - 4. Natural Gas Piping.
 - 5. Refrigerant Piping.
 - 6. Equipment Utility and Relief Drain Piping.

1.03 MANUFACTURER'S ASSISTANCE

- A. Manufacturer shall provide, if required, to the CONTRACTOR a factory trained service man to properly train CONTRACTOR'S personnel in all phases of installation.

PART 2 – PRODUCTS**2.01 PIPING MATERIALS**

- A. All piping installed on this project shall be new and of full weight and size indicated and of proper specification for service intended. Only domestic pipe may be used. Pipe and pipe fittings for the various systems shall be as follows:
 - 1. Sanitary Waste and Vent Piping.
 - a. Piping above and below slab on grade extending to five (5) feet outside building perimeter, shall be solid core Schedule 40 PVC with solvent weld joints and DWV fittings.
 - b. Sanitary waste piping below grade outside building shall be as specified in *Civil Division*.
- B. Condensate Drain Piping.
 - 1. Condensate drain piping routed indoors shall be solid core Schedule 40 PVC with solvent weld joints and DWV fittings.
 - 2. Piping exposed outside of building shall be Schedule 40 galvanized steel with threaded joints and fittings, or Schedule 40 PVC with solvent weld joints and fittings, paying close attention to spacing of piping supports in *Section Supports and Anchors*.

- C. Domestic Water Piping.
1. Piping above slab on grade inside building shall be Type "L" copper with 95/5 soldered joints or specialty piping systems such as "ProPress" by Viega. "T-drill" or "pulled" taps/outlets shall NOT be utilized; only full body fittings will be allowed.
 2. Piping below slab on grade and to a point ten (10) feet from building perimeter shall be Type "K" copper pipe with brazed joints. Note: There shall be no joints below slab on grade except at building entrance service on piping 2" and larger.
 3. Piping routed outside building below grade, shall be as specified in Section *Civil Division*.
- D. Natural Gas Piping
1. Piping above slab on grade and extending from meter or regulator shall be Schedule 40 black steel pipe complying with ANSI B36.10, ASTM A53 or ASTM A106 with class 150# Malleable iron or steel fittings. Joints in piping sizes 2" and smaller shall be screwed type. Joints in piping sizes 2 ½" and larger shall be welded with flanges at valves.
 2. Connections to gas-fired equipment, such as furnaces, shall include gas cock, drip leg and union and be rigid as detailed above.
- E. Refrigerant Piping
1. Piping shall be Type "L" ACR copper with brazed joints. All joints, fittings and piping shall be brazed connection type. No flared or compression piping accessories allowed except at equipment connections.
- F. Equipment Utility and Relief Drain Piping
1. Indoor water heater T & P, backflow preventer and miscellaneous equipment relief and drain piping shall be full size connection Type 'L' copper with solder joints.
 2. Piping exposed outside of building shall be Schedule 40 galvanized steel with threaded joints and fittings.

2.02 PIPE FITTINGS, UNIONS, FLANGES, AND GASKETS

- A. All fittings shall conform to pipe as to black steel, galvanized steel, copper, PVC or cast iron, etc. or as indicated. Fittings and accessories shall have equal or greater pressure rating than piping specified for particular application.
- B. Malleable steel fittings shall be minimum 150 psi class.
- C. Steel pipe unions shall be malleable iron having bronze-to-iron ground joints.
- D. Steel nipples shall be extra heavy type. All thread nipples prohibited. Provide a minimum of 1" of bare pipe between threaded ends of nipples.
- E. Flange bolts: Galvanized Alloy steel, ASTM #A-196, Galvanized GR. B-7; nuts' ASTM-#S-194, GR. 2-H; both hex head style.

- F. Flange gaskets serving piping below 250 degrees F shall be synthetic composition type; serving above 250 degrees F gaskets shall be corrugated metallic type. Utilize gasket suitable for service intended.
- G. Couplings, steel pipe malleable iron, Grade II.
- H. Provide factory made reducers and increasers, and nipples of comparable materials as the piping. The use of bushings is not acceptable to obtain reduction or increase in sizes.
- I. Galvanized steel pipe shall be assembled with galvanized screw fittings unless specifically indicated otherwise.

2.03 DIELECTRIC FITTINGS

- A. Provide where copper and ferrous metal are joined.
 - 1. 2 inch and less: Threaded dielectric union.
 - 2. 2-1/2 inch and larger: Flange union with dielectric gasket and bolt sleeves.
 - 3. Temperature Rating, degree F: 210 for water systems.

2.04 BEDDING AND BACKFILL MATERIALS

- A. Type S1 – Select Fill
 - 1. Material shall consist of select, non-organic, debris-free silty clays or sandy clays with no more than 55 percent fines passing a No. 200 sieve.
 - 2. The plasticity index shall be within the range of 8 to 20.
 - 3. The liquid limit shall be less than 40.
- B. Type S2 – Course Aggregate
 - 1. Material shall consist of washed stone free of shale, clay, friable material, sand and debris.
 - 2. The aggregate shall be graded in accordance with ANSI/ASTM C33, size number 467.
- C. Type S3 – Pea Gravel
 - 1. Material shall consist of natural stone free of shale, clay, friable material, sand and debris.
 - 2. The material shall be graded to be between a minimum of 1/4" and a maximum of 5/8" in size.
- D. Type S4 – Sand
 - 1. Material shall consist of natural river or bank sand, washed free of silt, clay, or organic matter, loam friable or soluble materials.
 - 2. The material shall be graded in accordance with ANSI/ASTM C33.
- E. Type S5 – Crushed Stone
 - 1. Crushed limestone, No. 610 gradation.

2.05 BEDDING AND BACKFILLING MATERIAL QUALITY CONTROL

- A. Tests and analysis of soil material shall be performed in accordance with ASTM D4318 or ASTM C136.
- B. Materials tested which do not meet the specified requirements shall be removed and replaced with acceptable material at no cost to Owner.
- C. Maximum dry density of the soil materials shall be determined by ASTM D698 and field density of in-place materials by ASTM D2922.

PART 3 – EXECUTION**3.01 PIPING INSTALLATION**

- A. General
 - 1. Arrange and install piping approximately as indicated, straight, plumb and as direct as possible; form right angles or parallel lines with building walls. Keep pipes close to walls, partitions, ceilings, offset only where necessary to follow walls as directed. Locate groups of pipes parallel to each other; space them at distance to permit applying full insulation and to permit access for servicing valves. The PROFESSIONAL reserves the right to require this CONTRACTOR to make minor changes in pipe locations where conflicts occur with other trades or equipment. Such changes shall be made without extra cost to OWNER.
 - 2. Install horizontal piping as high as possible without sags or humps. Grade drainage piping at uniform slope of $\frac{1}{8}$ " per foot minimum and maximum $\frac{1}{4}$ " per foot, or as noted. Where this is impossible, maintain slope as directed, but in no case less than $\frac{1}{16}$ " per foot. Pitch piping in direction of flow.
 - 3. When piping is cut, it shall be reamed with pipe reamer and all burrs, scale, trash and foreign matter removed. If any piping is found installed without being reamed, cleaned, deburred, etc., or in any way contrary to above, it shall be sufficient reason for related erected piping to be removed, inspected by the PROFESSIONAL, corrected and reinstalled, all at CONTRACTOR'S expense.
 - 4. Where size changes on horizontal lines, use reducing fittings; bushings are prohibited. On liquid lines have eccentricity down, hold the top level. On gas or vapor lines have eccentricity up, hold the bottom level.
 - 5. Sufficient space shall be allowed in erecting piping for proper application of thermal installations including fittings. In no case shall any insulation be cut or reduced thickness because of inadequate space.
 - 6. Offset equipment connections to allow valving off for maintenance and repair with minimal removal of piping.
 - 7. Locate valves for easy access and operation. Concealed valves shall be provided access doors. Do not locate any valves with stems below horizontal.

8. Install gauges, thermometers, valves and other devices with due regard for ease in reading or operating and maintaining said devices. Locate and position thermometers and gauges to be easily read by operator or staff standing on floor or walkway provided. Servicing shall not require dismantling adjacent equipment or pipe work.
 9. Furnish and install unions or mating flanges at all connections to each piece of equipment conveniently located to facilitate quick and easy disconnecting of equipment. Flanges or union connections shall be used on both sides of traps, control valves, pressure reducing valves and meters and the like.
- B. Steel Piping
1. Where piping is threaded, dies shall be clean and sharp. Threads shall conform to ANSUI B2.1; joint compound shall be applied to male threads only and joints made up so no more than three threads show. Coat exposed threads or steel pipe with joint compound and red lead paint for corrosion protection. The caulking of these joints will not be tolerated. Pipe joint compound must be approved by the PROFESSIONAL.
 2. Where welding is specified or done, it shall be by electric arc by mechanics skilled in operation and holding a test certificate acceptable to the ENGINEER. All scale and flux shall be removed from piping after welding. Welding, beveling, spacing and other details shall conform to ANSI B31.1.
- C. Plastic Piping
1. Utilize manufacturer's recommended solvent glue and purple pipe cleaning compound on all PVC or CPVC joints where specified. Install all fittings and joints as per manufacturer's recommendation.
 2. Install all underground plastic and fiberglass glass piping outside building perimeter with tracer identification tape (per Section *Mechanical Identification*) and minimum 12-gauge bare copper wire for future location reference.
- D. Copper Piping
1. Copper tubing shall be thoroughly reamed, cleaned with steel wool or emery cloth and a non-corrosive flux used before soldering or brazing.
 2. Copper tubing shall be thoroughly reamed and de-burred before joining with specialty piping systems such as Viega "Pro-Press".
 3. Where solder joints are specified, use solder having 95% tin and 5% antimony. Each roll of solder shall be clearly stamped as to grade and content.
 4. Where brazing joints are specified, use a brazing filler metals having a melting point above 1100 degrees F and containing at least 5% silver.
 5. Where copper tubing extends through concrete slab on grade, tubing shall have an "Armaflex" or "Rubatex" type.
 6. Provide PVC isolation wrap where copper pipe extends through masonry walls to connect plumbing fixtures or valves, etc.

- E. Refrigerant Piping
1. Braze joints in the presence of an inert gas.
 2. Verify pipe size and configuration and provide same based on HVAC equipment manufacturer's recommendation to provide scheduled capacity, performance and maximize equipment life.
 3. Refrigerant piping systems shall be installed in accordance with applicable chapters of the ASHRAE "Applications" handbook. Particular attention shall be given to suction gas, velocities and requirements for liquid sub-cooling.

3.02 PIPE EXPANSION

- A. In the installation of all pipe runs where shown or where necessary, install swing joints, flexible couplings, turns, expansion loop or long offsets to allow for expansion. Broken pipe or fittings due to rigid connections must be removed and replaced at no additional cost to the OWNER.
- B. All lines shall be securely anchored where required. Where such anchors occur, they shall be securely fastened to the steel or concrete structure of the building in a manner approved by the PROFESSIONAL. Drawings shall be submitted before installation.

3.03 ANCHORS

Plastic pipe shall be jointed to steel systems with flanges. Steel system shall be anchored within five (5') feet of connection point to eliminate any thrust, stress, or torque from steel system to fiberglass and/or plastic system.

3.04 THRUST BLOCKS

All changes in direction of fiberglass or plastic pressure systems for 2" and larger systems shall be encased in concrete (3000 psi) thrust blocks to provide anchor points for direct expansion and contraction.

3.05 TESTS

- A. Cooperation/Scheduling:

The ARCHITECT shall be notified no less than ninety-six (96) hours prior to any pipe test. The ARCHITECT shall also be notified in adequate time for an inspection of the test before the test is completed. The PRIME CONTRACTOR'S Superintendent shall be responsible for administering and witnessing all tests, log it for permanent record and transmit to ARCHITECT at completion of project. CONTRACTOR shall refer to and make additional copies of the "Pipe Test Log Form" at the end of this section to use as standard test log forms. The PRIME CONTRACTOR'S Superintendent shall keep this on-going log on jobsite and shall include the following:

1. Date of Test
2. Duct/Piping Description (EX: "Sanitary Sewer")
3. Location (EX: "Northwest Quadrant First Level")
4. Results (EX: "Held 10 ft. of head for eight hours without leakage", etc.)

- B. Tests shall be as follows: (New and Existing Modified Piping shall be tested and all leaks repaired)
1. Gravity Flow Sanitary Waste and Vent piping above and below slab: Minimum 10 feet static head and as required by ASA-A40.8 or local code, for a minimum period of four (4) hours, without discernable loss. All below grade piping and joints shall be clearly visible during test.
 2. Gravity Flow Condensate Drain piping above and below slab: Minimum 10 feet static head and as required by ASA-A40.8 or local code, for a minimum period of four (4) hours, without discernable loss. All below grade piping and joints shall be clearly visible during test.
 3. Water Piping: (Domestic and circulating systems) 125 psi hydrostatic or 100 psi air, in conjunction with manufacturer's recommendations, with no discernable pressure loss for a period of eight (8) hours. Potable water piping shall be pressurized with water or air during all phases of construction such that leaks can be promptly identified and remedied.
 4. Natural Gas Piping: All gas piping shall be tested at twice the operating pressure, but not less than 30 psig, with compressed air or nitrogen, with no discernable pressure loss, for a period of not less than eight (8) hours. Oxygen shall not be used. All factory coated and wrapped piping below grade to be tested and proven tight with Holiday Leak Detector. All new and/or modified piping shall be tested to a minimum of 1.5 times the operating pressure or a minimum of 3 psig, whichever is greater.
 5. Refrigerant piping: 450 psig nitrogen for 8 hour period. Test piping with all piping accessories such as charging valves and filter/driers in place, unless not recommended by equipment manufacturer's installation instructions. Refrigerant piping shall be left with minimum 60 psi pressure during all phases of construction such that leaks can be promptly identified and remedied.

3.06 SYSTEM CLEANING, TREATMENT AND PROTECTION

- A. Potable Water System: All new and modified existing potable water lines shall be thoroughly flushed and sterilized with a solution containing not less than 50 ppm available chlorine for eight (8) hours. During sterilization, operate all valves, faucets, etc., so that all portions of the system are reached. Flush system with clear water until concentration drops to 0.5 ppm. CONTRACTOR shall furnish sample to State Health Department attesting to satisfactory condition of water. Submit copy of test reports to ARCHITECT near end of project and prior to OWNER'S use of potable water distribution system.

3.07 BELOW GRADE PIPING INSTALLATION

- A. Preparation
1. Prior to excavation, investigation shall be made to the extent necessary to determine the location of existing underground structures and conflicts. This CONTRACTOR shall coordinate and utilize the services of public and private "locators" to ascertain the whereabouts of all underground utilities in the area where work is to be performed.

2. When obstructions that are not shown on the Contract Drawings are encountered during the progress of work and interfere so that an alteration of the Drawings is required, the PROFESSIONAL will alter the Drawings or order a deviation in line and grade or arrange for removal, relocation, or reconstruction of the obstructions.
3. Appropriate traffic control devices shall be provided in accordance with federal, state, or local regulations to regulate, warn, and guide traffic at the work site.
4. Trees, shrubs, fences, and all other property and surface structures shall be protected during construction unless their removal is shown on the Contract Drawings and Specifications or approved by the OWNER.

B. Excavation

1. During excavation, material meeting the Type S1 requirements shall be stock piled in an orderly manner and at a sufficient distance from the banks of the trench to avoid over-loading and to prevent slides or cave-ins. Submit test reports to verify soil properties.
2. All excavated materials not required or suitable for backfill shall be removed and disposed of off-site at CONTRACTOR's expense.
3. Excavation and trenching shall be performed to allow utilities to be installed to lines and grades established by the Contract Drawings and Specifications with fittings and valves at the required locations unless otherwise approved by the PROFESSIONAL.
4. All excavation of every description and of whatever substances encountered shall be performed to the depths indicated or as otherwise specified.
5. Excavated material shall be placed in a manner that will not obstruct sidewalks, driveways, or other structures.
6. Care should be exercised by the CONTRACTOR during excavation to avoid damage to existing structures and utilities.
7. When excavation of rock is encountered, all rock shall be removed to provide a clearance of at least 9 inches below and on each side of all pipe, valves, and fittings. The same shall also be performed when pieces of concrete or masonry and other debris or subterranean structures, such as masonry walls, piers, or foundations are encountered during excavation.
8. When crossing existing pipelines or other structures, alignment and grade shall be adjusted as necessary, with the approval of the PROFESSIONAL, to provide clearance as required by federal, state or local regulations or as deemed necessary by the PROFESSIONAL to prevent future damage or contamination of either structure.
9. Removal of pavement and road surfaces shall be a part of the trench excavation and the amount removed shall depend upon the width of trench required for the installation of structures. The dimensions of pavement removed shall not exceed the dimensions of the opening required for installation of pipe and other structures by more than 6 inches in any direction unless required or approved by the OWNER.

10. Should the trench pass over a sewer or other excavation, the trench bottom shall be sufficiently compacted to provide support equal to that of the native soil or conform to other regulatory requirements in a manner that will prevent damage to the existing installation.
11. Temporary support, adequate protection, and maintenance of all underground and surface structures, drains, sewers, and other obstructions encountered in the progress of the work shall be furnished by the CONTRACTOR. All properties that have been disturbed shall be restored as nearly as practical to their original condition.
12. When the sub grade is found to be unstable or to include ashes, cinders, refuse, organic material, or other unsuitable material, such material shall be removed, to a minimum of at least 12 inches below the pipe level and backfilled up to original trench depth with Type S1 material.
13. Ditches shall be kept free of water during piping installation. Grading shall be done as necessary to prevent surface water from flowing into trenches or other excavations, and any water accumulating therein shall be removed by pumping or by other approved methods. Discharge from any trench dewatering pumps shall be conducted to natural drainage channels, storm sewers, or an approved reservoir.

C. Bedding and Backfilling

1. General Requirements:
 - a. The trenches shall not be backfilled until the installation conforms to the requirements specified.
 - b. Do not install backfill over porous, wet, frozen or spongy sub-grade surfaces.
 - c. In areas where less than 16" of ground cover exists, the piping shall be encased in concrete. Concrete shall be minimum 3000 PSI with reinforcing as indicated or required. Backfill shall be provided above concrete to original grade or sub-grade.
 - d. Pavement, base course, and compacted sub grade disturbed by trenching operations shall be replaced in an acceptable manner with materials equal to the adjacent compacted sub grade, base course, and pavement for a minimum distance of 12 inches on each side of the trench.
 - e. If compaction tests indicate Work does not meet specified requirements, CONTRACTOR shall remove Work, replace and retest until specified requirements are met.
2. Bedding and Backfilling Requirements:
 - a. Bedding shall be provided for all piping, valves, etc.
 - b. Bedding material shall be either Type S3 or S4.
 - c. Bedding shall extend from 4" below bottom of pipe to 12" above top of pipe.

- d. Backfill shall extend from 12" above top of pipe up to top of trench or original grade/sub-grade.
3. Placement and compaction of bedding and backfilling materials under roads, parking areas, etc. shall be performed as follows:
- a. Place materials in continuous 6" thick horizontally placed loose layers and compact to 98% ASTM D698 maximum density with stability (stability shall be the absence of significant pumping or yielding of the soils while compaction is being performed).
 - b. Adjust moisture content of materials utilized for bedding and backfilling with lime or other Professional approved method of restoring stability as required to obtain specified compaction requirements.
 - c. Compaction tests shall be performed for each lift of bedding and/or backfilling per 200 linear foot of piping length.
4. Placement and compaction of bedding and backfilling materials under grassy areas, sidewalks, etc. shall be performed as follows:
- a. Place materials in continuous 9" thick horizontally placed loose layers and compact to 95% ASTM D698 maximum density with stability (stability shall be the absence of significant pumping or yielding of the soils while compaction is being performed).
 - b. Adjust moisture content of materials utilized for bedding and backfilling with lime or other Professional approved method of restoring stability as required to obtain specified compaction requirements.
 - c. Compaction tests shall be performed for each lift of bedding and/or backfilling per 200 linear foot of piping length.

PIPE TEST LOG							
DATE	SYSTEM	LOCATION OF TEST	TEST PRESSURE OF TEST	LENGTH OF TEST	RESULTS	CONTRACTOR'S SUPERINTENDENT WITNESS INITIALS	
						PRIME	MECHANICAL
Note: Turn in all forms filled out with project closeout documentation. Copy this form if more sheets are needed. These forms and/or log shall be kept at jobsite and upon request made available to ARCHITECT and/or PROFESSIONAL.							

END OF SECTION

SECTION 200100 VALVES**PART 1 – GENERAL****1.01 SCOPE**

- A. Provide all material, equipment and labor, etc., required to complete installation as specified herein and/or shown or scheduled on Contract Drawings.

1.02 APPLICABLE STANDARDS

- A. Insofar as possible, all valves of the same type shall be of the same manufacturer.

1.03 VALVE DESCRIPTION AND IDENTIFICATION

- A. Valves shall have name or trademark of manufacturer and working pressure cast or stamped on valve body.
- B. Valve hand wheels shall be oriented when installed to provide maximum accessibility for operation.
- C. Valve discs shall be the manufacturer's standard material for the service in which the valve is used unless otherwise indicated under the individual type valve specification.

PART 2 - PRODUCTS (OTHER VALVES FROM THOSE LISTED MAY BE SUBMITTED FOR APPROVAL)**2.01 VALVES FOR DOMESTIC WATER APPLICATIONS**

- A. All valves shall be NSF 61 compliant and contain less than 0.25% lead (Pb) by weight.
- B. Ball Valves:
 - 1. Valves 2 inches and smaller shall be two-piece brass or stainless steel construction, 1-1/4 inch extended neck, chrome plated ball with full port, P.T.F.E. seals and seats. Heavy duty steel handle with vinyl grip, quarter turn operation. Valves shall be suitable for working pressure of 200 psig and maximum 250° F.
 - 2. Valves 2-1/2 inches and larger shall be same as above except that two or three-piece brass or stainless steel construction may be utilized.
- C. Silent Check Valves:

Silent check valves 2 inches and smaller shall be horizontal or vertical silent spring check type. Valves shall be rated for 200# WOG.

2.02 VALVES FOR NATURAL GAS SYSTEM

- A. Plug Valves (for sizes 1¼" and larger, and at main service valves):
 - 1. Valves shall be iron-body (semi-steel) lubricated, bolted-glad type with Teflon coated plug. Flange unit for installation between 150# ASA steel flat-faced slip-on weld flanges. All valves shall be wrench operated and wrench shall be furnished with each size valve. Each plug valve shall be serviced with the silicone sealant/lubricant recommended by the valve manufacturer. Valves 2" and smaller shall be short-pattern type with threaded end connections. Valves shall be rated at 175# WOG.

2. Valves shall be equal to:
 - a. Nordstrom Fig. 142
 - b. Walworth No. 655
 - c. Powell No. 2200
- B. Ball Valves (for sizes 1" and smaller)
 1. Valves shall be one quarter turn shut-off, listed for gas service, bronze construction, CSA B16.44 5 psig rated, UL 842 5 psig rated and ANSI Z21.15 1/2 psig rated.
 2. Provide lever handle for equipment connections equal to McDonald Model 10710.
 3. Provide tee handle for Science Lab emergency shut-down application equal to McDonald Model 10710M.

2.03 CHROME PLATED VALVES

- A. Valves in exposed domestic plumbing connections to equipment shall have chrome plated finish.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Installation shall be such that the valve can be fully opened and have at least 6" clearance beyond valve stem handle and sufficient clearance to remove stem for repair.
- B. Locate and orient valves to permit proper operation and access for maintenance of packing, seat and disc. Generally, locate valve stems in overhead piping in horizontal position. Provide a union adjacent to one end of all threaded end valves. Control valves usually require reducers to connect to pipe sizes shown on the drawings. Install butterfly valves with the valve open as recommended by the manufacturer to prevent binding of the disc in the seat.

3.02 DISCHARGE FROM SAFETY AND/OR RELIEF VALVES

- A. Relief valves relieving steam, gas of any type, including compressed air, or liquid above 120 degrees F., shall be piped full size to outside building or as indicated so that discharge cannot hit any person or structure.

3.03 RELIEF VALVE CAPACITY

- A. Valve relieving capacity shall meet all code requirements and also be equal to at least 1.25 of possible heat input to be relieved.

END OF SECTION

SECTION 20 01 20 - PIPING SPECIALTIES

PART 1 – GENERAL

1.01 SCOPE

- A. Provide all labor, equipment, materials, etc., required to complete installation as specified herein and/or shown or scheduled on Contract Drawings.
- B. Work Included: Piping specialties to connect fire protection and plumbing equipment.

PART 2 – PRODUCTS

2.01 BACKFLOW PREVENTORS

- A. Install a backflow prevention device at main service entrance for potable water and at any point in the domestic water system where the potable water supply comes in contact with a potential source of contamination. Devices shall be certified by a recognized testing laboratory and be AWWA C-511-89 FCCCHR of USC, UPC, and IPC compliant. Listed below is a partial list of connections to the water system which shall be protected against backflow or back siphonage.
 - 1. Atmospheric Vacuum Breaker:
 - a. Hose bibbs and sink faucets w/threaded outlets.

2.02 THERMOMETERS

- A. Light powered, liquid crystal display, °F or °C selector switch and 6” brass stem with adjustable angle as required to read display from eyelevel.
- B. Separable Socket (Well): Brass, extension neck type to clear pipe insulation.
- C. Scale range may be slightly greater than shown to meet manufacturers' standard. Required ranges in degrees F:
 - Domestic Water.....30 to 180
- D. Equal to Weiss Instruments, Inc “Digital Vari-angle” or Weksler “AAD” series.
- E. Provide all thermometers located outdoors with waterproof cover equal to Weiss DVC-4.

PART 3 – EXECUTION

3.01 INSTALLATION

All equipment shall be installed as per manufacturer's recommendation and applicable codes and standards. Provide appurtenances as required for a complete system. Provide all appurtenances as indicated on Contract Drawings, where specified or not.

END OF SECTION

SECTION 20 01 40 - SUPPORTS AND ANCHORS**PART 1 – GENERAL****1.01 SCOPE**

- A. Provide all labor, equipment, material, etc., required to complete installation as specified herein and/or shown or scheduled on Contract Drawings.

1.02 SUPPORT

- A. Supports shall be installed in one of the following methods: (1) from wood using coach screw on open construction and hanger flanges on sheeting, (2) from concrete using inserts, (3) from steel using beam clamps, rivets or bolts, (4) from concrete blocks using toggle or through bolts. Fasten supports to building in following order of preference: (1) steel framing, (2) concrete, (3) wood framing, (4) masonry, (5) wood sheathing. Do not support from roof deck without approval. All hangers, rods, and inserts shall be Underwriters' Laboratories approved for the service intended and meet MSS #SP-58 and 69.

PART 2 – PRODUCTS**2.01 HANGERS, SUPPORTS, ANCHORS AND GUIDES**

- A. All hangers, fasteners and accessories exposed to view indoors shall be galvanized or zinc plated. Similar installations outdoors shall be hot dipped galvanized materials and fasteners.
- B. Supports, hangers, anchors and guides shall be provided for all horizontal and vertical piping. Selection and application shall be in accordance with ANSI/MSS SP-69.
- C. All pipe supports shall be of type and arrangement hereinafter specified. They shall be so arranged as to prevent excessive bending stresses between supports. Specifically designed hangers shall be fabricated and installed in accordance with ANSI/MSS SP-69.
- D. All bracket clamp and rod sizes indicated in this specification are minimum size only. The CONTRACTOR under this section shall be responsible for structural integrity of all supports. All structural hanging materials except variable spring units shall have a safety factor of 5 built in.
- E. All piping routed on trapeze hangers shall be attached rigidly to same unistrut hanger bar with clamps designed by unistrut manufacturer as approved by PROFESSIONAL. Insulated piping clamps shall encapsulate piping, insulation and saddle.

2.02 BASES AND PADS

- A. Concrete equipment pads shall be constructed of minimum 3000 psi reinforced concrete. Provide $\frac{3}{4}$ " chamfer on all exposed top perimeter edges of pads.
- B. Top of equipment pads outdoors shall be minimum 3" above and below worst case finished grade and be reinforced and of a strength suitable for application.
- C. Pads shall be provided in the following applications:
 - 1. Air conditioning equipment outside building. Size pads to extend from building perimeter and extend minimum eighteen (18) inches around equipment on remaining three sides, or as indicated.

2. Backflow preventer enclosures outside building. Size pads to extend minimum twelve (12) inches around equipment on all sides, or as indicated.
3. Floor mounted water heaters, air handling units, boilers, pumps, and where shown or specified on Drawings.
4. Provide similar concrete surrounds at cleanouts, grease interceptors, wet wells, etc., and as indicated.

PART 3 – EXECUTION

3.01 PIPING SUPPORT

- A. All hangers for insulated piping shall be sized to accommodate insulation and shield. No hangers for insulated piping may be installed directly below or onto pipe itself except domestic cold water, and condensate drain piping where insulation is for condensation and/or freeze protection only.
- B. Provide hanger spaced per International Plumbing Code, International Fuel Gas Code, and International Mechanical Code requirements for piping type and size.
- C. Support horizontal PVC pipe with hanger or pier, located close to hub; use one support for each pipe length, or every other joint, whichever is closer. Where maintenance requirements may impose torque, as at a cleanout, support on both sides of torque point.
- D. Provide hanger within 18" of each elbow, also provide hanger with 18" of connection to each piece of equipment.
- E. Support vertical pipe at base and at each floor. In addition, 1" or smaller copper pipe shall be supported at 5' intervals or midway between floors, whichever distance is shorter.
- F. Provide PVC or other approved coating for steel, cast iron or PVC pipe riser clamps. See applicable details.
- G. Pipes passing thru walls shall not bear on building construction. Provide sleeves and fire proofing sealant as per Section *Basic Mechanical Materials and Methods*.
- H. Maximum weights on hanger rods assuming a maximum operating temperature of 450 degrees F. shall be such that stress in tension shall not exceed 9000 psi, using root area of threaded portion.
- I. For copper pipe, supports shall follow schedule and specifications. Supports for uncovered lines shall be especially designed for copper tubing, and shall be of exact O.D. diameter of tubing and shall be copper plated.
- J. Shields at Hangers: Insulated pipe shall be protected at the point of support by a 180 degree insert of high density, 100 psi, waterproofed calcium silicate encased in a 180 degree galvanized sheet metal inverted saddle. Insert to be same thickness as gauges shown in chart below. Insulation insert to extend 1" beyond sheet metal on all insulated water lines. If pipe hanger spacing exceeds 12 feet, use double layer sheet metal shields. Check Section *Mechanical Insulation* for Alternatives.

PIPE SIZE	SHIELD LENGTH	MINIMUM GAUGE
1/2" - 2"	8"	24
2-1/2" - 4"	12"	20
6" - 8"	16"	16

- K. Provide all steel required for support of pipes and equipment other than steel shown on STRUCTURAL ENGINEER'S Drawings.
- L. All pipe supports shall be designed to avoid interferences with other piping, hangers, electrical conduits and supports, building structures and equipment.

3.02 OTHER MOUNTINGS

- A. Any piece of equipment installed in a finished ceiling or wall area shall be supported independently of the building finish. Ceiling mounted items shall be supported directly from the building structure.
- B. Support piping from structural steel members by malleable iron or formed steel beam clamps. Where suspended from concrete slabs, install inserts of malleable iron during building construction.
- C. Wire or perforated hangers will not be permitted. Provide adjustable split ring swivel malleable iron hangers for horizontal runs up to and including 3" pipe size. Provide adjustable steel clevis type hangers for pipes over 3".
- D. Provide malleable iron split ring hanger with copper finish and copper plated malleable iron adjuster for use with copper piping. For insulated piping, provide hangers sized to accommodate insulation.

END OF SECTION

SECTION 20 01 90 - MECHANICAL IDENTIFICATION

PART 1 – GENERAL

1.01 SCOPE

- A. Piping System Identification
- B. Equipment Identification
- C. Miscellaneous Identification

1.02 REFERENCES

ANSI A13.1 – Scheme for the Identification of Piping Systems

PART 2 – PRODUCTS – SPECIFIED AS PER INDIVIDUAL APPLICATION IN PART 3

PART 3 – EXECUTION

3.01 IDENTIFICATION OF PIPING SYSTEMS

- A. Identify all pipe after final painting and/or insulation with manufacturer’s preprinted labels at the following minimum locations:
 - 1. Straight runs of piping with a maximum spacing of twenty (20) feet.
 - 2. Adjacent to each valve.
 - 3. Adjacent to each branch takeoff point.
 - 4. On each side of where piping passes through walls/floors.
- B. Letter shall be sized in accordance with the following:

OUTSIDE DIAMETER OF PIPE COVERING	MINIMUM WEIGHT OF LEGEND LETTERS
Up to 3/4"	1/2"
1" to 1-1/4"	3/4"
1-1/2" to 2"	1"
2-1/2" to 6"	1-1/2"

- C. At each legend, include a manufacturer’s label with an arrow to show normal flow.
- D. Identify location of outside underground piping by: (1) 4" x 18" concrete stakes, flush with finish grade, located above lines at end and/or corners or (2) by 2" x 2" brass plates embedded in building walls above pipes.
- E. Identify all non-metallic piping below grade with 2" wide metalized tracer continuous roll identification tape, with service, as Brimar Industries “Underground Tape 2” Detectable”. Install tape +/- 12" below finished grade directly atop buried pipe, and 12-gauge bare copper tracer wire taped continuously to top of piping service. All tracer tape/wire shall be extended continuously between concrete stakes, and tied to stakes ± 6" below finished grade.

3.02 IDENTIFICATION OF PIPING ABOVE GRADE

- A. All piping exposed to view or concealed shall include manufactured labels on pipe in a visible location. Label shall be attached to pipe every twenty feet (20'). Labels shall be installed after piping has been insulated.
- B. Labels to be utilized as follows.
 - 1. In exposed applications, CONTRACTOR shall utilize pre-coiled, snap in place type markers as Seton "Setmark". On 6" and larger pipe, CONTRACTOR shall utilize nylon ties to secure marker to piping.
 - 2. In concealed applications, CONTRACTOR shall utilize a pressure-sensitive tape manufactured legend on all installations. Tape shall be tamper resistant vinyl tape for indoor as Seton "Opti-Code" and outdoor installations as Seton "Ultra-mark."
 - 3. Tape legend colors shall meet ANSI recommendations.
 - 4. On piping where markers do not include directional arrows, CONTRACTOR shall include similar manufactured stick-on flow arrows on all pumped circulating systems as Seton "Arrows On A Roll" with colors to match pipe legend tape identification.

3.03 EQUIPMENT IDENTIFICATION

- A. All equipment, starters, controls panels, switches, thermostats, humidistats and other control devices shall be permanently labeled with equipment being served. Equipment labels shall correspond to those shown on the Contract Documents.
- B. Individual functions and equipment on indicators and controllers on control panels shall be clearly permanently identified. Color code of labels, marking and identification shall be approved by PROFESSIONAL. This applies to the HVAC system, override panel, microprocessor time clocks and specialty annunciation specified in Section *Controls and Instrumentation*.
 - 1. Labels for equipment, starters and control panels shall be phenolic type with minimum 3/4 inch tall engraved lettering.
 - 2. Identification for individual controls devices including thermostats, humidistats, relays, switches, etc. shall be labeled with either phenolic type with minimum 1/2 inch tall engraved lettering or stick-on type from lettering machine.
- C. A reduced scale floor plan drawing with all devices referenced to the equipment served shall be framed and mounted where directed. A copy of this reduced scale floor plan drawing shall also be included in each of the Operations and Maintenance Manuals. Submit same to PROFESSIONAL for approval, prior to final mounting and inclusion in O & M Manual.

END OF SECTION

SECTION 20 02 50**MECHANICAL INSULATION****PART 1 – GENERAL****1.01 SCOPE**

- A. It is intended that all heating and/or air conditioning ductwork, all storm drain piping above slab on grade and all domestic water piping above slab on grade throughout this project be insulated, except as specifically stated otherwise hereafter.
- B. Insulation shall include all insulating materials their applications, bands, tie wire, and weather protection for all pipe, fittings, valves, and equipment as indicated and as specified herein.
- C. Piping systems requiring insulation, types of insulation required, and insulation thickness shall be as listed herein. All fittings, flanges, and valves (except valve stems, hand wheels, and operators) in piping systems requiring insulation shall be insulated unless otherwise specified. Fitting, flange, and valve insulation shall be premolded, precut, or job-fabricated insulation of the same thickness and conductivity as used on adjacent piping. Insulation exterior shall be cleanable, grease resistant, non-flaking and non-peeling.

PART 2 – PRODUCTS**2.01 PIPING INSULATION**

- A. Fiberglass pipe insulation (FG)
 - 1. Insulation shall have a thermal conductivity $k=0.23$ at 75 degrees F.
 - 2. Insulation shall include a white ASJ with self-sealing overlap joints and seams.
 - 3. Insulation shall be equal to Johns Manville "Micro-Lok" or approved equal.
- B. Flexible elastomeric pipe insulation (FU)
 - 1. Insulation shall have a thermal conductivity $k=0.25$ at 75 degrees F.
 - 2. Insulation shall be equal to Armacell "AP Armaflex".
- C. Phenolic (P)
 - 1. Insulation shall have a thermal conductivity $k=0.15$ (density 10 pcf nominal)
 - 2. Insulation shall be equal to Insul-Phen.
- D. PVC pipe and fitting covers.
 - 1. Pipe and fitting covers shall be 20 mill thick flame retardant PVC. Fitting covers shall be neat, tight fitting radius type.
 - 2. Pipe and fitting covers shall be equal to Zeston type 300 or approved equal.

2.02 DUCTWORK INSULATION

- A. Rectangular Ductwork Interior Acoustical Liner

1. See Section *Ductwork*.
- B. External Ductwrap Insulation (Ductwrap)
 1. Insulation shall be 2.2" thick and 3/4 pcf density fiberglass material with FSK facing. The "k" factor at 75° F., mean temperature shall not exceed 0.31 and shall meet NFPA 90A & 90B Standards.
- C. Rigid Board Insulation (Board)
 1. Insulation shall be one inch (1") thick with FSK outer skin and black matte durable finish meeting the requirements of ASTM G21 and G22.
 2. Insulation shall be equal to Knauf "Ductboard M" or CertainTeed "Ductboard with Enhanced Facing".

PART 3 – EXECUTION

3.01 GENERAL INSULATION INSTALLATION REQUIREMENTS

- A. The insulation shall be applied by licensed insulation applicators and all work shall be performed in a neat and workmanlike manner.
- B. No insulation shall be applied over pipes, fittings, or other surfaces, which are not clean.
- C. Insulation shall be applied after pipes have been thoroughly tested and proven tight by the CONTRACTOR.
- D. Piping insulation thru rated walls shall be coordinated with Section *Basic Mechanical Materials and Methods* and approved pipe sleeve and fire stop with UL Listing.
- E. Insulation shall be clean and dry when installed and during the application of any finish.
- F. Install materials neatly with smooth and even surfaces with jackets drawn tight and smoothly cemented down on longitudinal and end laps.
- G. Scrap pieces shall not be used where a full-length section will fit.
- H. Pipe insulation shall be continuous through sleeves, wall and ceiling openings.
- I. A PVC grommet shall be utilized at metal stud penetrations of piping, and insulation shall be installed snug to both sides of penetration with ends of piping insulation vapor sealed if specified.
- J. Piping and ductwork shall be individually insulated.
- K. Chrome plated pipes and pipes used solely for fire protection shall not be insulated.
- L. Equipment nameplates, access plates in fan housings and ductwork and the like for ventilating and air heating systems, shall not be insulated but insulation must be carefully beveled and sealed around it.
- M. Ductwork insulation shall be continuous through sleeves, wall and ceiling openings except at fire dampers in ductwork systems.

N. Vapor Barrier Installation

1. A complete moisture and vapor seal shall be provided wherever insulation terminates against metal hangers, anchors and other projections through insulation on cold surfaces for which a vapor seal is specified as identified in Part 3 paragraph 3.03 of this specification section.
2. Seam and fitting covers shall be sealed with two (2) generous brush coat of fire resistant vapor barrier coating, applied at all longitudinal and circumferential laps.
3. Ends of sections of insulation that butt against flanges, unions, valves, and fittings, and joints at intervals of not more than 12-feet on continuous runs of pipe shall be coated with a vapor barrier coating.
4. Breaks and punctures in the jacket material shall be patched by wrapping a strip of jacket material around the pipe and cementing, coating as specified for butt strips. The patch shall extend not less than 1½" past the break in both directions.
5. At penetrations such as thermometers, valve stems, etc., the voids in the insulation shall be filled with vapor barrier coating and the penetration sealed with a brush coat of the same coating.
6. PVC fitting jackets in concealed applications shall be with a strip of insulation jacket and brush coat of vapor barrier sealant.
7. PVC fitting jackets in exposed applications shall be neatly covered with a PVC/vinyl tape neatly smoothed.

O. Installation at Hangers and Anchors

1. Pipe insulation shall be continuous through pipe hangers.
2. Where pipe is supported by the insulation, galvanized sheet metal shields or saddles 12-inches long shall be provided. Shields/saddles shall be 20-gauge galvanized sheet metal for pipes 6" and smaller and 18 gauge for pipes 8" and larger.
3. Where shields are used on pipes 2-inches and larger, insulation inserts shall be provided at points of hangers and supports.
 - a. Insulation inserts shall be of calcium silicate, cellular glass (minimum 8 pcf), molded glass fiber (minimum 8 pcf), or other approved material of the same thickness as adjacent insulation.
 - b. Inserts shall have sufficient compressive strength to adequately support the pipe without compressing the inserts to a thickness less than the adjacent insulation.
 - c. Insulation inserts shall cover the bottom half of the pipe circumference 180 degrees and be not less in length than the protection shield.
 - d. Vapor barrier facing of the insert shall be of the same material as the facing on the adjacent insulation.

- e. Seal inserts into the insulation with vapor barrier coating.
- 4. Where protection saddles are used, fill all voids with the same insulation material as used on the adjacent pipe.
- 5. Insulate and vapor seal insulation at anchors same as piping for a distance not less than four times insulation thickness to prevent condensation.

3.02 PIPING INSULATION INSTALLATION

- A. Fiberglass pipe insulation (FG)
 - 1. Install insulation with longitudinal laps and butt strips additionally smoothly secured with Benjamin-Foster 85-20 adhesive.
 - 2. Fittings and valves on pipe shall be similarly insulated with thickness equal to the adjacent pipe.
- B. Flexible elastomeric pipe insulation (FU)
 - 1. Miter 90-degree turns and elbows, tees, and valve insulation.
 - 2. Secure longitudinal joints with vinyl tape on 9-inch centers.
 - 3. Bond cuts, butt joints, ends, and longitudinal joints with adhesive. After adhesive cures, apply 2-inch wide pressure sensitive adhesive vinyl tape over bonded cuts, joints, and ends.
- C. PVC pipe and fitting covers.
 - 1. PVC pipe and fitting covers shall be installed with a smooth appearance and no visible wrinkles.
 - 2. All longitudinal seams shall be installed such the joints facing up or to the back of the finished product.
 - 3. All longitudinal and circumferential PVC jacket joints and connections shall be spot welded every 12" with Perma Weld Adhesive and subsequently neatly sealed with tight fitting pressure sensitive vinyl tape, installed without wrinkles.

3.03 PIPING INSULATION APPLICATIONS

PIPING INSULATION MATERIAL TYPE, SERVICE JACKET, VAPOR BARRIER AND THICKNESS TABLE									
SERVICE	INSULATION MATERIAL (NOTE 'A')	TYPE OF SERVICE JACKET REQ'D (NOTE 'B')	VAPOR BARRIER	INSULATION THICKNESS (INCHES)					NOTES
				1/2" - 1 1/4"	1 1/2" - 3"	3 1/2" - 6"	8" - 10"	11" - 36"	

DOMESTIC HOT AND RECIRCULATING	FG	B	YES	1	1.5	1.5	1.5	1.5	1,2,3,4
	FU	C	NO	1	1.5	1.5	1.5	1.5	
	P	B	NO	0.5	1	1	1	1	
DOMESTIC COLD WATER	FG	B	NO	0.75	1	1	1	1	1,2,3,4
	FU	C	NO	0.75	0.75	0.75	0.75	0.75	
A/C CONDENSATE DRAIN LOCATED INSIDE BUILDING	FG	A OR B	YES	1	1	1	1	1	4,5
	FU	C	NO	0.75	1	1	1	1	
DRINKING FOUNTAIN DRAIN PIPING (ON SEWER TIE-ON)	FG	B	YES	1	1	1	1	1	5
	FU	C	NO	1	1	-	-	-	
REFRIGERANT PIPING & (SUCTION & LIQUID)	FU	C	NO	0.75	1.0	-	-	-	6

NOTE 'A' - INSULATION MATERIAL				
MATERIAL		SPEC	TYPE	CLASS / GRADE
FU	FLEXIBLE UNICELLULAR	ASTM C 534	-	-
FG	FIBER GLASS	ASTM C 547	I	1
P	PHENOLIC	ASTM C 552	-	-
CG	CELLULAR GLASS	ASTM C 1126	III	1

NOTE 'B' - TYPE OF SERVICE JACKET REQUIRED	
A	FOIL BACKED ALL SERVICE JACKET (ASJ)
B	PAPER ASJ
C	NONE

TABLE NOTES:

- Flexible unicellular insulation shall be utilized on domestic piping concealed within interior and exterior walls and plumbing chases. After the building is completely in the dry, the Contractor may utilize fiberglass insulation in these applications.

2. Note that higher density insulation inserts shall be utilized on all water piping larger than 1-1/2" size, at all hanger/saddle supports, etc.
3. Insulation located outside shall be one inch thicker than shown in table above.
4. A **full coverage PVC jacket** shall be required on insulated piping and fittings exposed in mechanical rooms, in crawlspace, and in interior exposed applications everywhere. See Section *Mechanical Identification* for color requirements.
5. Drain piping in concealed applications may be insulated with flexible unicellular or fiberglass.
6. Liquid refrigerant piping on heat pump systems where changeover valve is located at condensing unit, where recommended by manufacturer or where required to prevent condensation shall same as refrigerant suction piping above. (Example: Variable Refrigerant Flow or Ductless mini-split arrangement)

3.04 DUCTWORK INSULATION INSTALLATION

- A. Rectangular Ductwork Interior Acoustical Liner
 1. See Section *Ductwork*.
- B. External Ductwrap Insulation
 1. Insulation shall be installed in a manner to prevent compression of the insulation.
 2. When ductwork (rectangular or flat oval) with any vertical or bottom side is greater than 18", install pins and clips in a 12" o.c. grid, with pins within 4" of any longitudinal edge. Excess length of pins shall be snipped and top of pin/washer covered with pressure UL 181 pressure sensitive tape.
 3. All longitudinal and circumferential insulation seams shall be sealed with 3" wide pressure sensitive tape bearing the UL 181 label.
- C. Rigid Board Insulation
 1. Insulation shall be installed in a manner to prevent compression of the insulation.
 2. When ductwork (rectangular or flat oval) with any vertical or bottom side is greater than 18", install pins and clips in a 12" o.c. grid, with pins within 4" of any longitudinal edge. Excess length of pins shall be snipped and top of pin/washer covered with pressure UL 181 pressure sensitive tape.
 3. All longitudinal and circumferential insulation seams shall be sealed with 3" wide pressure sensitive tape bearing the UL 181 label.

3.05 DUCTWORK INSULATION APPLICATIONS

DUCTWORK INSULATION MATERIAL TYPE, VAPOR BARRIER AND THICKNESS TABLE				
DUCTWORK FUNCTION/TYPE	INSULATION MATERIAL	VAPOR BARRIER REQ'D	INSULATION THICKNESS (INCHES)	NOTES
Rectangular Low Pressure Supply Air	DUCT WRAP	YES	2.2	1
Round/Oval Low Pressure Supply Air	DUCT WRAP	YES	2.2	
Rectangular Low Pressure Return Air	DUCT WRAP	YES	2.2	1
Round/Oval Low Pressure Return Air	DUCT WRAP	YES	2.2	1
Round/Oval Low Pressure Exhaust Air	NONE	-	-	
Round/Oval Low Pressure Outside Air	DUCT WRAP	YES	2.2	
Miscellaneous Ductwork and Accessories	DUCT WRAP	YES	2.2	4

TABLE NOTES:

1. See Section *Ductwork* for:
 - a. Additional acoustical internal insulation required in addition to specified external insulation.
 - b. Interior liner required on ductwork located outdoors.
2. Not used.
3. See Section *Ductwork* for acoustical internal insulation required.
4. Miscellaneous Insulation and Acoustical Treatment Requirements:
 - a. Air Distribution Devices (Grilles, Registers and Diffusers):
 - i. The concealed frame and housing of all such devices above ceilings, in attics, walls, crawlspaces, etc., shall be factory insulated.
 - ii. When factory insulation is not available, ductwrap insulation shall be installed on any concealed frame, housings, plenums, etc.
 - b. Fire, Smoke, Combination Fire/Smoke shall be insulated per detail on Drawings and Damper Manufacturer's recommendations.
 - c. Control and Manual dampers shall be insulated such that automatic or manual operator is not impeded.
5. See Details on Drawings for more information and construction requirements.

END OF SECTION

SECTION 22 04 30 PLUMBING SPECIALTIES**PART 1 – GENERAL****1.01 SCOPE**

- A. Domestic water, sewer, roof drainage and condensate drains, including piping, equipment and all necessary accessories as designated in this section.
- B. Furnish all cleanouts and/or test tees as shown on Contract Drawings and required by Code. Cleanouts shall be the same size as the pipe they serve, except that 4 inches shall be the largest size required. Cleanouts shall be provided at the foot of each soil stack and of each run, change in direction, and mains, not to exceed 50 feet apart inside of building and 80 feet apart outside of building. The smallest flush floor cleanout shall be 3" unless otherwise noted.

PART 2 – PRODUCTS**2.01 FLOOR DRAINS**

- A. Floor drains shall be in accordance with ANSI A112.21.1. Provide caulking flange for connection to cast iron pipe, screwed outlets for connection to steel pipe, and side outlet when shown. Provide suitable clamping device and extensions if required, where installed in connection with waterproofing membrane. (Submit detailed shop drawings of these drains). Double drainage pattern floor drains shall have integral seepage pan for embedding in floor construction, and weep holes to provide adequate drainage from pan to drain pipe.
- B. The following plumbing drains are Jay R. Smith Models, however equal Zurn, Wade, Jonespec, MIFAB, Watts or Josam models are acceptable. Note: Provide flashing clamp when required with waterproofing membrane.
 - 1. FD – 1 - Floor Drain: (Toilet Areas) Zurn Model Z415-7B, duco coated cast iron body with nickel bronze 7" round strainer, clamping collar. Drain shall have trap primer connections where indicated. Size as indicated.
 - 2. FD – 2 - Floor Drain: (Recessed Grate) Zurn Model Z415-7I, duco coated cast iron body with nickel bronze 7" diameter extended rim strainer, clamping collar. Drain shall have trap primer where indicated. Size as indicated. Top lip to be installed flush with finished floor.

2.02 TRAPS

- A. Provide on all sanitary branch waste connections from fixtures or equipment not provided with traps. Exposed brass shall be polished brass chromium plated with nipple and setscrew escutcheons. Concealed traps may be wrought cast brass. Slip joints not permitted on sewer side of trap. Traps shall correspond to fittings on cast iron soil pipe or steel pipe respectively, and size shall be as required by connected service or fixture, or as scheduled.
- B. All drains, overflow, condensate and relief, to be routed to a trapped hub or floor drain. If plans are not specific, check with PROFESSIONAL over routing of such drains.

2.03 OTHER DRAINS

Other required drains, including condensate drain piping, relief and overflow drain piping shall be provided and installed by CONTRACTOR. See BASIC MECHANICAL MATERIALS AND METHODS for piping specifications. Drains with outlets outdoors shall include insect screen neatly attached over opening.

2.06 CLEANOUTS

- A. Cleanouts shall be as manufactured by Wade, Jay R. Smith, Zurn, Watts, or Josam, and shall be as follows:
 - 1. Inside building, exposed on walls - Zurn Model Z1446.
 - 2. Inside building where tile floors occur - Zurn Model Z1400.
 - 3. Inside building where ceramic or quarry tile occurs - Zurn Model Z1400.
 - 4. Outside building where concrete occurs - Zurn Model Z1406.
 - 5. Outside building, no paving - Zurn Model Z1449 with 18" x 18" x 4" concrete pad poured around cleanout with sloped top to shed water.
- B. All interior cleanouts to have nickel bronze finish and exterior cleanouts a brass finish unless otherwise noted. All flush grade cleanouts and cleanouts in walks, etc., shall have inset square key stainless steel covers.

PART 3 – EXECUTION**3.01 INSTALLATION: (DRAINS)**

- A. Floor drains shall be installed according to manufacturer's recommendations. Provide and install all flashing and weatherproofing as required. Adjust extension sections on all drains as required for proper height adjustment.
- B. All floor drains connected to sanitary waste system to be trapped. Connect floor drains to sanitary waste piping as indicated on Contract Drawings.
- C. The CONTRACTOR shall connect to roof drains and exterior roof downspouts and route new piping to its conclusion outside of building as indicated on Contract Drawings.
- D. Each AC equipment drip and drain opening which normally or frequently discharges water (such as air conditioning unit drains, pump base and stuffing box drips, overflows, and similar drips and drains) shall be connected to the drain openings or piped down directly over the floor drains which are provided for the purpose, as applicable, whether indicated on the Drawings or not.
- E. Each water relief valve discharge shall be piped down to 6" above floor, but not necessarily over a floor drain or connected to a drain opening, unless otherwise indicated. No drain piping is required from the discharges of drain valves, unless otherwise indicated.
- F. The top of all floor and trench drain strainer covers shall be cleaned and polished prior to final inspection by the PROFESSIONAL.
- G. Drains shall be provided at all coils, receivers, pump suction lines, pump plates where facilities are provided and at all low points of the systems. Such drains shall consist of the necessary pipe, valves and fittings required in the opinion of the PROFESSIONAL to permit servicing of equipment, systems, etc.

3.02 INSTALLATION: (CLEANOUTS)

- A. Install cleanouts such that each type is flush with floor, walls, outside grade, etc. Except as explicitly noted, all inside floor cleanouts shall be flush with finished floor surface.
- B. Flush grade cleanouts shall include a concrete pad surrounding cleanout as indicated above concrete pad and cleanout top shall be flush with finished grade.
- C. All cleanout plug threaded sections to be installed with appropriate lubricant and sealant for future maintenance and access.
- D. The top and faceplate of all cleanouts indoors shall be cleaned and polished prior to final inspection by the PROFESSIONAL.

END OF SECTION

SECTION 22 04 40**PLUMBING FIXTURES, TRIM & ACCESSORIES****PART 1 – GENERAL****1.01 SCOPE**

- A. Provide all labor, equipment, materials, etc., required to complete installation as specified herein and/or shown or scheduled on plans.
- B. Work Included: Plumbing fixtures, associated trim and fittings necessary to make a complete installation from wall or floor connections to rough piping, and certain accessories.

PART 2 – PRODUCTS**2.01 FIXTURE TRIM**

- A. All exposed metal parts of all fixtures, including faucets, waste fittings, waste plugs, flush valves, traps, supplies, nipples, and escutcheons shall be chrome-plated brass unless other materials or finish is specified. Basket and similar strainer assemblies for sinks shall be stainless steel.
- B. Drain and waste assemblies below lavatories and sinks shall be minimum 17 gauge chrome plated brass and traps shall include cleanout plugs.
- C. Stops and supplies:
 - 1. All stops and supplies shall be NSF 61 compliant and contain less than 0.25% lead (Pb) by weight.
 - 2. Chrome plated brass/copper supplies shall be provided on all water supplies to fixtures. All hot/cold faucet handles for lavatories, sinks and bath/shower supply fittings shall include red and blue color code indications.
 - 3. Stops shall be chrome-plated brass, angle all bronze compression quarter turn ball type as McQuire LFBV series. Locate stops centrally above or below fixture in accessible locations.

2.02 ESCUTCHEONS

- A. Provide chrome-plated escutcheons on all water and drain piping in wall, floor and ceiling penetrations.
- B. Heavy-duty type escutcheons, with setscrews shall be utilized in exposed applications under wall mounted lavatories and sinks and on exposed piping applications on tank type water closet stops and on exposed piping to flush valves, etc.
- C. Light duty slip-on type may be utilized in concealed installations within cabinets.

2.03 CARRIERS

- A. Provide appropriate carriers for all wall mounted water closets, urinals, lavatories, electric drinking fountains, and sinks, and as indicated elsewhere in these specifications or on the drawings, or as required. All carriers shall be concealed, floor mounted type unless otherwise approved by the PROFESSIONAL.
- B. Where wall hung water closets, urinals, lavatories, electric drinking fountains, or sinks are installed back-to-back and carriers are specified, provide one carrier to serve both fixtures in lieu of individual carriers.

2.04 HANDICAPPED SERVICES

- A. Provide where required and/or indicated plumbing fixtures and installations that comply with the latest version of "American with Disabilities Act" (ADA).
- B. Provide neat pre-packaged molded insulation protection on an exposed drain and water piping below sinks and lavatories equal to TRUEBO Models #102 and #105.

2.05 PLUMBING FIXTURES AND TRIM

Furnish and install all plumbing fixtures specified herein and shown on plans. Kohler fixtures are specified, however, Eljer, or American Standard may be used if they are equal in all respects to those specified. CONTRACTOR shall submit data on trim as well as fixtures. All water closets, urinals and other fixtures associated with flush valves shall be water conservation type unless specified otherwise. All lavatory and shower supply fittings shall be of the flow restrictor type, unless specified otherwise. Flush valves shall be Zurn type "AV" or Sloan Royal with clog resistant design.

- A. Water Closets: All water closet seats shall have stainless steel mounting post and fasteners with "Sta-Tite" technology as Bemis or Church.
 - 1. WC-1 – ADA Compliant floor mounted vitreous china siphon jet with elongated bowl and 1-1/2" top spud, 2" passage and 1.6 gallon flush. (Coordinate with grab bar and ARCHITECT's details per ADA requirements. Install with handle opposite nearest corner installation).
 - a. Fixture: Kohler Model K-4302 (Highcrest).
 - b. Flush valve: Zurn Model ZR-6000AV-WS1-ADA battery powered sensor operated.
 - c. Seat: Bemis Model 10SSCT.
- B. Urinals:
 - 1. U-1 – ADA Compliant wall mounted vitreous china washout design with 3/4" top spud, 2" outlet and high efficiency 1.0 gallon flush.
 - a. Fixture: Kohler Model K-4904-ET-0 (Bardon).
 - b. Flush valve: Zurn Model ZR-6003AV-WS1 battery powered sensor operated.
 - c. Carrier: Zurn adjustable floor mounted wall carrier(s) as required.
- C. Lavatories:
 - 1. L-1 – ADA Compliant wall mounted vitreous china with 4" faucet centers and 5" backsplash.
 - a. Fixture: Kohler Model K-2005 (Kingston).
 - b. Faucet: Zurn Model Z-6955-XL-S-TMV-1, battery powered sensor operated faucet with 0.5 gpm aerator and thermostatic mixing valve.
 - c. Carrier: Zurn adjustable floor mounted wall carrier(s) as required.

D. Service Sinks:

1. SS-1 – Molded Stone, floor mounted utility tub (size 23"x21"x13").
 - a. Fixture: Fiat Model FL-1.
 - b. Faucet: Zurn Model Z-812N4, centerset cast brass vacuum breaker spout with integral 3/4" hose threaded outlet and 4" wrist blade handles.
 - c. Accessories and Trim:
 - i. White baked enamel steel legs
 - ii. Strainer drain and tailpiece.

E. Sinks: The following stainless steel sinks are Elkay Models with Zurn faucets and trim, however, equal Dayton or Just models shall be acceptable.

1. S-1 – Double compartment, 18 ga. self-rimming (size 33"x23"x10" deep).
 - a. Fixture: Elkay Model LR-3322-10.
 - b. Faucet: Zurn Model Z-871G4-XL-HS-2F, kitchen sink faucet with 4" wrist blade handles and 2.2 gpm aerator, 8" cast brass swing spout, hose and spray.
 - c. Trim: Elkay Model LK-35 stainless steel basket strainer (2 each).

F. Drinking Fountains/Bottle Fillers: All capacities (G. P. H.) are based on 50 degree F., drinking water, 80 degree F., inlet water and 90 degree F. ambient. All shall be NSF 61 compliant and contain less than 0.25% lead (Pb) by weight.

1. EDF-1 – ADA Compliant wall mounted barrier-free, one-piece stainless steel basin with integral drain and push button and stainless steel cabinet. 8.0 gallons per hour.
 - a. Murdock Model A171408F-VR.
 - b. Accessories and Trim:
 - i. WF1 – Water Filter, NSF 42 and 53, 1500 gallon capacity, 1 micron.
 - ii. Cane touch apron for installation on exposed wall applications
 - c. Carrier: Zurn adjustable floor mounted wall carrier(s) as required.

G. Hose Bibbs:

1. HB-1 - Hose Bibb: Non-freeze wall hydrant (designed to fit one standard modular masonry course), stainless steel box with hinged locking cover stamped "WATER", bronze hydrant, hose connection with integral vacuum breaker, and "T" handle key, Zurn Model Z-1320-EZ, Hydrant shall be 3/4 inch.
2. HB-2 - Hose Bibb: Mild climate box wall hydrant, Hydrant in hinged covered box, stainless steel box and hinged cover and, "T" handle key, Zurn Model Z-1330, hydrant shall be 3/4 inch.

H. Trap Primers:

1. TP-1 - Trap Primer: Trap primer shall be connected to water closet flush valve. Exposed piping shall be chrome plated, provide chrome-plated escutcheon at mount to wall. Zurn Model Z-6000 TPO.

I. Trap Guard

1. **TG-1** - Trap Guard: Flexible elastomeric tube treated to roll up when water is not passing through to resist emission of sewer gases, as ProSet®, MiFab, Smith, or Green Drain. Trap guard to be designed to meet dimensional and installation requirements of specified floor drain.

J. Water Hammer Arrestors (WHA):

1. Water hammer arrestors shall be piston type.
2. Water hammer arrestors shall be type approved for installation with no access panel required.
3. All water hammer arrestors shall be NSF 61 compliant and contain less than 0.25% lead (Pb) by weight.
4. The following schedule for Sioux Chief Hyrda-Rester arrestors shall apply:

P.D.I SYMBOL	FIXTURE UNIT RATINGS
A	4-11
B	12-32
C	33-60
D	61-113
E	114-154
F	155-330

K. Emergency Fixtures:

1. **EEW-1** – Emergency Eye/Face Wash, wall mounted barrier free stainless steel type with round bowl.
 - a. Haws Model 7360BTWC.
 - b. Accessories and Trim:
 - i. Chrome-plated brass stay-open ball valve with stainless steel ball and stem
 - ii. Chrome plated brass inline strainer, trap and tailpiece
 - iii. Haws Model 9102 stainless steel dust cover and flag to activate unit and raise cover
 - iv. Universal sign for wall mounting as directed by Architect
 - c. Mixing vavvlve: Haws Model TWBS.EWE lead-free emergency mixing valve with dual internal bypass for thermal and pressure assisted activation for uninterrupted flow in the event of hot water supply or tempering valve actuator failure.

- L. **IMB** – Ice Maker Box: White powder coated steel recessed metal box with quarter-turn ball valve and integral water hammer arrester. Box equal to Guy Gray Model MIB1HAAB where installed in non-fire rated construction or Guy Gray Model FRIB12ABSHA where installed in fire rated construction. Provide with NSF 61 compliant (lead free) 10 foot long stainless steel icemaker connector equal. Make final connection to equipment.

PART 3 – EXECUTION**3.01 INSTALLATION**

- A. Fixture Setting: Opening between fixture and floor and wall finish shall be sealed with silicone based caulking. Grout other excessive gaps as required.
- B. Supports and Fastenings: Secure all fixtures, equipment and trimmings to partitions, walls, etc., with brass through bolts, toggle bolts, expansion bolts, or power set fasteners, as required. Exposed heads of bolts and nuts in finished rooms to be hexagonal, polished chromium plated brass with rounded tops.
- C. Support wall hung lavatories and urinals by appropriate carriers.
- D. Tightly cover and protect fixtures and equipment against dirt, water and chemical or mechanical injury.
- E. On floor mounted water closets, offset shall not be more than 3/4" and non-reducing.
- F. Attach floor mounted water closets to closet flange.
- G. Items supplied by others as denoted are to be furnished complete with stops, risers, faucets, strainers, tailpiece, and traps. The intent is that this CONTRACTOR shall provide all "rough-in" through face of wall and shall connect equipment provided by others, except where otherwise noted.
- H. All exposed metal trim and piping shall be chrome plated brass and polished.
- I. Trim which can be removed or disassembled without tools is not permitted.
- J. Furnish and install plumbing fixtures and pertaining appurtenances of the manufacturer and model number as indicated in these specifications and/or noted on the plans.
- K. Replace any fixtures or equipment broken, cracked, discolored, pitted, or otherwise imperfect.
- L. Setting height or location of fixtures shall be as dimensioned or as directed by ARCHITECT.
- M. Provide plumbing fixtures with accessible stops in supplies or with integral stops in faucets. Provide lavatory faucets, sink faucets, and supply stops with renewable seats.
- N. Provide closets with white bolt caps with retainer clips. Use all mineral gasket with plastic discharge sleeve having ethane core reinforcement.
- O. Install all wall, roof and ground hydrants in strict accordance with manufacturer's recommendations and applicable details on Drawings. Hydrants shall be installed such that box/hydrant is square and plumb with adjacent building construction. Where wall hydrants are specified to match standard brick dimensions, adjust location in field to avoid cutting bricks and install with long dimension horizontal and hinge on bottom of box.
- P. Install all fixtures in strict accordance with manufacturer's recommendations.

Q. Water Hammer Arrestors:

1. All water supply piping fittings and fixtures shall be protected against water hammer, shock or surge pressure by installation water hammer arrestors.
2. Water hammer arresters shall be installed per the manufacturer's recommendations. This shall include spacing, sizing, etc.
3. Fixture piping shall be adequately anchored to prevent vibration.
4. CONTRACTOR must guarantee against water hammer at end of project.

3.02 CLEANING:

- A. At completion of all work, fixtures, exposed materials and equipment shall be thoroughly cleaned.

3.03 OPERATIONAL TESTS

- A. Pour at least five (5) gallons of water into every floor drain to test for pipe stoppage. Remedy all stoppage.

END OF SECTION

SECTION 22 04 50 - DOMESTIC WATER HEATERS AND ACCESSORIES**PART 1 – GENERAL****1.01 SCOPE**

- A. Provide all labor, equipment, material, etc., required to complete water heater installations specified herein and/or shown or scheduled on Contract Drawings.

1.02 APPLICABLE STANDARDS

- A. A.S.M.E. Code Sections where referenced or applicable.
- B. The water heater shall include all standard equipment as shown on manufacturer's specification sheet, shall fit properly into the space provided for it and shall conform to the Drawing requirements. The complete installation shall be in accordance with all applicable state and local codes and installation drawings/details.

PART 2 – PRODUCTS**2.01 DOMESTIC HOT WATER EQUIPMENT**

- A. Water Heater WH-1 (Tankless Commercial Natural Gas)
 - 1. Unit shall have full stainless steel water way and heat exchanger. Unit shall be capable of providing hot water outlet temperature with $\pm 2^{\circ}\text{F.}$, of setpoint, at any entering water temperature between 50°F. , and 140°F. , and at any flow rate between 0.5 and 7.0 gpm. Unit shall come complete with all operating and safety controls, and include flow switch, combustion air and flue kit, etc.
 - 2. Unit shall be of the size and capacity indicated on Contract Drawings.

2.02 ACCESSORIES

- A. Relief Valve for Gas and Electric Water Heaters: Brass or bronze, fully automatic, self-closing combination pressure and temperature ASME relief valve. Pressure relief valve shall be spring-operated with testing lever, set for 100 pounds pressure. Temperature relief valves shall contain a non-corrosive metal thermostat with bulb. Pipe discharge to floor or as directed on Drawings or by PROFESSIONAL.
- B. Potable Water Expansion Tank (EXPT)

Provide potable water expansion tanks with factory finished metal outer jacket with FDA approved rubberized bladder with pre-charged tank and charging valve. Acceptance volume shall be within five percent (5%) of minimum specified (see detail(s) on schedule on Drawings). Support units as recommended by unit manufacturer and Industry Standards. Expansion tanks shall be rated for 125 psi. ASME construction shall be provided where water heater is ASME constructed. See Schedule/Drawings for more information.
- C. Tankless Gas Water Heater Isolation Valve Kit: Brass or bronze, lead-free. Provide hot and cold water valve assemblies. Both shall include quarter-turn ball shut-off valve and integrated drain valve with captive nut and washer and color-coded handles. Hot water valve shall also include built-in side port of T&P relief valve connection.

PART 3 – EXECUTION

3.01 LEAKAGE TEST:

- A. Before connections are made, test heaters and tanks with hydrostatic pressure of 150 psig and prove tight.

3.02 PERFORMANCE TEST:

- A. Prove system is balanced and 105 degrees F. is available at farthest outlet from heaters.
- B. Install heater as per manufacturer's instructions. Refer to Section *Basic Mechanical Materials and Methods* for instruction of ferrous to non-ferrous piping connections. Refer to Drawings for detail of water heater installation, if applicable.
- C. Provide all pipe, fittings, and accessories as indicated or required for complete installation.
- D. See Section *Testing, Adjusting and Balancing* for setting water heaters, and testing/setting fixtures and valves, etc.

END OF SECTION

SECTION 23 06 70**PACKAGED AIR CONDITIONERS****PART 1 – GENERAL****1.01 SCOPE**

- A. Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.
- B. Work Included: Self-contained units, rooftop units, window units, through-wall units, computer room units, and split systems.
- C. Warm air furnace/evaporator coil and condensing units.
- D. Definitions:
 - 1. Energy Efficiency Ratio (EER): A ratio calculated by dividing the cooling capacity in Btuh by the power input in watts at any given set of rating conditions, expressed in Btuh per watt (Btuh/watt).
 - 2. Unitary (ARI): Consists of one or more factory-made assemblies, which normally include an evaporator or cooling coil, a compressor and condenser combination, and may include a heating function.

1.02 APPLICABLE STANDARDS

- A. Refer to Section, *Basic Mechanical Materials and Methods*.
- B. Safety Standards:
 - 1. Design, manufacture and installation of mechanical refrigeration equipment: ANSI B9.1.
 - 2. Machinery Guards: Provide guards as shown in AMCA 410 for belts, chains, couplings, pulleys, sheaves, shafts, gears and other moving parts regardless of height above the floor. Drive guards may be excluded where motors and drives are inside factory fabricated unit casings.
- C. Corrosion Prevention: Unless specified otherwise, equipment fabricated from ferrous metals that do not have a zinc-coating conforming to ASTM A386 or a duplex coating of zinc and paint shall be treated for prevention of rust with a factory coating or paint system that will withstand 125 hours in a salt-spray fog test, except that equipment located outdoors shall be tested for 500 hours. The salt-spray fog test shall be in accordance with ASTM B117 using a 20 percent sodium chloride solution. Immediately after completion of the test, the coating shall show no signs of blistering, wrinkling or cracking, no loss of adhesion, and the specimen shall show no signs of rust creepage beyond 1/8 inch on either side of the scratch mark. The film thickness of the factory coating or paint system applied on the equipment, shall be not less than film thickness used on the test specimen.
- D. Applicable ARI Standards:
 - 1. Capacity 135,000 BTU/HR and Greater: ARI 360.
 - 2. Capacity Below 135,000 BTU/HR: ARI 210. Units shall be listed in the ARI Directory of Certified Unitary Air-Conditioners.

PART 2 – PRODUCTS**2.01 UNITARY AIR CONDITIONERS**

- A. Self-Contained Combination Packaged Unit (Up to 25 Tons): Air-conditioner shall be a factory packaged cooling combination heating and cooling single zone unit as indicated and shall be suitable for mounting on concrete pad on ground. The package shall consist of one or more refrigerant compressors with electric motors, cooling coils, condensers, fans, air filters, heating section, control wiring and piping, all factory assembled in a weatherproof enclosure mounted on a structural steel base ready for field connection to utilities and ducts. The package unit shall be sufficiently rigid and arranged to permit handling by a crane boom or by helicopter.
- B. Unit Enclosure: Construct with removable insulated access panels completely weatherized for outside installation, and properly reinforced and braced. Provide panels and access door for inspection and access to all internal parts. Provide insulated enclosure with adequate reinforced points of supports for setting of the unit. Joints shall be air and watertight. Base shall consist of a one piece welded assembly with 14 gauge members.
- C. Access to compressors, evaporator fan, controls and air filter sections shall include hinged access doors with weatherproof gasketed seal and quarter turn latches.
- D. For ground mounted horizontal duct connection configurations, provide manufacturer's interior acoustically lined galvanized structural plenum and/or base rail arrangement, where required to match installation requirements, such that base of outside air intake opening is a minimum of 30" above unit slab.
- E. Provide manufacturer approved heavy duty louvered or expanded metal grille hail guard spaced minimum 2" from face of condensing coil. See detail on Contract Drawings.
- F. Cabinet Insulation: One inch (1") thick and 3/4 pound density to prevent condensate from forming on the unit casing from air entrance at coils to air outlet of unit. Insulation shall meet the requirements of NFPA Standard 90A and be protected against deterioration and delamination from air currents. Insulate condensate drain pan with water impervious insulation of sufficient thickness to prevent condensate formation on the exterior at ambient conditions encountered.
- G. Evaporator Fan: Forward curved type (or backward inclined) DWDI Class I centrifugal type specifically designed and suitable for the operating pressure conforming to AMCA 210. Provide adjustable pitch pulley. Units shall have greaseable lubricated ball bearings. Statically balance fan assemblies in the fan housing and final assembly. Fan motors to be isolated with spring isolators. Fan motors shall conform to NEMA MG-1. Motor starters shall conform to NEMA ICS. Motors shall have thermal overload protection. Three phase motors shall have protection from phase loss, reversal, and high/low voltage.
- H. Compressors: Provide scroll type conforming to ARI 520, provided with all minimum standard equipment and accessories listed therein.
 - 1. Compressor shall be of the scroll type and shall include high and low pressure cutouts, overloads, and inherent thermostat.
 - 2. Compressors shall be suction gas cooled and include integral centrifugal oil pump to provide positive lubrication of all moving parts.

3. Compressors shall include anti-slugging device, timed automatic restart delay and crankcase heaters.
 4. Individual compressor isolation valves shall be provided where compressors are installed in tandem arrangement on the same refrigerant circuit.
 5. Three phase compressors shall have protection from phase loss, reversal, and high/low voltage.
- I. Coils:
1. Condenser, and evaporator coils shall be copper type with aluminum fins and conform to ARI 410 or as approved.
 2. Condensing Coils for Multi-Compressors: Provide a separate air cooled condenser circuit for each multi-compressor separate circuited installation(s). If compressors are paralleled, provide not less than two independent circuits, and no less separate circuits or distinct levels of control than scheduled. A common-housing may be used, but each coil must be provided with separate controls to operate individual condenser fans for each coil. All coils shall sub-cooler. The air-cooled condenser coil shall be extended-surface fin-and-tube with seamless copper tubes with aluminum fins. The coils shall be tested for 425 psi. In the event one compressor fails, the other compressor(s) shall continue to operate on the other independent circuit.
 3. Evaporator coils for multi-circuited systems shall be split face design.
- J. Filter Boxes: Provide filter boxes with insulated hinged access doors with snug fitting air filter frame allowing a maximum 1% of scheduled air flow bypass.
- Filters shall be of the high velocity to serve the airflow capacity indicated on Contract Drawings. See Section *Air Cleaning/Treatment* for air filter specifications, including type, efficiency and number.
- K. Heating Section (All units shall have heat in reheat position):
1. Primary heating/reheat capability (dehumidification mode).
Hot refrigerant gas condenser coil (when refrigerant compressor(s) are running) with two-position hot gas reheat valve.
 2. Secondary/Supplemental Heating (in Reheat Position)
Gas Fired Furnace: Heat exchanger tubes and cylindrical drum shall be constructed of aluminized steel with a stainless steel power burner section. Stainless steel power burner shall have prepurge, electric spark ignition, 100% safety shutoff controls, electronic flame sensing controls, series gas valves and limit controls. Staging control shall be with separate gas valves. All controls shall be listed for operation at low outdoor air temperatures. Burner shall be equipped with inspection window and air shutter for combustion air adjustment. Complete service access shall be provided for controls and wiring. Shall be A.G.A. design certified for outdoor installation. Units with cooling capacity exceeding 5 tons shall have 2-stage heating capability heat in the re-heat position. Provide multistage controls of capacity and characteristics as scheduled on Drawings.

- L. Power Safety and Auxiliary Electric Controls and Accessories:
1. Three-phase units shall be provided with phase loss/reversal and brownout protection to shut down all motors in the unit if the phases are more than 10% out of balance on voltage, or the voltage is more than 10% under or over design voltage. These electrical controls shall include automatic restart capability.
 2. Unit shall be provided with a factory installed 115 volt, 15 amp ground fault service receptacle. Receptacle to be factory powered.
- M. Controls:
1. Unit shall be factory provided with a BACNET MSTP interface "card" to allow Owner's building EMS to read, reset, and control unit operation from remote workstation, etc.
 2. Combination automatic heating/cooling changeover and auto-on fan switch shall be remotely zone mounted where indicated. Mount all other controls including motor starters and safety controls inside the enclosure. All wiring inside enclosure shall be accomplished at the factory. Unit mounted control panel shall include magnetic contactors for compressor, evaporator and condenser fan motors, three leg compressor overloads high and low pressure cutouts, oil pressure cutouts, non-recycling pump down and reset relay.
 3. Condenser Controls: Provide head pressure control with variable speed condenser fans to insure condensing temperature for proper system operation at all ambient temperatures down to 0°F. Condenser fans to be heavy duty permanently lubricated ball bearing type with built-in thermal overload protection. Provide units with low ambient controls where scheduled with multiple cooling circuits or required to provide stable operation to suit application.
 4. Condenser Start-Up Control: Provide condenser with a start-up control package which permits start-up of compressor at ambient temperature of 0°F. Package shall temporarily by-pass system low pressure-start to permit start-up whenever minimum ambient temperature is below design evaporator coil suction temperature. Provide low ambient start-up capability where required to suit application.
 5. Economizer:
 - a. Systems scheduled on Drawings shall have an outdoor air option with moisture eliminators and full economizer cycle and shall include motorized automatic exhaust fan or fans, and motorized automatic modulating return and outside air dampers. Economizer cycle shall be controlled on a differential enthalpy basis.
 6. Provide low limit temperature sensors on face of evaporator on systems with multiple refrigeration circuits for each stage of refrigeration, with adjustable time delay and automatic restart controls.
- N. Warranty: See Section *Mechanical Systems and Equipment Warranties* for more information.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Handle and install units and accessories in accordance with ARI 260 and the manufacturer's printed instructions. Unit shall be started up and checked out by a factory service representative. CONTRACTOR shall furnish PROFESSIONAL test report covering unit operation and start-up.

3.02 TESTS

- A. Perform tests and make reports in accordance with Sections *Basic Mechanical Materials and Methods* and *Testing, Adjusting, and Balancing*.

3.03 UNIT CAPACITY

- A. Characteristics and capacity of systems shall be as indicated on Contract Drawings.

3.04 CONTROLS

- A. All systems will be provided with automatic heating/cooling changeover controls; one or two stage heating and/or cooling as required. Provide auxiliary time clocks and thermostats and/or humidistats as indicated in Section *Controls and Instrumentation*.

3.05 AIR FILTRATION

- A. See Section *Air Cleaning/Treatment* for specific requirements.

END OF SECTION

SECTION 23 06 75 - VARIABLE REFRIGERANT FLOW/VOLUME AIR CONDITIONERS**PART 1 – GENERAL****1.01 SCOPE**

- A. Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.
- B. Work Included:
 - 1. Outdoor units and accessories complete with controls.
 - 2. Indoor units with direct-expansion coils, blowers, and controls.
 - 3. Branch controllers.
 - 4. Refrigerant piping.
 - 5. Refrigerant piping system valves.
 - 6. Control network with centralized controllers and system integration capability via BACnet/IP and remote room controllers. See Section *Controls and Instrumentation* for additional requirements.
- C. Definitions:
 - 1. VRF: Variable refrigerant flow.
 - 2. IDU: Indoor unit with heating/cooling coil, fan, etc. with control components in a cabinet.
 - 3. ODU: Outdoor unit with compressor and condenser coil with all control components in a cabinet.
 - 4. BC: Branch controller.
 - 5. DDC: Direct digital controls.

1.02 SUBMITTALS

- A. Product Data: For each complete system. Include rated capacities of selected models: shipping, installed, and operating weights; furnished specialties; and accessories. Include plan and elevation views of units, minimum clearances, and data on ratings and capacities.
- B. Shop Drawings: For each complete system. Include Drawings to scale indicating all components, refrigerant piping, manufacturer specific fittings/connections, control devices, wiring, etc. For the complete system. Ductwork associated with indoor ducted units is not required to be shown.
- C. Installers Credentials: For project specific Contractor's personnel. Include installation and start-up training certificates of successful completion furnished by manufacturer.

1.03 QUALITY ASSURANCE

- A. The system shall be installed by a factory trained and manufacturer certified Contractor with extensive training on this type equipment. Training to be performed and certification to be provided by the manufacturer.
- B. The system shall be designed and submitted using the manufacturer's approved application software.
- C. The system shall be installed by a contractor who has successfully completed the manufacturer's factory training class.
- D. Upon completion of installation and prior to final commissioning, Contractor shall provide revised piping layout reflecting actual installation conditions for submittal to with close-out documents and to equipment manufacturer.
- E. Provide a verified and submitted commissioning report to Trane Factory Service Department
- F. The units shall be tested by a Nationally Recognized Testing Laboratory (NRTL), in accordance with ANSI/UL 1995 – Heating and Cooling Equipment and bear the Listed Mark, AHRI 210-240 and AHRI 1230.
- G. All wiring shall be in accordance with the National Electric Code (NEC).
- H. The system will be produced in an ISO 9001 and ISO 14001 facility, which are standards set by the International Standard Organization (ISO). The system shall be factory tested for safety and function.
- I. Mechanical equipment for wind-born debris regions shall be designed in accordance with ASCE 7-2010 and installed to resist the wind pressures on the equipment and the supports.
- J. The condensing unit will be factory charged with R-410A.
- K. The VRF system installer must be factory-trained and certified prior to submission of bid. A factory-trained and certified employee of the installer must be on-site at all times when HVAC system is being installed and placed in operation.
- L. The Contractor is to provide a letter from the manufacturer verifying the training certification and a minimum of four (4) successful installations of specified VRF system with references within seven (7) days of Notice to Proceed.

1.04 SYSTEM DESCRIPTION

- A. The variable capacity, heat recovery air conditioning system shall be a Variable Refrigerant Volume Series (heat and cool model) split system as specified. The system shall consist of multiple evaporators, branch selector boxes, custom manufacturer specific joints and headers, a three-pipe refrigeration distribution system using PID control and condenser unit. The condenser shall be a direct expansion (DX), air-cooled heat recovery, multi-zone air-conditioning system with variable speed inverter driven compressors using R-410A refrigerant. All zones are each capable of operating separately with individual temperature control. A dedicated hot gas pipe shall be required to ensure optimum heating operation performance.
- B. The condensing unit shall be interconnected to indoor units in accordance with manufacturer's engineering data book detailing each available indoor unit. The indoor units shall be connected to the condensing unit utilizing manufacturer recommended piping joints and headers to ensure correct refrigerant flow and balancing.

- C. Operation of the system shall permit either individual cooling or heating of each indoor unit simultaneously or all of the indoor units associated with each branch of the cool/heat selector box. Each indoor unit or group of indoor units shall be able to provide set temperature independently via a local remote controller, an Intelligent Controller, an Intelligent Manager or a BMS interface as indicated on Drawings and/or elsewhere in Specifications.
- D. Branch selector boxes shall be located as shown on the drawing. Each branch of the branch selector box shall consist of three electronic expansion valves, refrigerant control piping and electronics to facilitate communications between the box and main processor and between the box and indoor units. The branch selector box shall control the operational mode of the subordinate indoor units. The use of three EEV's ensures continuous heating during defrost (multiple condenser systems), no heating impact during changeover and reduced sound levels.

1.05 SYSTEM FEATURES

- A. VFD Inverter Control and Variable Refrigerant Temperature – Each condensing unit shall use high efficiency, variable speed all “inverter” compressor(s) coupled with inverter fan motors to optimize part load performance. The system capacity and refrigerant temperatures shall be modulated automatically to set suction and condensing pressures while varying the refrigerant volume for the needs of the cooling or heating loads. The control will be automatic and customizable depending on load and weather conditions.
- B. Configurator software – Each system shall be available with configurator software package to allow for remote configuration of operational settings and also for assessment of operational data and error codes. If this software is not provided by an alternate manufacturer, for each individual outdoor unit the contractor shall do the settings manually and keep detailed records for future maintenance purposes.
- C. Auto-Charging – Each system shall have a refrigerant auto-charging function.
- D. Defrost Heating – Multiple condenser VRV systems shall maintain continuous heating during defrost operation. Reverse cycle (cooling mode) defrost operation shall not be permitted due to the potential reduction in space temperature.
- E. Oil Return Heating – Multiple condenser systems shall maintain continuous heating during oil return operation. Reverse cycle (cooling mode) oil return during heating operation shall not be permitted due to the potential reduction in space temperature.
- F. Low Ambient Cooling – Each system shall be capable of low ambient cooling operation to 10° F DB.
- G. Independent Control – Each indoor unit shall use a dedicated electronic expansion valve for independent control.
- H. Oil Return – Each system shall be furnished with a centrifugal oil separator and active oil recovery cycle
- I. Simple Wiring – Systems shall use wiring type, gauge, etc. per the manufacturer's recommendations.
- J. Advanced Diagnostics – Systems shall include a self diagnostic, auto-check function to detect a malfunction and display the type and location.

- K. Advanced Controls – Each system shall have at least one remote controller capable of controlling up to 16 indoor units.
- L. Each system shall be capable of integrating with open protocol BACnet and LonWorks building management systems.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Unit shall be stored and handled according to the manufacturer's recommendations.

PART 2 – PRODUCTS

2.01 CONDENSING UNIT

- A. General:
 - 1. The condensing unit is designed specifically for use with variable refrigerant flow/volume components.
 - 2. The condensing unit shall be factory assembled and pre-wired with all necessary electronic and refrigerant controls. The refrigeration circuit of the condensing unit shall consist of inverter 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, liquid receiver and suction accumulator.
 - 3. High/low pressure gas line, liquid and suction lines must be individually insulated between the condensing and indoor units.
 - 4. The condensing unit can be wired and piped with access from the left, right, rear or bottom.
 - 5. The system will automatically restart operation after a power failure and will not cause any settings to be lost, thus eliminating the need for reprogramming.
 - 6. The unit shall incorporate an auto-charging feature. Manual charging should be supported with a minimum of 2 hours of system operation data to ensure correct operation.
 - 7. The condensing unit shall be modular in design and should allow for side-by-side installation with minimum spacing.
 - 8. The following safety devices shall be included on the condensing unit; high pressure sensor and switch, low pressure sensor, 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.
 - 9. To ensure the liquid refrigerant does not flash when supplying to the various indoor units, the circuit shall be provided with a sub-cooling feature.
 - 10. Oil recovery cycle shall be automatic occurring operation to ensure active oil management. Each system shall maintain continuous heating during oil return operation.
 - 11. The condensing unit shall be capable of heating operation at 10°F wet bulb ambient temperature without additional low ambient controls or an auxiliary heat source.
 - 12. The multiple condenser systems shall continue to provide heat to the indoor units in heating operation while in the defrost mode.

B. Unit Cabinet:

1. The condensing unit shall be completely weatherproof and corrosion resistant. The unit shall be constructed from rust-proofed mild steel panels coated with a baked enamel finish.

C. Fan:

1. The condensing unit shall consist of one or more propeller type, direct-drive fan motors that have multiple speed operation via a DC (digitally commutating) inverter.
2. The condensing unit fan motor shall have multiple speed operation of the DC (digitally commutating) inverter type, and be of high external static pressure design.
3. The fan motor shall have inherent protection and permanently lubricated bearings.
4. The fan motor shall be provided with a fan guard to prevent contact with moving parts.

D. Condenser Coil:

1. The condenser coil shall be manufactured from copper tubes expanded into aluminum fins to form a mechanical bond.
2. The heat exchanger coil shall be of a waffle louver fin and rifled bore tube design to ensure high efficiency performance.
3. The heat exchanger on the condensing units shall be manufactured from Hi-X seamless copper tube with N-shape internal grooves mechanically bonded on to aluminum fins to an e-Pass Design.
4. The fins are to be covered with an anti-corrosion Ultra Gold coating as standard with a salt spray test rating of 1000hr (ASTM B117 & Blister Rating:10), Acetic acid salt spray test: 500hr (ASTM G85 & Blister Rating:10)
5. The pipe plates shall be treated with powdered polyester resin for corrosion prevention. The thickness of the coating must be between 2.0 to 3.0 microns.
6. The outdoor coil shall have three-circuit heat exchanger design eliminating the need for bottom plate heater. The lower part of the coil shall be used for inverter cooling and be on or off during heating operation enhancing the defrost operation.
7. The condensing unit shall be factory equipped with condenser coil guards on all sides.

E. Compressor:

1. The inverter scroll compressors shall be variable speed (PVM inverter) controlled which is capable of changing the speed to follow the variations in total cooling and heating load as determined by the suction gas pressure as measured in the condensing unit. In addition, samplings of evaporator and condenser temperatures shall be made so that the high/low pressures detected are read every 20 seconds and calculated. With each reading, the compressor capacity (INV frequency) shall be controlled to eliminate deviation from target value. Non-inverter driven compressors, which may cause starting motor current to exceed the nominal motor current (RLA) and require larger wire sizing, shall not be allowed.

2. The inverter driven compressor in each condensing unit shall be of highly efficient reluctance DC (digitally commutating), hermetically sealed scroll "G-type" or "J-type".
3. The capacity control range shall be as low as 3% to 100% depending upon particular quantity and size of units.
4. The compressors' motors shall have a cooling system using discharge gas, to avoid sudden changes in temperature resulting in significant stresses on winding and bearings.
5. Each compressor shall be equipped with a crankcase heater, high pressure safety switch, and internal thermal overload protector.
6. Oil separators shall be standard with the equipment together with an intelligent oil management system.
7. The compressor shall be spring mounted to avoid the transmission of vibration eliminating the standard need for spring insulation.
8. In the event of compressor failure, the remaining compressors shall continue to operate and provide heating or cooling as required at a proportionally reduced capacity. The microprocessor and associated controls shall be designed to specifically address this condition.
9. In the case of multiple condenser modules, conjoined operation hours of the compressors shall be balanced by means of the Duty Cycling Function, ensuring sequential starting of each module at each start/stop cycle, completion of oil return, completion of defrost or every 8 hours and extending the operating life of the system.

2.02 BRANCH SELECTOR BOX FOR HEAT RECOVERY SYSTEM

A. General:

1. The branch selector boxes are designed specifically for use with heat recovery system components.
2. These selector boxes shall be factory assembled, wired, and piped.
3. These branch controllers must be run tested at the factory.
4. These selector boxes must be mounted indoors.
5. When simultaneously heating and cooling, the units in heating mode shall energize their subcooling electronic expansion valve.

B. Unit Cabinet:

1. These units shall have a galvanized steel plate casing.
2. Each cabinet shall house 3 electronic expansion valves for refrigerant control per branch.
3. The cabinet shall contain one subcooling heat exchanger per branch.
4. The unit shall have sound absorption thermal insulation material made of flame and heat resistant foamed polyethylene.

C. Refrigerant Valves:

1. The unit shall be furnished with 3 electronic expansion valves per branch to control the direction of refrigerant flow.
2. In multi-port units, each port shall have its own electronic expansion valves. If common expansion/solenoid valves are used, redundancy must be provided.

3. Multiple indoor units may be connected to a branch selector box with the use of a custom manufacturer specific joint provided they are within the capacity range of the branch selector.

2.03 CEILING CASSETTE UNIT

A. General:

1. Indoor unit shall be a ceiling cassette fan coil unit, operable with R-410A refrigerant, equipped with an electronic expansion valve, direct drive DC (ECM) type fan, for installation into the ceiling cavity equipped with an air panel grill.
2. The indoor unit shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, condensate drain pan, condensate drain pump, condensate safety shutoff and alarm, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch.
3. Return air shall be through the concentric panel, which includes a resin net, mold resistant, antibacterial filter.
4. The indoor units shall be equipped with a condensate pan with antibacterial treatment and condensate pump. The condensate pump provides up to 27" of lift from bottom of unit to top of drain piping and has a built-in safety shutoff and alarm.
5. The indoor units shall be equipped with a return air thermistor.

B. Unit Cabinet:

1. The cabinet shall be space saving and shall be located into the ceiling.
2. Fresh air intake shall be possible by way of optional fresh air intake kit. See Schedule on Drawings for more information.
3. A branch duct knockout shall exist for branch ducting of supply air. (See Drawings for locations.)
4. The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.

C. Fan:

1. The fan shall be direct-drive DC (ECM) type fan, statically and dynamically balanced impeller with three fan speeds available.
2. The airflow rate shall be available in three manual settings.
3. The DC fan shall be able to automatically adjust the fan speed in 5 speeds based on the space load.
4. The fan motor shall be equipped as standard with adjustable external static pressure (ESP) settings to allow operation with the high efficiency air filter options.
5. The fan motor shall be thermally protected.

D. Coil:

1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.

3. The coil shall be a 2, or 3-row cross fin copper evaporator coil with up to 21 FPI design completely factory tested.
4. The refrigerant connections shall be flare connections and the condensate will be 1 -1/4 inch outside diameter PVC.
5. A condensate pan with antibacterial treatment shall be located under the coil.
6. A thermistor will be located on the liquid and gas line.

E. Control:

1. The unit shall have controls provided by equipment manufacturer to perform input functions necessary to operate the system.
2. The unit shall be compatible with interfacing with a BMS system via optional LonWorks or BACnet gateways.
3. The unit shall be compatible with a manufacturer's touchscreen advanced multi-zone controller.

2.04 ONE WAY BLOW CASSETTE UNIT

A. General:

1. Indoor unit model shall be a ceiling suspended cassette fan coil unit, operable with R-410A refrigerant, equipped with an electronic expansion valve, for installation onto a ceiling within a conditioned space.
2. The indoor unit shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, condensate drain pan, condensate lift pump, condensate safety shutoff and alarm, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch.
3. The indoor unit shall be able to process up to 15% fresh air
4. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.
5. Return air shall be through the flat back panel, which includes a white resin net mold resistant filter.
6. The indoor units shall be equipped with a condensate pan and condensate pump. The condensate pump provides up to 33-716" of lift and has a built-in safety shutoff and alarm.
7. The indoor units shall be equipped with a return air thermistor.

B. Unit Cabinet:

1. The cabinet shall be space saving and shall be located into the ceiling.
2. The cabinet shall have a built in 4" knock-out to connect fresh air intake
3. The cabinet shall be constructed with sound absorbing foamed polyurethane noise insulation.
4. The cabinet shall be equipped with foamed polystyrene and foamed polyethylene heat insulation.

C. Fan:

1. The fan shall be direct-drive Sirocco fan type with statically and dynamically balanced impeller with five selectable fan speeds available.
2. The airflow rate shall be available in five settings.
3. The fan motor shall be thermally protected.

D. Coil:

1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
3. The coils for units up to 1 ton shall be a 2-row cross fin copper evaporator coil with 20.5 FPI design completely factory tested for the
4. The coils for units from 1.25 ton to 2.0 ton shall be 2-row cross fin copper evaporator coil with 20.5 FPI and an additional row with 15.9 FPI.
5. The refrigerant connections shall be flare connections and the condensate will be 1-1/32 inch outside diameter PVC.
6. A condensate pan with antibacterial treatment shall be located under the coil.
7. A condensate pump with a 33-7/16 inch lift shall be located below the coil in the condensate pan with a built-in safety alarm.
8. A thermistor will be located on the liquid and gas line.

E. Control:

1. The unit shall have controls provided by equipment manufacturer to perform input functions necessary to operate the system.
2. The unit shall be compatible with interfacing with a BMS system via optional LonWorks or BACnet gateways.
3. The unit shall be compatible with manufacturer's touchscreen advanced multi-zone controller.

PART 3 – EXECUTION**3.01 INSTALLATION**

Handle and install units and accessories in accordance with applicable ARI standards and the manufacturer's printed instructions. Unit shall be started up and checked out by factory service representative or Contractor's personnel who have successfully completed manufacturer's training education. As a part of close-out documents, Contractor shall furnish test report covering unit operation and start-up for each and every unit in project.

3.02 TESTS

Perform tests and make reports in accordance with Sections *Basic Mechanical Materials and Methods* and *Testing, Adjusting, and Balancing*.

3.03 CONTROLS

- A. All systems will be provided with automatic heating/cooling changeover controls. Provide central control panels, auxiliary control devices, etc., as indicated on Drawings and in Section *Controls and Instrumentation*.

3.04 AIR FILTRATION

- A. See Section *Air Cleaning/Treatment* for specific requirements.

END OF SECTION

SECTION 23 08 60 - FANS**PART 1 – GENERAL****1.01 SCOPE**

- A. Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.
- B. Work included: Fans for heating, ventilating and air conditioning.
- C. Product Definitions: AMCA Publication 99, Standard 1-66.

1.02 APPLICABLE STANDARDS

- A. Fans and power ventilators shall be listed in the current edition of AMCA 261, and shall bear the AMCA performance seal.
- B. Operating Limits for Centrifugal Fans: AMCA 99 (Class 1, 11, and 111).
- C. Fans and power ventilators shall comply with the following standards:
 - 1. Testing and Rating: AMCA 210.
 - 2. Sound Rating: AMCA 300.
- D. Performance Criteria:
 - 1. The fan schedule shows CFM and design static pressure. Scheduled fan motors, ½ horsepower and larger, are to be sized for design CFM at 110 percent design static pressure, but not to exceed 3/4-inch additional pressure.
 - 2. Provide fans and motors capable of stable operation at design conditions and at 110 percent pressure as stated above.
 - 3. Lower than design pressure drop of approved individual components may allow use of a smaller fan motor and still provide the safety factor. When submitted as a deviation, a smaller motor may be approved in the interest of energy conservation.
 - 4. Select fan operating point as follows:
 - a. Forward curved and axial fans: Right hand side of peak pressure point.
 - b. Airfoil, backward inclined or tubular: Near the peak of static efficiency.
- E. Safety Criteria: Provide manufacturer's standard screen on fan inlet and discharge exposed to operating and maintenance personnel.

PART 2 – PRODUCTS**2.01 CENTRIFUGAL FANS**

A. General:

1. Standards and Performance Criteria: Refer to Paragraph, QUALITY ASSURANCE.
2. Construction: Wheel diameters and outlet areas shall be in accordance with AMCA standards.
 - a. Housing: Low carbon steel, arc welded throughout, braced and supported by structural channel or angle iron to prevent vibration or pulsation, flanged outlet, inlet fully streamlined. Provide lifting clips, and casing drain. Provide manufacturer's standard access door. Provide screens for fan inlets without duct connections.
 - b. Wheel: Steel plate with die formed blades welded or riveted in place, factory balanced statically and dynamically.
 - c. Shaft: Designed to operate at no more than 70 percent of the first critical speed at the top of the speed range of the fans class.
 - d. Bearings: Heavy-duty ball or roller type sized to produce a B10 life of not less than 40,000 hours, and an average fatigue life of 200,000 hours. Extend lubrication tubes for interior bearings or ducted units to outside of housing.
 - e. Painting: AMCA Standard preparation for coating 2601-66-1E33, followed by manufacturer's standard rust resistant baked enamel colored coating inside and out.
3. See Section *Electrical Requirements* for motor and starter requirements.
4. See Detail on Drawings for roof curb construction requirements.

B. Exhaust Air Fans

1. Direct Drive Above Ceiling Type:
 - a. Fan shall be mounted above ceiling and vent routed as indicated. Fan shall have forward curved wheel constructed of aluminum. Fan motor shall be of the shaded pole type. Housing shall be of the steel construction with baked enamel finish. Grille mounted in ceiling shall be of extruded aluminum.
 - b. Capacity and characteristics shall be as indicated on Contract Drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install fan, motor and drive in accordance with manufacturer's instructions.
- B. Align fan and motor sheaves to allow belts to run true and straight.
- C. Bolt equipment to curbs with galvanized lag bolts, number and location per manufacturer's instructions.

3.02 PRE-OPERATION MAINTENANCE

- A. Grease bearings and install maintenance notation chart per Section *Basic Mechanical Materials and Methods*.
- B. Rotate impeller by hand and check for shifting during shipment and check all bolts, collars, and other parts for tightness.

3.03 START-UP AND INSTRUCTIONS

- A. Check vibration and correct as necessary for air balance work.

3.04 ACCESSORIES

- A. Provide all accessories including roof curbs, solid state speed controllers, wall mounting collars, insect and/or bird screen, OSHA approved motor and inlet/outlet protecting guards, back-draft damper (motorized or manual as indicated), thermostats, vibration isolators and starters with pilots, etc., as indicated or required.

END OF SECTION

SECTION 23 08 85 - AIR CLEANING/TREATMENT**PART 1 – GENERAL****1.01 SCOPE**

- A. Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.
- B. Descriptions:
 - 1. Air filters for Heating, Ventilating and Air Conditioning.
 - 2. Definitions: Refer to newest edition of ASHRAE 52.2 for definitions of face velocity, net effective filtering area, media velocity, resistance (pressure drop), minimum efficiency reporting value (MERV), etc.

1.02 APPLICABLE STANDARDS

Air Filter Performance Report for Extended Surface Filters:

- A. Submit a test report for each type of filter being offered. The report shall be less than two years old and have been prepared by an independent testing laboratory using test equipment, method and duct section as specified by ASHRAE Standard 52.2-1999 for type filter under test and acceptable to ENGINEER, indicating that filters comply with the requirements of this specification. Test for 500 fpm will be accepted for lower velocity filters provided the test report of an independent testing laboratory complies with all the requirements of this specification.
 - 1. Selection procedures for manufacturer's standard products: All filters tested shall have been procured by the independent testing laboratory from the open market independent of manufacturer of these filters and a statement to this effect must accompany test report.
 - 2. Selection procedures for new products not available on open market: Testing laboratory will certify that filters are not available in areas remote from manufacturer's facilities. For each required test the independent Testing Laboratory shall select from the manufacturer's stock or production the number of samples required. The samples selected shall be representative of standard production considering media utilized and manufacturing locations. These test reports shall be less than six months old.
- B. Filter Supplier Warranty for Extended Surface Filters: Guarantee the filters against leaks, blow-outs, and other deficiencies during their normal useful life. Defective filters shall be replaced at no cost to the Owner.
- C. Identification: Each filter shall bear markings indicating manufacturer's name, filter size, and MERV rating per ASHRAE Standard 52.2.
- D. Definitions and Abbreviations
 - 1. Spares: Filter(s) in sets to be turned over to the OWNER at the end of the project for the OWNER'S use after the project or any portion thereof, is complete.

2. Construction Period: This term generally includes the time period beginning with the OWNER'S notice-to-proceed and ending with the OWNER'S final acceptance of a project, or any phase of a project.
3. Temporary: A term generally depicting the use of air filters for use during the construction period.
4. Filter Grille: An inlet device connected to an HVAC system where an air filter is to be installed and maintained during construction and permanently after project is completed.
5. Pleated Filters: An extended surface filter with folds of air filtration media.
6. Filter or Filter Set: Air filter(s) in sizes as recommended by equipment or supplier manufacturer to prevent air bypass and to provide the maximum face size and minimum velocity to promote longer filter life expectancy.
7. F/G: fiberglass

1.03 RESPONSIBILITY

- A. The CONTRACTOR is responsible for providing, monitoring and maintaining all air filtration specified provisions during the construction period.
- B. The CONTRACTOR is also responsible for providing spare sets of air filter(s) to the OWNER, labeled and in boxes for storage, for the OWNER'S use after the project is complete and at which time the OWNER assumes control of operation and maintenance functions for the systems. One of the filter spare sets shall be installed on the day of the final inspection by the PROFESSIONAL.

1.04 AIR FILTRATION PROTECTION REQUIRED

The following systems and installations shall be provided with proper air filtration prior to startup or use of the facilities new HVAC systems and existing or renovated HVAC systems in the area(s) affected by this project.

- A. All new air handling systems, including up-flow/horizontal furnaces, roof top packaged systems, outdoor air and heat recovery systems, blower coil, central station and built-up air handling system with water, or refrigerant coils.
- B. Filter grilles or registers.
- C. Ducted return air systems: Provide temporary air filtration over all return air grilles, registers and filter grilles (in addition to filters in frame of filter grille).

1.05 TYPE OF AIR FILTRATION REQUIRED

The following is a listing of generic equipment and installation air filtration requirements. The CONTRACTOR may submit alternate filter thickness(es) to match specific applications but shall not be less than that listed, for PROFESSIONAL'S approval. The CONTRACTOR shall verify size, including thickness matched to CONTRACTOR supplied equipment and air distribution device accessory.

AIR FILTRATION REQUIREMENTS							
GENERAL INFORMATION			CONSTRUCTION PERIOD FILTRATION		SPARES (PROJECT FILTRATION)		COMPLETION
FILTER FUNCTION/ LOCATION	FILTER TYPE	NOMINAL FILTER DEPTH/ THICKNESS	MINIMUM RATING	MERV	MINIMUM RATING	MERV	NUMBER OF SETS REQUIRED
RETURN AIR GRILLES/ REGISTERS	PLEATED	1"	11		N/A		N/A
VRF INDOOR UNITS, (IDU's)	WASHABLE	-	4		4		1
PAD-MOUNTED PACKAGED UNITS, (RTU'S)	PLEATED	2"	8		8		3

PART 2 – PRODUCTS

2.01 EXTENDED SURFACE AIR FILTERS

- A. Filter shall be pleated, disposable type. Filter shall consist of non-woven cotton and synthetic fabric media, media support grid and enclosing frame.
- B. The filter shall be listed by Underwriters Laboratories as Class 2.
- C. The media support shall be a welded wire grid with an effective open area of not less than 96%. The welded wire grid shall be bonded to the filter media to eliminate the possibility of media oscillation and media pull away.
- D. The enclosing frame shall be constructed of a rigid, heavy-duty beverage board with diagonal support members bonded to each side of the filter to insure pleat stability. The inside periphery of the enclosing frame shall be bonded to the filter pack to eliminate possibility of air bypass.
- E. Filter Characteristics

MINIMUM EFFICIENCY REPORTING VALUE (MERV)	FILTER DEPTH/ THICKNESS	PRESSURE DROP (IN. W.G. @ 350 F.P.M.)		PRESSURE DROP (IN. W.G. @ 500 F.P.M.)	
		INITIAL	FINAL	INITIAL	FINAL
8	1"	0.23	0.5	-	-
8	2"	-	-	0.29	0.75
11	1"	0.30	0.50	-	-
11	2"	-	-	0.35	0.75

PART 3 – EXECUTION

3.01 INSTALLATION AND COORDINATION

- A. Install supports, filters and gages in accordance with manufacturer's instructions.
- B. At end of project, provide list of all HVAC air handling equipment and filter grilles, with size and quantity of air filters and MERV rating for each, and submit for Owner's future use and maintenance record. Furthermore, submit a letter signed by the OWNER acknowledging receipt of all spare sets of air filters outlined above. All boxes of air filters shall be labeled to match the individual HVAC system or return air filter grille location for which the filters are to be utilized.

3.02 START-UP AND TEMPORARY USE

- A. Clean and vacuum air handling units and plenums to the satisfaction of the ENGINEER prior to starting air-handling systems.
- B. Change out replaceable air filters, as filters are 60% loaded during construction use period and just prior to OWNER'S acceptance of project. Filters for use during construction period are in addition to OWNER'S spare sets, as specified herein.
- C. Thoroughly wash wall unit filters as filters are 40% loaded during construction period, and just prior to OWNER'S acceptance of project.

END OF SECTION

SECTION 23 08 90 - DUCTWORK

PART 1 – GENERAL

1.01 SCOPE

- A. Provide all material, equipment and labor, etc., required including all supply, return, outside air, exhaust, and other ductwork and as required for the A/C system, including mains, branches, plenums, mixing boxes, fittings, accessories, and other related sheet metal work for a complete installation as specified herein and/or shown on Drawings.
- B. Work under this Section includes but is not necessarily limited to the following items: Ductwork for heating, ventilating and air conditioning systems.
- C. Construct ductwork to meet all functional criteria defined in the SMACNA “HVAC Duct Construction Standards - Metal and Flexible” Latest Edition. This shall be subsequently referred to as the SMACNA Manual.

1.02 APPLICABLE STANDARDS

APPLICABLE PUBLICATIONS: The publications listed below form a part of this Specification to the extent referenced. The publications are referenced in the text by the basic designation only.

- A. National Fire Protection Association (NFPA):
 - 1. 90A.....Air Conditioning and Ventilating Systems – Latest Edition
 - 2. 90B..... Warm Air Heating and Air-Conditioning Systems – Latest Edition
 - 3. 96.....Vapor Removal from Cooking Equipment – Latest Edition
- B. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
 - 1. Low Pressure Duct Construction Standards – Latest Edition
 - 2. Guidelines for Welding Sheet Metal – Latest Edition
 - 3. Duct Liner Application Standard – Latest Edition

1.03 DEFINITIONS

- A. Seal or Sealing: Use of liquid or mastic sealant, with or without compatible tape overlay, or gasketing of flanged joints, to keep air leakage at duct joints, seams and connections to an acceptable minimum.
- B. Exposed Duct: Exposed to view in a finished room or outdoors.

1.04 QUALITY ASSURANCE

- A. The CONTRACTOR must comply with the enclosed specification in its entirety.
- B. At the discretion of the PROFESSIONAL, sheet metal gauges, reinforcing and sealant may be checked at various times during the construction period to verify all duct construction is in compliance.

- C. If during site observations the PROFESSIONAL finds changes have been made without prior approval, the CONTRACTOR will correct deficiencies identified to comply with this specification solely at the CONTRACTOR's expense.
- D. Duct penetrations and/or doors, etc., necessary for the PROFESSIONAL to observe the duct installations, shall be made/installed and repaired, etc. by this CONTRACTOR, in ductwork as selected by PROFESSIONAL, at no additional cost to the OWNER or PROFESSIONAL.
- E. All ductwork shall be installed un-insulated (except duct liner), subsequently sealed and observed/approved by PROFESSIONAL prior to insulating.

PART 2 – PRODUCTS

2.01 DUCTWORK PRESSURE CLASS CONSTRUCTION REQUIREMENTS

- A. Ductwork shall be constructed to meet or exceed the SMACNA Standards based upon the following table of ductwork type and function.

DUCTWORK FUNCTION	DUCTWORK TYPE	DUCTWORK PRESSURE CLASS (IN. W.G.)
Low Pressure Supply Air	Rectangular	2 (pos.)
Low Pressure Supply Air	Round or Oval	2 (pos.)
Low Pressure Return Air	Rectangular	2 (neg.)
Low Pressure Return Air	Round or Oval	2 (neg.)
Low Pressure Exhaust Air	Round or Oval	2 (neg.)
Low Pressure Outside Air	Round or Oval	2 (pos. or neg.)

- B. Ductwork with the type not specifically indicated on Drawings shall be constructed to 2 in. w.g. unless upstream of terminal units (variable air volume boxes) which shall be constructed to 4 in. w.g.

2.02 RECTANGULAR DUCTWORK

- A. General Requirements
 - 1. Construct all rectangular ductwork with approved new prime G-90 or better galvanized steel sheet ASTM S27 (LFQ) with chemical treatment or as specified, with careful, neat, and accurate workmanship and with all joints and seams air tight. Longitudinal seams, transverse joints and bracing, sheet metal gauges and other construction details shall be as recommended in the latest edition of the ASHRAE Guide and SMACNA "HVAC Duct Construction Standards – Metal and Flexible", and as specified below.
 - 2. **The rectangular duct sizes as indicated on the Drawings are inside dimensions, or net free area.** All necessary allowances should be made in the sizes shown on the Drawings to accommodate internal insulation or acoustic lining.
 - 3. All ductwork shall be provided with any re-enforcements factory installed to meet the SMACNA pressure classifications listed in paragraph 2.01.

4. Transitions shall have a ratio of at least 4 to 1 except where prevented by job conditions. In such case the transition shall be made as gradual as possible.
 5. All duct transitions from square to round shall be smooth square-to-round transitions. Spin-in fittings at the end of capped ducts are not acceptable.
 6. Flanged (TDC or TDF) ductwork with reinforced gasketed joints shall be installed in the following applications:
 - a. Indoor ductwork with any dimension greater than 30 inches.
 - b. All indoor ductwork exposed to view regardless of size.
 - c. All outdoor ductwork regardless of size.
 7. Rectangular ductwork exposed to weather shall be crowned to shed water.
- B. Low Pressure Ductwork
1. Elbows shall be either mitered or radius type for 90 degree turns and radius only for all turns less than 90 degrees as indicated on the Drawings.
 2. Mitered elbows shall be constructed using turning vanes in each mitered 90 degree turn. Turning vanes shall be galvanized steel of double-wall air foil design. Where ductwork is greater than or equal to 12" in the plane of the turn, install turning vanes with 4" minimum radius of curvature on a maximum of 4" centers. Where ductwork less than 12" in the plane of the turn, install turning vanes with 2" minimum radius of curvature on a maximum of 2" centers.
 3. Curved elbows shall have a centerline radius of 1-1/2 times the cross-sectional dimension of the duct in the plane of the turn.
 4. All rectangular branch connections to rectangular ducts shall be a lateral or radius type and include an externally adjustable factory fabricated air turning vane assembly. Where lateral types are installed, the length of the lateral shall be equal to one quarter of the duct width but in no case less than 4". Where radius types are installed, the centerline radius shall be 1-1/2 times the branch duct dimension in the plane of the turn.

2.03 INTERNAL INSULATION (DUCT LINER) FOR RECTANGULAR DUCTWORK

- A. Duct liner shall meet all of the following requirements and include independent testing lab verification of conformance with all of the following product characteristics.
1. Duct liner shall be made of spun or flame attenuated fiberglass with a factory-applied edge coating and of thickness and density based upon the application listed below.
 - a. Indoor applications – 1" thick, 1-1/2 pcf density.
 - b. Outdoor applications – 1-1/2" thick, 1-1/2 pcf density.
 2. The thermal conductivity shall be equal to or less than 0.25 at 75 degree F. mean temperature.

3. The liner shall meet the Life Safety Standards as established by NFPA 90A and 90B and shall not support microbial growth as tested in accordance with ASTM G21 and G22.
 4. The duct liner shall conform to the requirements of ASTM C 1071, with an NRC not less than 0.70 as tested per ASTM C 423 using a Type "A" mounting.
- B. Comparable Products
1. Knauf "Ductliner EM"
 2. CertainTeed "Toughgard"
 3. Johns Manville "Linacoustic RC".

2.04 LONGITUDINAL SEAM ROUND LOW PRESSURE DUCTWORK

- A. Concealed round ductwork shall be constructed with SMACNA minimum pressure classification of 2" w.g.
- B. Snap-lock pipe is acceptable as long as all longitudinal and circumferential seams are sealed and screws as indicated in *Part 3 - Execution*.
- C. All elbows and fittings shall be factory fabricated items by the same manufacturer as ductwork. Wye and laterals at diffusers take-offs shall be factory fabricated.

2.05 FLEXIBLE AIR DUCTWORK

- A. Insulated Flexible Air Duct: Factory made including mineral fiber insulation with maximum C factor of 0.16 (R=6) at 75 degrees F. mean temperature, encased with a low permeability moisture barrier metalized outer jacket, having a puncture resistance of not less than 50 Beach Units. Acoustic insertion loss shall be not less than 3db per foot of straight duct, at 500 Hz, based on 6-inch duct, air velocity at 2500 fpm.
- B. Flexible ducts shall be listed by Underwriters Laboratories, Inc., complying with UL 181. Ducts larger than 8-inches diameter shall be Class 1. Ducts 8-inches in diameter and smaller may be Class 1 or Class 2.
- C. Minimum working pressure for low and medium pressure systems: 6-inches w.g. positive, 2-inches w.g. negative.
- D. Duct Clamps
 1. Stainless steel strap with cadmium plated worm gear tightening device.
 2. Nylon tie wrap minimum 1/4 inch wide.

2.06 FLEXIBLE DUCTWORK ELBOW SUPPORTS

- A. Elbow supports shall be constructed of durable composite material and be fully adjustable to support flexible duct diameters 6 –16 inches Elbow supports shall be UL listed for use in return air plenum spaces. Flexible ductwork elbow supports equal to Thermaflex FlexFlow Elbow.

2.07 JOINT SEALING

- A. Sealant: Elastomeric compound, gun or brush grade, maximum 25 flame spread and 50 smoke developed (dry state) compounded specifically for sealing ductwork. Use products as recommended by the manufacturer for low, medium or high-pressure metal duct systems.
- B. Tape/Gaskets in flanged joints such as TDC or TDF: Soft butyl rubber/elastomeric composition equal to Sticky Tape manufactured by Ductmate.

2.08 ROUND FABRIC DUCTWORK

- A. Provide all connectors, fittings, flow straightener/equalizers suspension system and adaptors by same manufacturer. All materials utilized shall have been tested and bear the UL label to be in compliance with the flammability and smoke developed limitations of NFPA 90A. Exposed low-pressure ductwork shall be equal to DUCTSOX or approved equal.
- B. See Drawings for clarity regarding most required accessories, configuration, length, etc.
- C. All exposed to view ductwork indicated to include a factory colored finish, with colors as selected by OWNER.
- D. Fabric ductwork shall be warranted for ten (10) years, non-prorated, parts only.

PART 3 – EXECUTION**3.01 GENERAL INSTALLATION REQUIREMENTS**

- A. Comply with provisions of Section, BASIC MECHANICAL MATERIALS AND METHODS, particularly regarding coordination with other trades.
- B. Fabricate and install ductwork and accessories in accordance with referenced SMACNA Standards and manufacturer's printed instructions.
- C. Fabricate ductwork based on field measurements of space available. Sizes on plans may be altered by the CONTRACTOR, when approved by the ENGINEER, to other dimensions without increasing air pressure friction losses where necessary to avoid interferences and clearance difficulties.
- D. All ductwork located outdoors shall be sealed water tight on all seams and connections.
- E. Provide duct transitions, offsets and connections to dampers, coils, and other equipment.
- F. Weld sheet metal in accordance with SMACNA, Guidelines for Welding Sheet Metal. Repair damaged galvanized areas with galvanizing repair compound.
- G. Each collar for outlet and intake devices on exposed ducts shall be flanged inward at the device mounting end, and the outside dimensions of the collar shall not be less than the overall flange dimensions of the devices attached thereto.
- H. At each location where exposed ductwork passes through finished walls, floors, or ceiling, install a neat sheet metal collar completely covering the rough opening in the building construction secured to ductwork with sheet metal screws.

- I. Provide UL approved flexible connectors per Section Mechanical Sound and Vibration Control.
- J. Construct casings, eliminators, and pipe penetrations in accordance with applicable SMACNA Standards. Design casing access doors to swing against air pressure so the pressure helps to maintain a tight seal.
- K. Install fire, smoke and combination fire/smoke dampers in accordance with the manufacturer's instructions to conform to the installation used for the rating test.
- L. Where diffusers, registers and grilles cannot be installed to avoid seeing inside the duct, or items and other installations above the ceiling through plenum grilles, paint the inside of the duct or above ceiling installations, with flat black paint to reduce visibility.
- M. Protection and Cleaning
 - 1. Adequately protect ductwork and equipment against physical damage and entry of foreign matter to the inside at all times both prior to and after installation into project.
 - 2. Cap open ends of ducts and equipment when not in operation.
 - 3. Clean ductwork and equipment prior to painting. See PAINTING section for specific requirements pertaining to surface preparation.
 - 4. Both the inside and outside of all ductwork and equipment shall be clean and free of dust, debris, foreign material, etc. prior to final acceptance of the project.
 - 5. Place equipment in first class operating condition, or return to source of supply for repair or replacement, as determined by PROFESSIONAL.
- N. Control Damper Installation:
 - 1. Provide necessary transitions required to install dampers which do not match the duct size indicated.
 - 2. Assemble multiple section dampers with required interconnecting linkage and extend required number of shafts through duct for external mounting of damper motors.
 - 3. Provide necessary sheet metal baffle plates to eliminate stratification and provide air volumes specified. Locate baffles by experimentation, and affix and seal permanently in place, only after stratification problem has been eliminated.

3.02 INTERNAL INSULATION (DUCT LINER) FOR RECTANGULAR DUCTWORK

- A. The following rectangular ductwork shall be interior acoustically lined:
 - 1. Ductwork within ten (10) feet of any supply or return fan for HVAC applications, except built-up R/A plenums.
 - 2. Ductwork within ten (10) feet of exhaust fans.
 - 3. Ductwork exposed to view indoors.
 - 4. Supply and Return ductwork located outdoors.

5. Transfer air ductwork and plenums.
 6. Supply air plenums adjacent to air moving equipment, etc.
 7. Ductwork within ten (10) feet of any air terminal unit (variable air volume box).
 8. Where specifically indicated on Drawings.
- B. The duct liner shall be applied to the flat sheet with 100% coverage of adhesive with the black matte surface facing the air stream.
 - C. Ducts with the sides or bottom dimension exceeding 20" shall have the liner additionally secured with welded pins and speed clips or "Gripnails" on a maximum of 12" centers and within 3" of edges. Pins shall be cut close to the speed clips.
 - D. Provide sheet metal nosing on all liner, where liner terminates and ductwork continues.
 - E. All seams, exposed edges and leading edges of all longitudinal and cross-joints of the liner shall be coated with an approved white sealant "butter".
 - F. Wet butter shall also be applied to duct to duct seams and connections simultaneously with the jobsite installation.

3.03 LONGITUDINAL SEAM ROUND LOW PRESSURE DUCTWORK

- A. Screws shall be installed every 18" O.C. along longitudinal seams and minimum 6" from end connections
- B. Screws shall be installed every 4" on center, but not less than 4 equally spaced, on circumferential ductwork and fitting joints.
- C. All elbows and fittings shall be factory fabricated items by the same manufacturer as ductwork. Wye and laterals at diffusers take-offs shall be factory fabricated.
- D. No dovetail field joints or fittings are allowed.

3.04 FLEXIBLE AIR DUCTWORK

- A. Flexible ducts shall be installed with stainless steel strap or nylon tie wraps with sealant and as approved for UL 181, Class 1 installation. A "tightening gun" shall be utilized when installing nylon tie wraps.
- B. Flexible ducts shall not penetrate any wall, floor, partition or ceiling.
- C. Flexible duct shall be installed in continuous single pieces not over five (5') feet long, as straight and short as feasible, adequately supported.
- D. Centerline radius of bends shall be not less than two duct diameters.
- E. Flexible ductwork shall be suspended on 36" centers with a minimum 1-1/4-inch wide flat banding material.

3.05 JOINT SEALING

- A. **All ductwork joints and longitudinal seams shall be sealed airtight.** Sealant shall be visibly sealed on the exterior of duct, including all factory fittings, all connections, both longitudinal and circumferential.

- B. Duct tape (gray or foil type) shall NOT be utilized as a ductwork sealer.
- C. Elastomeric or hard cast duct sealer shall NOT be utilized on fire damper sleeve to duct connections.
- D. Utilize flanged style ductwork joining system in conjunction with tape/gasket for sealing breakaway joints and connections to fire, smoke and/or combination fire/smoke dampers.

3.06 DUCT LEAKAGE TESTS AND REPAIR

- A. ALL ductwork shall be sealed airtight, as specified herein. Designated ductwork, as hereafter identified, shall be field pressure tested and proven tight. Other ductwork, not specified to be field tested may be randomly inspected by PROFESSIONAL; any or all ductwork not found to be comprehensively sealed (by visual inspection) may be thereafter required to be field pressure tested, solely at PROFESSIONAL'S discretion, to prove air tightness to specified tolerances.
- B. The following ductwork shall be tested by the CONTRACTOR and witnessed and logged by a representative of the TAB Agency performing the work identified in Section *Testing, Adjusting and Balancing*. This includes all supply, return, exhaust, outside air, etc. trunk and all branch ducts, and plenums excluding flexible duct run-outs to individual air distribution devices, shall be tested and proven tight within specified tolerances.
 - 1. All Low Pressure Ductwork.
 - a. Test pressure shall be at pressure class construction requirements identified in Part 2 of this specification.
- C. Measured air quantity leakage test
 - 1. The CONTRACTOR shall use recently calibrated orifice run, manometers and portable blower as recommended by AABC.
 - 2. Instruments used for testing and balancing of system shall have been calibrated within six months preceding tests and checked for accuracy prior to start of work.
 - 3. Instruments shall be of a type normally recognized as adequate and accurate for the test contemplated. List type of instrument, manufacturer, serial number and latest calibration date as a part of the submitted test data.
 - 4. Allowable Leakage
 - a. Low Pressure Ductwork shall have a maximum leakage of five (5) percent of design flow rate (cfm) for complete system or portions thereof. Summation of leakage for all sections shall not exceed the total allowable for a single system.

Verification: By TAB Agency. See attached Duct Test Log.

SECTION 23 09 10 - DUCTWORK ACCESSORIES**PART 1 – GENERAL****1.01 SCOPE**

- A. Ductwork accessories for HVAC including supply air, return air, outside air, transfer air and general exhaust systems.

1.02 APPLICABLE STANDARDS

- A. Refer to Paragraph, QUALITY ASSURANCE, in Section, BASIC METHODS AND REQUIREMENTS (MECHANICAL).
- B. Fire Safety Code: Comply with NFPA 90A
- C. Duct System Construction: Referenced SMACNA Standards are the minimum acceptable quality.
- D. Duct accessories exposed to the air stream, such as dampers turning vanes, extractors, etc. and access openings, shall be of the same material as the duct or provide at least the same level of corrosion resistance.

1.03 DEFINITIONS

- A. Seal or Sealing: Use of liquid or mastic sealant, with or without compatible tape overlay, or gasketing of flanged joints, to keep air leakage at duct joints, seams and connections to an acceptable minimum.
- B. SMACNA duct pressure classification for Low Pressure: Static pressure rating up to 2 inches wg (water gauge), positive or negative, for rectangular ducts, and 1 inch wg for round ductwork.

PART 2 – PRODUCTS**2.01 TAKE-OFF FITTINGS**

- A. Round ductwork take-offs shall be conical/bellmouth type or 45 deg lateral (shoe-tap) type. Provide take-offs with volume damper including continuous shaft, locking quadrant handle, nylon bushings and stand-off bracket. Located where indicated and accessible.
- B. Conical take-off fittings shall be equal to Flexmaster model CBD SOG with B03 option.
- C. 45 deg lateral (shoe-tap) take-off fittings shall be equal to Flexmaster model STOD with B03 option.

2.02 DAMPERS

- A. Rectangular Volume Dampers: Opposed blade, multi-louver type. Provide end bearing for all dampers. Quadrant or other operator for externally insulated duct shall have stand-off mount so operation is clear of the insulation.
- B. Backdraft Dampers: Self-operating, multi-blade damper to open fully on 0.06 inch wg pressure difference and close by gravity. Aluminum, 16 gauge frame, 0.023 inch blades of airfoil or elliptical shape, with tie-bar to connect blades for parallel operation. Provide resilient gasket for air seal and quiet operation. Blade pivots shall be in nylon bushings. Provide adjustable counter-balance weight(s) where indicated or required to achieve specified performance.

2.03 DUCT ACCESS DOORS, PANELS AND SECTIONS

- A. Provide access doors, sized and located for maintenance work, upstream where possible, in the following locations:
 - 1. Each fire damper (for link service), fire/smoke damper, smoke damper and automatic control damper.
 - 2. Each duct mounted smoke detector.
 - 3. Each duct mounted coil.
 - 4. Each turn in grease ducts.
- B. Openings shall be as large as feasible in small ducts, 8" diameter minimum, with round spin-in access door and sash lock(s). Access sections in insulated ducts shall be double-wall, insulated.
 - 1. For low and medium pressure rectangular ducts, provide Flexmaster Model SDSM with R6 insulation option, flange with stick on gasket and cable door retention accessories.
 - 2. For round and flat oval ducts provide Ruskin Model ADR.

2.04 AIR DISTRIBUTION DEVICES

- A. Including supply, return, transfer and exhaust ceiling, floor and sidewall installation, aluminum gasketed construction as indicated. Provide steel construction and matching UL Listed ceiling radiation damper on applications in fire rated ceiling assemblies.
- B. All inside ceiling units shall have factory finish, off-white color unless otherwise noted.
- C. All soffit outdoor units shall have factory finish, color to match soffit. Submit color chart to ARCHITECT for custom color selection.
- D. See Schedule on Drawings for more information.

PART 3 – EXECUTION**3.01 INSTALLATION**

- A. Comply with provisions of Section, BASIC MECHANICAL MATERIALS AND METHODS, particularly regarding coordination with other trades.
- B. Construct casings, eliminators, and pipe penetrations in accordance with LPDS, Chapter 3. Design casing access doors to swing against air pressure so the pressure helps to maintain a tight seal.
- C. Install duct hangers and supports in accordance with SMACNA, LPDS, Chapter 5, and HPDS, Chapter 6, in concealed applications.
- D. Install life safety dampers in accordance with the manufacturer's instructions to conform to the installation used for the rating test. Install multiple access doors to provide access to all damper linkages/fusible links of multiple section life safety dampers.

- E. Seal openings around duct penetrations of fire rated ceilings and partitions with fire stop material as required by NFPA 90A. See Section *Basic Mechanical Materials and Methods*. Provide sound sealant around duct penetrations in wall indicated as sound and/or full height walls.
- F. Provide primary and secondary balance dampers on all supply distribution devices. Provide a supply air duct damper and air extractor off main ductwork to branch ductwork of the types as listed below:
 - 1. Round Ductwork: Provide conical or lateral type taps with integral butterfly damper. Submit information for approval.
 - 2. Rectangular Ductwork: Provide radius or lateral elbow tap, as indicated with air extractor assembly and opposed blade multi-blade damper.
 - 3. Provide exterior duct damper and extractor controller arm assemblies that extend past proposed ductwork installation for accessible operation.
- G. When splitter dampers occur above other than lay-in ceiling, provide damper assembly complete with supports, bearings, chromium plated ceiling escutcheons and adjustable regulator, as Young Models No. 1 and No. 890-A.

END OF SECTION

SECTION 23 09 80 - CONTROLS AND INSTRUMENTATION**PART 1 – GENERAL****1.01 DESCRIPTION**

- A. Provide complete HVAC controls and instrumentation for the following items:
 - 1. Air Handling Systems Including:
 - a. Exhaust Fans
 - b. Direct Expansion Systems
- B. Definitions:
 - 1. Deviations: The difference between the controller set point and the value of the controlled variable (such as room temperature) at any instant.
 - 2. Dead band: A temperature range over which no heating or cooling energy is supplied, such as 72-78 degrees F, i.e., as opposed to single point changeover or overlap.
 - 3. Control Wiring: Includes conduit, wire and wiring devices to install complete HVAC control systems including motor control circuits, interlocks, thermostats, switches and like devices.

1.02 QUALITY ASSURANCE

- A. Criteria:
 - 1. The maximum deviation of occupied room conditions from the controller set point shall not exceed plus or minus one degree F for temperature, and plus or minus three percent for relative humidity unless the system is operating in the dead band range.
- B. Performance tests:
 - 1. Demonstrate to the Owner that all controls are installed, adjusted, and can perform all functions required by the contract drawings and specifications.

1.03 SUBMITTALS

- A. Manufacturer's Literature and Data for all components, including the following:
 - 1. Controllers.
 - 2. Relays and switches.
 - 3. Control dampers, control valves and operators.
 - 4. Instrumentation products.
- B. Certificates:
 - 1. Compliance with paragraph, QUALITY ASSURANCE.
 - 2. Name and address of a permanent service organization maintained or trained by the manufacturer that will render satisfactory service within eight hours after notification that service is required.

- C. Control Drawings: Integrate with flow diagrams; show outlines of HVAC equipment with control devices, schematic one line control piping and wiring, and written sequence of operation and operation instructions. Equipment numbers shall correspond to those shown on the Contract Drawings. Provide three (3) complete sets of blue-line as-built drawings.
- D. Operation and Maintenance Manuals:
 - 1. Submit in accordance with Section *Mechanical Close-Out Requirements*.
 - 2. Include the following documentation:
 - a. General description and specification for all components.
 - b. Detailed illustrations and complete calibration procedures.
 - c. Complete trouble-shooting procedures and guidelines.
 - d. Complete operating instructions for all systems.
 - e. Piping schematic/flow diagrams.

1.04 INSTRUCTIONS

- A. Instructions to OWNER Operations Personnel: Perform in accordance with Section *Mechanical Close-Out Requirements*.
- B. Training by independent or franchised dealers who are not direct employees of the temperature control company will not be acceptable.

1.05 GUARANTY

- A. Any defects in workmanship or material during the guaranty period shall be corrected by the CONTRACTOR at no cost to the OWNER. Correction of defects shall be accomplished during regular working hours.

PART 2 – PRODUCTS

2.01 SENSORS AND CONTROLLERS

- A. Combination heating/cooling thermostat: This remote wall sensor/controller is to be utilized to control split and/or packaged HVAC equipment with heating and cooling capabilities. Thermostats shall be of the low voltage or electronic adjustable type and shall conform to requirements of UL 873. Thermostats for air conditioners shall be provided and shall be combination heating-cooling type with contacts hermetically sealed against moisture, corrosion, lint, dust and foreign materials. Thermostats shall be designed to operate on not more than 1.5 degrees Fahrenheit differential from setpoint to actual temperature, or as noted, and of suitable range calibrated in degrees Fahrenheit. Thermostats shall have adjustable heat anticipation and fixed cooling anticipation. Air conditioning heating/cooling thermostats shall contain two independent temperature sending elements electrically connected to control the heating and cooling operation(s), respectively. The electrical characteristics shall be 24V AC or less. The maximum differential between heating and cooling setpoints shall be 3 degrees Fahrenheit. Automatic switching for system changeover from heating to cooling or cooling to heating shall be accomplished through the use of a thermostat sub base. Provide all thermostats with visible temperature space read out in degrees Fahrenheit, and adjustable separate setpoint control for heating and cooling functions.

Provide the number of stages of control, with a nominal 3 to 5 degrees Fahrenheit between stages, for heating and cooling functions to match the number of stages scheduled and/or specified. Provide a type thermostat with emergency/auxiliary heat control capability matched to heat pump applications.

- B. Humidistat: Low voltage or electronic type sensor/controller capable of minimum 2% relative humidity accuracy, and no more than 1% drift per year temperature compensating, non-condensing, early field calibratable, sensor/controller shall energize humidity control equipment/capability on a rise in space above setpoint. Provide multistage or multiple setpoint humidity sensor/controllers to match equipment scheduled and/or specified capability and/or control.

Duct or Plenum sensing humidity sensor/controllers shall include duct penetration probe or other suitable PROFESSIONAL approved sensing capability, as Johnson Controls HE-67 or as approved.

2.02 RELAYS:

- A. Provide as required for system functions.
- B. Electrical Pilot Duty or Contactor Types: Provide inductive rated contacts for circuits with coils, motors or other inductive devices, minimum 120V, 15A. rating.

2.03 MOTORIZED CONTROL DAMPERS

- A. Dampers shall be of the airfoil, ultra low leakage, opposed blade design. Dampers shall be constructed of minimum 16 gauge galvanized steel. Side mounted linkage shall be out of airstream. Blades shall include rubber edge seals for tight seal.
- B. Damper actuators shall be two-position normally closed low-voltage type.
- C. Design and install control dampers to "fail safe" in either the normally open or normally closed position as required for freeze, moisture, smoke or fire protection.

2.04 FINAL CONTROL ELEMENTS AND OPERATORS

- A. Fail Safe Operation: Design and install control valves and dampers to "fail safe" in either the normally open or normally closed position as required for freeze, moisture, smoke or fire protection.
- B. Spring Ranges: As required for system sequencing and to provide tight close-off.

2.05 WIRING MATERIALS

- A. Comply with applicable sections of *Division 26 and 28*. Provide wiring for control devices furnished under this Section, HVAC motor control conduits and interlocks. Color code and number all wires, whether individual or in cables, for identification.
- B. A complete wiring system shall be provided for all direct digital control (DDC) and electric controlled apparatus. All wiring shall be installed in a neat, workmanlike manner, of sufficient size and tested to be continuous and without unnecessary "short".

Wiring shall be as follows:

1. Exposed Areas and Mechanical Equipment Rooms: Wiring shall be routed in metallic conduit per Div. 26 and 28 requirements. Provide flexible conduit connections to rotating equipment.

2. Concealed, Accessible Areas: Wiring may be routed outside in above ceiling accessible spaces conduit, however wiring outside conduit shall be sheathed with plenum rated jacket with maximum rating of 50/25 smoke developed/fire rated per NFPA 90A.
 - a. All wiring will be routed in the bar joists and/or roof structure space and supported with tie-straps at maximum 6'-0" on center.
 - b. All drops and risers to HVAC equipment, fans, sensors, etc., will have a tie-strap installed directly above each device to insure a vertical support to the device.
 - c. Any open wiring that enters a conduit in the walls or drop/rise to connect equipment will have a minimum of 12" of wire looped outside the conduit above the ceiling and will be attached utilizing a tie-strap within 12" of the conduit end or connection.
3. Inaccessible Areas: Same as #1 above - includes wiring in walls, above hard ceilings, in chases, etc.
4. Inside Panels or Unit Enclosures: Wiring may be run outside conduit and neatly tied in bundles for neatness and function.
5. Wiring in exterior and moist environments shall be routed in weatherproof liquid tight conduit with matching fittings and connections.
6. Minimum gauge for low voltage (24VAC or less) control wiring shall be 18 AWG copper solid conductor(s).

2.06 IDENTIFICATION/SIGNAGE

- A. Provide permanent phenolic labels for all operators, controllers, and sensors. Coordinate with ENGINEER on designations required. Submit Shop Drawing of installation indicating switch location(s) and identification. See Section *Mechanical Identification*.

2.07 CONTROL SEQUENCES

Control sequences shall be:

- A. PACKAGED GAS HEATING/ELECTRIC COOLING SYSTEMS (WITH INTEGRAL HOT GAS REFRIGERANT COIL FOR HUMIDITY CONTROL)
 1. UNIT CONTROLS SHALL BE ENERGIZED FROM THERMOSTAT CONTROLLER LOCATED AS INDICATED ON DRAWINGS.
 2. WHEN THE UNIT CONTROLS ARE ENERGIZED, WITH THERMOSTAT FAN "AUTO-ON" SWITCH IS IN "ON" POSITION, EVAPORATOR FAN SHALL RUN CONTINUOUSLY AND ZONE HEATING AND COOLING THERMOSTAT SHALL CONTROL THE HEATING FUNCTION AND CYCLE CONDENSING UNITS TO MAINTAIN ZONE ENVIRONMENT CONDITIONS.
 3. UNITS DESIGNATED WILL INCLUDE AND BE DE-ENERGIZED BY SMOKE DETECTOR(S) LOCATED IN THE RETURN DUCT/PLENUM AND SUPPLY AIR TRUNK DUCT IF PRODUCTS OF COMBUSTION ARE DETECTED.

4. A ZONE LOCATED HIGH LIMIT HUMIDITY SENSOR/CONTROLLER SET INITIALLY ON 60% RH AND LOW AND HIGH LIMIT THERMOSTAT SETTINGS OF 62 AND 85 DEGREES F. RESPECTIVELY, SHALL AUTOMATICALLY OVERRIDE PROGRAMMABLE THERMOSTAT TIME BASED "NORMAL OCCUPANCY" CONTROL OF ALL ZONE COOLING/HEATING CAPABILITY FOR UNOCCUPIED PERIOD UPPER LIMIT HUMIDITY, MANAGEMENT OF UTILITY USAGE AND/OR FREEZE PREVENTION.
5. DURING UNOCCUPIED PERIODS, SUPPLY FAN SHALL BE CYCLED IN CONJUNCTION WITH A CALL FOR HEATING/COOLING OR DEHUMIDIFICATION.
6. DURING ALL PERIODS, ZONE HUMIDISTAT SHALL ENERGIZE REFRIGERATION CAPACITY AND THERMOSTATIC CONTROLS SHALL CYCLE REFRIGERANT HOT GAS REHEAT AND SEQUENCE GAS VALVE, IN STEPS, AS SECOND STAGE HEATING CAPABILITY, TO MAINTAIN ZONE THERMOSTATIC AND HUMIDITY SETPOINT PER MANUFACTURER'S CONTROLS STRATEGY.
7. PROVIDE INDIVIDUAL EVAPORATOR COIL CIRCUIT FREEZESTAT COMPRESSOR SHUTDOWN AND AUTOMATIC TIME DELAY RESTART CONTROLS ON SYSTEMS SCHEDULED WITH LOW AMBIENT CONTROLS AND ALL UNITS WITH DUAL CIRCUIT EVAPORATORS.
8. WHERE INDICATED ON DRAWINGS, OUTSIDE AIR DAMPER POSITION SHALL BE OVERRIDDEN BY DRY BULB BASED ECONOMIZER CONTROLS WHEN OUTSIDE AIR AND RETURN AIR CONDITIONS INDICATE LESS ENERGY IS REQUIRED TO CONDITION OUTSIDE AIR THAN RETURN AIR. OUTSIDE AIR DAMPERS SHALL BE COMPLETELY OPENED PRIOR TO BEGINNING TO MODULATE RETURN AIR DAMPER CLOSED. WHEN CONDITIONS ARE NO LONGER CONDUCIVE TO ECONOMIZER OPERATION, NORMAL SEQUENCE OF OPERATION SHALL RESUME. DRY BULB ECONOMIZER CONTROLS SHALL BE DISABLED WHEN AMBIENT TEMPERATURE RISES ABOVE 65 DEG (ADJUSTABLE).

B. VARIABLE REFRIGERANT FLOW/VOLUME HEATING/COOLING SYSTEMS

1. UNIT CONTROLS SHALL BE ENERGIZED FROM PROGRAMMABLE THERMOSTAT CONTROLLER LOCATED AS INDICATED ON DRAWINGS.
2. WHEN THE UNIT CONTROLS ARE ENERGIZED, ZONE HEATING AND COOLING THERMOSTAT SHALL CONTROL THE HEATING/COOLING OF VIA THE BRANCH CONTROLLER IN CONJUNCTION WITH THE OUTDOOR UNIT AND TO MAINTAIN ZONE ENVIRONMENT CONDITIONS.

C. SELF CONTAINED DEHUMIDIFIER(S)

1. UNIT(S) SHALL BE SEQUENCED BY UNIT MOUNTED CONTROLLER SET TO INITIALLY MAINTAIN MAXIMUM 60% RELATIVE HUMIDITY (RH).

D. FANS:

1. SEE CONTROL SEQUENCE AT SCHEDULE(S) ON DRAWINGS.

PART 3 – EXECUTION

3.01 INSTALLATION AND ADJUSTMENT

- A. Install and adjust required control components and systems in accordance with instructions of the manufacturer. Work shall be performed by employees of the manufacturer or an authorized representative.
- B. All control wiring shall be routed in accordance with paragraph 2.05 herein. Install control wiring and connections in accordance with applicable Sections of *DIVISION 26 and 28*.
- C. Except for short apparatus connections run conduit parallel to or at right angles to the building structure. Conceal conduit in finished spaces.
- D. Do not run conduit concealed under insulation or inside ducts. Mount control devices and conduit located on ducts or apparatus with external insulation or stand-off support to avoid interference with insulation.
- E. Run wire connecting devices on or in control cabinets parallel with the sides of the cabinet neatly racked to permit tracing. Rack connections bridging a cabinet door along the hinge side and protect from damage. Provide grommets, sleeves or vinyl tape to protect plastic tubing or wires from sharp edges of panels, conduit, and other items.
- F. Provide all necessary factory and/or field labor for complete calibration and adjustment of the air flow control components, and be responsible for setting all control set-points, operating sequences, and alarm systems contained within the control center to produce the system performance specified.
- G. CONTRACTOR shall provide all power wiring and connect relays, time clocks, control panels, MCP, etc. which are furnished by CONTRACTOR.
- H. Provide permanent identification of panel MCP, time clock, and all controllers, by zone, etc. as per Section *Mechanical Identification* and PROFESSIONAL'S instruction. Submit details of proposed identification along with control schematics and device specifications for PROFESSIONAL'S approval. Submit Drawings, schematics, operating instructions, etc. to be posted, framed, laminated, etc. to PROFESSIONAL for approval.

3.02 FIRE ALARM/SMOKE DETECTION COORDINATION

- A. A new fire alarm system is being installed as a part of this project (see *DIVISION 26 and 28*). The CONTRACTOR shall provide and install all specified duct and/or plenum mounted smoke detectors as called for by code, specified, and on Mechanical Drawings, etc. and connect devices to fire alarm system.
- B. In general, all smoke detectors shall annunciate to, and be compatible with the fire alarm system. All fire alarm wiring, annunciators, and adaptation to fire alarm system by the CONTRACTOR. All shutdown and controls to automatically de-energize HVAC systems are by the CONTRACTOR.
- C. It is the CONTRACTOR's responsibility to coordinate these responsibilities for safety and operating controls, for complete and operative HVAC systems.
- D. Smoke detectors of proper size and type shall be furnished and properly installed per NFPA and International Electrical and Mechanical codes. The detectors shall

be furnished with necessary N.C. and N.O. contacts to accomplish shutdown of HVAC systems.

- E. Each detector shall have a remote alarm and test station installed where directed by ARCHITECT or as shown on Drawings.
- F. See *Division 26 and 28* specifications for other requirements; coordination by this CONTRACTOR.
- G. In general, specified CONTRACTOR above shall furnish and install approved smoke detection and shutdown controls for the following HVAC equipment and accessories:
 - 1. HVAC air handling systems with air delivery capacity 2000 cfm or greater.
 - 2. This includes makeup air, exhaust, heat recovery, ventilation and similar HVAC support and auxiliary systems.
 - 3. All HVAC equipment with smoke detectors shall be additionally connected to the fire alarm system such that the equipment shall automatically be de-energized by any fire alarm annunciation from the same zone as is served by the same HVAC equipment.

END OF SECTION

SECTION 23 09 90**TESTING, ADJUSTING AND BALANCING****PART 1 – GENERAL****1.01 SCOPE**

- A. The process of Testing, Adjusting and Balancing (TAB) for mechanical HVAC and Plumbing systems is a requirement for this project.
- B. Definitions and Abbreviations:
 - 1. TAB: Testing, Adjusting and Balancing. The process of checking and adjusting HVAC and plumbing systems to meet design objectives and performance intent.
 - 2. AABC: Associated Air Balance Council.
 - 3. NEBB: National Environmental Balancing Bureau.
 - 4. Plumbing Systems: Domestic hot water and re-circulating systems.
 - 5. Air Systems: Included all supply air, return air, exhaust air, transfer air and outside air systems.
- C. The CONTRACTOR shall provide the services of a qualified independent TAB Agency for testing, adjusting, and balancing as described herein and include same in his bid. CONTRACTOR shall submit TAB AGENCY experience, agenda and associated credentials to PROFESSIONAL for TAB AGENCY and agenda approval.

1.02 APPLICABLE STANDARDS

- A. TAB Agency Qualifications: Current membership in AABC or NEBB.
- B. Performance Criteria: Work shall be performed in accordance with the approved TAB agenda requirements.
- C. Test Equipment Criteria: The basic instrumentation requirements and accuracy/calibration required by AABC (Section Two) or Section II of the NEBB Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems.
- D. A factory air test hood, recently calibrated, shall be utilized for ceiling air device CFM measurement.

1.03 APPLICABLE PUBLICATIONS:

The following publications form a part of this Specification to the extent indicated by the reference thereto. In text the publications are referred to by the initials of the organization.

- A. Associated Air Balance Council (AABC):
 - 1. National Standards for Total System Balance, 2002 Edition
- B. National Environmental Balancing Bureau (NEBB):
 - 1. Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems, 8th Edition, 2015

2. Procedural Standards for Measuring Sound and Vibration, 2nd Edition, September 2006

1.04 CORRESPONDENCE

- A. Representative of TESTING, ADJUSTING and BALANCING Agency shall report to the CONTRACTOR, during all phases of the test and balance process, any deficiencies that will impair the proper balance and operation of the systems involved. This shall include, but not limited to, reporting balancing valves/dampers, controls, and safety sensors, etc. not installed as called for on the Plans or in the Specifications.
- B. The TAB Agency shall submit preliminary reports a minimum seven (7) days prior to scheduled substantial completion for this project or any phase thereof, and including a comprehensive narrative of problems, obstacles, recommendations, and remedial actions for PROFESSIONAL'S review and approval.
- C. TAB Agency shall not release any reports to other parties until such has been approved by the PROFESSIONAL.

PART 2 - PRODUCTS - NOT USED

PART 3 – EXECUTION

3.01 GENERAL

- A. Coordinate TAB procedures with any phased construction requirements for the project so that usable increments of finished work may be accepted for beneficial occupancy. Systems serving partially occupied phases of the project may require balancing for each phase prior to final balancing and shall required separate TAB effort and reports for each phase and submittal prior to advancing to next phase of project.
- B. Allow sufficient time in construction schedule for TAB prior to substantial completion inspection for the project.
- C. Conduct final TAB after system has been completed and is in full working order. Put all HVAC systems into full operation and continue operation of the systems during each working day of TAB. Accomplish TAB in accordance with the CONTRACTOR provided Agenda approved by PROFESSIONAL.
- D. Substantial Completion: Substantial Completion of mechanical systems shall not be given without TAB Agency's written certification that the mechanical systems and controls have been thoroughly tested and are safely performing as intended. See certification required herein. No other certification will be acceptable.
- E. Preparation of Equipment and Systems for Testing and Balancing:
 1. The CONTRACTOR shall, upon completion of items or work required by this contract, thoroughly clean all dirt and debris from equipment, ducts, piping systems, strainers, accessories, etc.
 2. All bearings, gear boxes, wearing surfaces, or other equipment components requiring lubrication shall be properly serviced as recommended by the equipment manufacturer and shall be tagged with the date of service and type of lubricant used.

3. All specified cleaning and protective devices shall then be installed in equipment, piping, plenums, ductwork, etc., and systems shall be placed in continuous operation.
 4. All fans shall have been in operation for at least twenty-four (24) hours prior to the start of testing and balancing so that initial stretch of drive belts will have taken place, and all other mechanical equipment including all temperature and operating control devices will have been adjusted and calibrated for complete and functional operating service.
- F. System balancing and performance testing:
1. The CONTRACTOR shall secure copies of all report forms, data sheets, and instrumentation to be used by the agency in the performance of their services and submit the same for approval. This submittal data shall include a tabulation of instruments and devices to be utilized in the performance of testing and balancing operations and shall include the name of the manufacturer of the instrument of devices, model number, range, degree of accuracy, date of last calibration, or the other pertinent information that may be required to determine the utility of the instrument of device. As a minimum requirement, the following instrumentation shall be employed in the performance of balancing and testing of mechanical system: swinging vane or hot wire type anemometer, low ran (0-0.25 in. water column) inclined tube manometer, high range (0-20 in. water column) U-tube manometer, pilot tube, ammeter, volt-meter, self-timing tachometer (maximum scale Division 2 rpm) pyrometer, powered psychrometer, vibration meter, other instruments, tools, and devices as required to accurately balance and test mechanical systems and components.
- G. It is the responsibility of this section to make certain that all the submitted and/or existing equipment has proper motor size, sheave size, belt size, etc.

3.02 AIR BALANCE

- A. Place all interactive systems in operation with all filters installed and automatic control systems completed and operating. Artificially load air filters by partial blanking or other means to provide air pressure drop midway between the clean and dirty condition. Set/reset room thermostats and humidistat, and/or equipment controls as necessary to check heating and cooling functions, and air flow rates for air distribution devices and adjust units if not within specified tolerances.
- B. Balance systems to design ratings. Adjust fan speeds to provide design flows, including system diversities, at actual system pressures. Belt drives, including sheaves, belts, etc. shall be adjusted and/or replaced as required to safely obtain specified performance.
- C. Make pitot tube traverses of all trunk lines and major branches when required to determine proper proportioning of air flows. Airflow measuring devices, where installed, may be utilized for this purpose. Seal duct access holes with snap-in plugs.
- D. Record pressure drop readings across all major system components and significant drops within duct systems such as air filters, coils, heaters, etc.

- E. Make flow and pressure measurements at each terminal device, and each supply, return, or exhaust diffuser. Adjust each air outlet unit within plus or minus 10 percent of design requirements, but total air for each system shall be not less than shown unless otherwise approved by PROFESSIONAL. Adjust grilles and diffusers to minimize drafts in all areas. Mark permanently all damper quadrants at final set points. Total differentials between ventilation and exhaust for the purpose of proper pressurization, shall be maintained.
- F. Adjust exhaust systems to indicated CFM requirements (+/- 10%).

3.03 VIBRATION TESTING

- A. Check for excessive vibration of rotating equipment.

3.04 SOUND TESTING

- A. Check for excessive noise from equipment, air distribution devices, etc. and notify PROFESSIONAL of any objectionable noise levels. Perform noise/sound measurement and provide noise level calculations/results in rooms and areas requested by PROFESSIONAL.

3.05 DUCT LEAKAGE TESTS

- A. See Section *Ductwork* for duct testing requirements.

3.06 BUILDING/ZONE PRESSURIZATION:

- A. The Tab Agency shall test the building pressurization and report same to PROFESSIONAL. These tests shall include various simulations between maximum and minimum ventilation capacities, to assure proper relief capability and pressurization per current ASHRAE recommendations

3.07 MINIMUM TAB DATA REQUIRED

Approved TAB Agency shall furnish all labor and materials to balance the following new and/or modified equipment and systems: The following minimum information shall be provided:

- A. VRF Indoor Units: on systems scheduled to have multiple stages of heating and/or cooling capacity, or CFM requirements, provide the information for temperatures and/or airflow to indicate same for each operating condition (single and multi-stage).
 1. Total S/A CFM –
 2. R/A CFM –
 3. O/A CFM –
 4. R/A E.A.T. Db/Wb (Cooling) –
 5. O/A E.A.T. Db/Wb (Cooling) –
 6. S/A L.A.T. Db/Wb (Cooling) –
 7. R/A E.A.T. Db/Wb (Heating) –
 8. O/A E.A.T. Db/Wb (Heating) –
 9. S/A L.A.T. Db/Wb (Heating) –

10. Fan Motor Voltage –
 11. Motor Horsepower –
 12. Fan Motor Amperage at 100% Capacity –
 13. External Static Pressure –
 14. Size, Type, Efficiency and Relative Condition of all Air Filters –
- B. Pad-Mounted Packaged Units: on systems scheduled to have multiple stages of heating and/or cooling capacity, or CFM requirements, provide the information for temperatures and/or airflow to indicate same for each operating condition. All information/data shall be gathered within a 90 minute period.
1. Total S/A CFM –
 2. R/A CFM –
 3. O/A CFM (Min/Max) –
 4. R/A E.A.T. - Db/Wb (Cooling) –
 5. O/A E.A.T. - Db/Wb (Cooling) –
 6. S/A L.A.T. - Db/Wb - (first stage cooling only)
 7. S/A L.A.T. - Db/Wb - (first & second stages cooling together)
 8. R/A E.A.T. - (Heating) –
 9. O/A E.A.T. (Heating) –
 10. S/A L.A.T. - (first stage heating only) –
 11. S/A L.A.T. - (first and second stages heating together) –
 12. External Static Pressure
 13. Fan RPM
 14. Fan Motor F.L.A. rated vs. actual
 15. Fan Motor Horsepower and Service Factor (belt drive units)
 16. Size, Type, Efficiency and Relative Condition of all Air Filters
- C. Fans:
1. CFM –
 2. Voltage –
 3. F.L.A. –
 4. External Static Pressure –
- D. Dehumidifiers:
1. CFM –

2. Voltage –
 3. F.L.A. –
 4. External Static Pressure –
 5. E.A.T. Db/Wb (Unit on) –
 6. L.A.T. Db/Wb (Unit on) –
- E. Balance all S.A., E.A. and O.A. air distribution devices to within 10% of specified C.F.M., yet main area pressurization and differentials.
- F. Mark all flow C.F.M., balance valve set points, etc. on an 11"x17" reduced scale set of working drawings and submit to PROFESSIONAL with TAB report prior to completion of work.
- G. Submit list of equipment with excessive vibration.
- H. Submit the Test and Balance report as indicated above, along with the working drawing to PROFESSIONAL for approval prior to completion and substantial completion inspection to job.
- I. Verify that all mechanical system controls, safety and shutdown interlock and sequence of operation is as specified. TAB Agency shall provide written certification that he has verified same and/or note any and all discrepancies. See paragraph 3.10 for specific certification.

3.08 TAB SITE VISIT COORDINATION

- A. The TAB Agency shall inform the PROFESSIONAL, in writing seven (7) calendar days prior to his site visit for final TAB of systems such that PROFESSIONAL may be present to witness same, at PROFESSIONAL'S sole discretion. Changes to schedule shall be coordinated with and approved by PROFESSIONAL, with sufficient advance notice. TAB Agency shall be required to coordinate with PROFESSIONAL'S office representative, date of final inspection, and provide random tests and verification of TAB report information, at PROFESSIONAL'S selection.
- B. It shall also be the responsibility of the TAB agency to include the cost of any opposite season check-out of all system components which might be required and modify air distribution delivery and/or temperature to any room, area, or zone which may require adjustment during the first year of system operation.

3.09 SYSTEM CHANGES

- A. Final balancing changes shall be approved by the CONTRACTOR'S who installed the equipment. Changes may encompass, but not be restricted to, changing the pulleys, belts, dampers or adding dampers, balancing valves, etc.
- B. The TAB Agency shall coordinate with the CONTRACTOR any changes required including belts, sheaves, etc. to balance systems within specified tolerances. All cost of any modifications is the responsibility of the CONTRACTOR.

3.10 VERIFICATION / INSPECTION

- A. After the final TAB report is submitted and reviewed by the PROFESSIONAL, he will soon afterward schedule a verification inspection with the TAB Agency. At this inspection, the TAB Agency will test airflow flows, water flows, sound levels, control

operation and sequence, for random air distribution grilles, fans, AHU's, equipment, piping, etc., as selected by PROFESSIONAL.

- B. This inspection will last no longer than four (4) hours for each completed phase of the project. Should this verification information exceed the specified tolerance, the TAB Agency may be required to retest and balance the entire system(s) to these tolerances, solely at the PROFESSIONAL's discretion. A follow-up verification inspection shall then be required, and the procedure will begin again. The cost of these inspections, re-inspections, TAB and reports shall be borne by the CONTRACTOR.

3.11 CERTIFICATION

- A. The TAB Agency shall provide the following written TAB certification within the final TAB report (see also Section *Mechanical Submittals and Shop Drawings*):
1. "The Testing, Adjusting and Balancing (TAB) Agency certifies that the HVAC air and plumbing water systems and controls have had a full range of tests and checks carried out by the TAB Agency, to determine if all components, sub-systems, systems and interfaces between systems operate in accordance with the Contract Documents. This includes all modes and sequences of control operation, interlocks and conditional and specified control responses to abnormal, safety and emergency conditions. The (TAB) Agency had provided to the OWNER the specified training and documentation on the operation of these systems such that these systems can be safely and efficiently operated in line with design requirements."

3.12 OWNER EDUCATION REQUIREMENTS AND INVOLVEMENT

- A. See Section *Mechanical Close-out Requirements* for Owner Education requirements.

END OF SECTION

SECTION 26 00 10 GENERAL PROVISIONS

PART 1 - GENERAL

1.01 GOVERNING CLAUSE

- A. For the sake of brevity, these specifications may omit phrases such as "Contractor shall provide", "unless otherwise indicated or specified", etc., but these phrases are nevertheless implied. Mention of materials and operations requires the Contractor to furnish, install and connect such materials and perform such operations to provide a complete and operating system to the satisfaction of the MDOT Project Engineer.

1.02 GENERAL CONDITIONS

- A. The General Conditions as amended, Information to Bidders, General Requirements, Addenda and other pertinent documents issued by the Mississippi Department of Transportation are a part of these Specifications and shall be complied with in every respect.
- B. Notwithstanding references in the Specifications to equipment, material or type of construction by name, make or catalog number, such reference shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. Where the phrase "or approved equal" is used in the Division 26 Specification, substitute equipment, equivalent in all respects to that specified, of any qualified manufacturer is permitted with the written approval of the Professional and MDOT Architect. Approval will not be considered until after award of contract and only if submitted by the successful Contractor. Where a list of manufacturers and/or catalog numbers is provided and the phrase "or approved equal" is omitted, substitute equipment, equivalent in all respects to that specified, from one of the listed manufacturers is permitted with the written approval of the Professional and MDOT Architect.

1.03 TEST AND OBSERVATIONS

- A. The complete project shall be, during and/or after construction, subject to the tests and observations as herein described and as noted on the drawings. Deficiencies found as a result of these tests and observations shall be corrected by the Contractor within a reasonable period and at no expense to the Owner.
- B. The complete project shall be subject to observations and tests conducted by the Professional, MDOT Project Engineer and MDOT Architect or for him in his presence. Upon notice, the Contractor shall furnish not to exceed two men, one to include the job foreman, and tools to assist and be directed by the Professional and the MDOT Project Engineer / MDOT Architect for a reasonable amount of time to make such tests and observations as are requested by the MDOT Project Engineer.

- C. The complete project shall be subject to observations and tests conducted by any Federal, State and/or local authority having jurisdiction. The Contractor shall make all corrections of any deficiencies required by the authority having jurisdiction to allow building occupancy.
- D. The complete project shall be subject to observations and tests conducted by the Owner's Insurance carrier. After inspection by this agency, Contractor shall make corrections of any deficiencies found adversely affecting the insurance to be carried by the Owner. Acceptance of this report or subsequent reports lie with the Owner.

1.04 RECORD DOCUMENTS

- A. The contractor shall provide to the Professional with the Close-Out Documents the following: Comply with Division 01 Sections

1.05 GUARANTEE

- A. The Contractor shall guarantee to the Owner all work performed under this Contract to be free from defects in workmanship and materials for a period of one year from the date of final acceptance by the Owner except as hereinafter noted.
- B. The Contractor shall correct, repair and/or replace upon notice from the Owner or his authorized representative within a reasonable period of time defects in the work performed under this Contract arising during the warranty period. This repair work shall be provided at no additional cost to the Owner.
- C. Lighting luminaire lamps are hereby exempt from the one-year guarantee as follows with the exception that all lamps are to be operating upon final acceptance of the project:
 - 1. All incandescent lamps shall be warranted for thirty (30) days after the date of final acceptance by the Owner. Lamp burn-outs occurring within this time frame shall be recorded by the Owner and will be reported to the Professional at the end of this warrantee period. Upon notice from the Professional, the Contractor shall furnish and install replacement lamps for each lamp burn-out reported.
 - 2. All gaseous vapor discharge lamps shall be warranted for one hundred eighty (180) days after the date of final acceptance by the Owner. Lamp burn-outs occurring within this time frame shall be recorded by the Owner and will be reported to the Professional at the end of this warrantee period. Upon notice from the Professional, the Contractor shall furnish and install replacement lamps for each lamp burn-out reported.

2. PART 2 - PRODUCTS (Not Used)

3. PART 3 - EXECUTION

3.01 ELECTRICAL SYSTEMS SCHEDULE

A. Provide and connect all equipment and materials for complete and operative systems as follows:

1. Secondary Electrical Service & Distribution System
2. Emergency/Standby Power System
3. Power Outlets & Connections to all Motors & Equipment Lighting & Control System
4. Programmable Lighting Control System
5. Telecommunication System
6. Raceways
7. Miscellaneous Systems as shown on the drawings or stated herein

END OF SECTION

SECTION 26 00 20 CODES AND STANDARDS

PART 1 - GENERAL

1.01 EQUIPMENT/MATERIAL

- A. Use only new equipment and materials of current manufacturer. Equipment/material shall be of current production from manufacturers' of long experience in the manufacture of such types of equipment/material and who are regularly engaged in the production of this type of equipment/material.
- B. Equipment/materials shall be installed and connected in strict compliance with manufacturer's recommendations unless these requirements are exceeded as noted on the drawings or specified herein.
- C. All equipment supplied shall have local service representation where applicable.
- D. Equipment and materials shall be installed and connected in a neat and workmanlike manner.

1.02 CODES

- A. Electrical equipment/material and their installation and connection shall strictly comply with the latest editions and applicable sections of the following listed codes and all applicable federal, state and local codes:
 - 1. NFPA 70 - National Electrical Code
 - 2. (NEC) NFPA 101 - Life Safety Code
 - 3. International Building Code(IBC)
 - 4. International Fire Code (IFC)
 - 5. National Electrical Safety Code (ANSI-C2)

1.03 STANDARDS

- A. All equipment/material shall be manufactured in compliance with applicable National Electrical Manufacturers Association (NEMA), American National Standards Institute (ANSI) and NEC Standards and requirements.
- B. All equipment/materials provided and connected shall be listed by Underwriter's Laboratory (UL) when such listings are issued for the type of equipment/materials. All equipment/material shall be installed and connected in full compliance with their UL listing.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 26 00 30

ELECTRICAL EQUIPMENT/MATERIAL SUBMITTALS

PART 1 – GENERAL

1.01 SCOPE

- A. In addition to the requirements of Section 01 33 00, the information and requirements of this section shall apply to the electrical work.

1.02 EQUIPMENT/MATERIAL

- A. Equipment is specified by manufacturer's name and catalog number and is intended to establish the minimum standards of quality acceptable.
- B. Where the phrase "or approved equal" is used in the Division 26 Specification, substitute equipment, equivalent in all respects to that specified, of any qualified manufacturer is permitted with the written approval of the Professional and MDOT Project Engineer. Approval will not be considered until after award of contract and only if submitted by the successful Contractor. Where a list of manufacturers and/or catalog numbers is provided and the phrase "or approved equal" is omitted, substitute equipment, equivalent in all respects to that specified, from one of the listed manufacturers is permitted with the written approval of the Professional and MDOT Project Engineer.
- C. The manufacturer's name and/or catalog number first mentioned in this specification is considered to be the specified equipment. The "or equal" manufacturers mentioned or other manufacturers proposed by the Contractor shall be considered as substituted equipment.
- D. Substituted equipment shall meet the dimensional and functional requirements of the building as represented by the plans and specifications. All revisions to the contract precipitated by the use of substituted equipment shall be incorporated by the Contractor, after approval in writing by the Professional and MDOT Project Engineer, and at no additional cost to the Owner.
- E. The Professional and MDOT Project Engineer's approval of the shop drawings is only for general conformance with the design concept of the Project and the information given in the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site; information that pertains solely to the fabrication process or to the means and methods of construction; coordination of work of all trades; and performing all work in a safe and satisfactory manner. Approval of the shop drawings does not modify the Contractor's duty to comply with the Contract Documents. Any equipment or work found in the judgement of the Professional or MDOT Project Engineer to be defective or otherwise unsuitable shall be repaired or replaced by the Contractor at no additional cost to the Owner.
- F. If requested in writing by the Professional or MDOT Project Engineer, the Contractor shall submit a scale drawing (scale as directed by the Professional or MDOT Project Engineer) of any electrical equipment area, conduit layout or the like which in the opinion of the Professional or MDOT Project Engineer may present difficulty regarding space allocation or clearances.

1.03 SUBMITTALS

- A. After the project notice to proceed has been issued and with promptness to assure reasonable time for review with no delay to the project, the Contractor shall electronically submit to the Professional and MDOT Project Engineer shop drawings for all equipment and material for the electrical systems for approval whether or not substituted equipment or materials.
- B. The Contractor shall include with his shop drawing submittals a copy of the electrical service characteristics letter required by Section 26 04 50. Shop drawings submitted without this letter attached will not be reviewed until this letter is provided.
- C. Shop drawings shall be submitted by specification section and shall be number as outlined in Section 01 33 00 with all material/equipment shop drawing cut sheets located under the appropriate specification section. All shop drawings shall be original pdf and shall be completely legible. Scanned copies and handwritten information will not be accepted.
- D. Space shall be provided on the title or index page of each section of the shop drawings for the Professional and MDOT Project Engineer’s review stamp and comments. This space shall be clearly labeled as to its use and shall have a minimum size of 7" wide X 5" high.
- E. All submitted equipment/material and associated options, accessories, special features, etc. shall be clearly marked and indicated on all copies of the shop drawings. Provide appropriate shop drawings on all required accessory equipment.
- F. All shop drawings for all systems, equipment and materials including any required one-line drawings, diagrams, etc. shall be submitted together. Partial submittals will not be reviewed without prior consent. Special systems provided by specialized vendors or distributors may be submitted in a separate binder.
- G. Provide complete shop drawings with all pertinent information for the following equipment and/or systems and all required components:
 - 1. Panelboards.
 - 2. Circuit Breakers.
 - 3. Transient Voltage Surge Suppression (TVSS)
 - 4. Devices. Conduits, Boxes and other Raceway
 - 5. Systems. Conductors, 600V.
 - 6. Control/Communication Cabling. Required Cable Test Reports.
 - 7. Wiring Devices.
 - 8. Lighting Luminaires and Accessories.
 - 9. Luminaire Drivers/Ballasts.
 - 10. Luminaire Emergency Battery Packs.
 - 11. Lighting Control System Components.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 26 01 00

BASIC ELECTRICAL MATERIALS & METHODS

PART 1 – GENERAL

1.01 COORDINATION

- A. This Contractor shall familiarize himself with the general construction and building systems of all divisions specified in the Contract Documents. Fully coordinate the installation of all electrical equipment and materials with the general construction work and work of other divisions of the specifications prior to the start of the installation. Notify the Professional and MDOT Project Engineer, prior to installation, of conflicts between electrical and structural, architectural, mechanical, etc. work.
- B. Layout and installation of Division 26 work shall be the responsibility of this Contractor and all conflicts with other trades shall be resolved by the Contractor and approved by the Professional and MDOT Project Engineer prior to installation.
- C. Sequence, coordinate and integrate installing electrical equipment and materials for efficient flow of the work. Coordinate the installation and positioning of large equipment before closing in the building. Providing appropriate pathways, lifting devices, etc. for the installation of electrical equipment and/or materials in new or existing facilities is the responsibility of this Contractor.
- D. Fully coordinate prior to installation all Utility Company services including metering facilities to the facility with the appropriate serving Utility Company. Comply with the requirements of the serving Utility Companies.
- E. The electrical drawings are not to scale. Follow architectural, equipment supplier shop drawings, and manufacturer's shop and installation drawings for accuracy. Coordinate the installation of electrical devices, equipment and/or materials with the architectural drawings, features and finishes for the space where installed.

PART 2 - PRODUCTS

2.01 ELECTRICAL IDENTIFICATION

- A. Conductors or wiring shall be labeled using tape markers of vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.
- B. Engraved plastic labels, signs, etc. shall be melamine plastic laminated punched or drilled for mechanical fasteners and shall be properly secured to associated equipment or device. Engraved legend shall be black letters on white background. Minimum label thickness shall be 1/16 inch.

2.02 FIRE PROOFING

- A. The Division 26 Contractor shall be responsible for procuring and coordinating with the Fire Proofing Contractor to provide the required fire proofing of all electrical penetrations in or through rated assemblies.

PART 3 - EXECUTION**3.01 ELECTRICAL IDENTIFICATION**

- A. Electrical equipment, devices, outlets, conductors, etc. shall be properly and legibly labeled as specified herein.
- B. Where equipment, circuit, etc. identification requires the use of building room numbers and room names, the numbers and names used shall be the final designations issued by the Architect as they appear on the building signage. These designations may or may not be as they are indicated on the Contract Drawings. The Contractor is responsible for fully coordinating the room designations with the Architect.

3.02 ELECTRICAL EQUIPMENT & MATERIAL INSTALLATION

- A. Equipment and materials shall be installed and connected in a neat and workmanlike manner.
- B. Install equipment and materials level, plumb, and parallel and perpendicular to other building systems' elements and components unless otherwise indicated.
- C. Install equipment to facilitate service, maintenance, and repair or replacement of components.
- D. Electrical equipment and devices shall be mounted at the height specified in the appropriate sections or as indicated on the drawings. Mounting heights may be adjusted slightly to permit cutting of masonry block to the top or bottom of the block course nearest the required height. All heights shall be consistently cut above or below the block coursing so that they are the same height above the reference.
- E. The mounting heights of electrical equipment and material shall reference the height above the finished floor or grade above which they are mounted. Mounting heights specified shall reference the center of the box, device, switch or circuit breaker operating handle unless indicated otherwise.
- F. Electrical switchboards, panelboards, motor control centers, disconnect switches, etc. shall be installed with the proper dedicated electrical spaces and working spaces as required by the NEC.

3.03 FIRE STOPPING

- A. Openings around electrical penetrations through smoke or fire rated wall, partition, floor or ceiling assemblies shall be smoke and/or fire stopped using an approved UL listed system designed for the materials encountered to maintain the smoke and/or fire rating of the assembly.
- B. All fire proofing in rated walls, partitions, floors or ceiling assemblies shall be performed by a certified Fire Proofing Contractor.

3.04 CUTTING & PATCHING

- A. Cut, channel, chase and/or drill floors, walls, partitions, ceilings and other surfaces required to permit electrical installations. Obtain permission in writing from the Professional and the General Contractor prior to cutting or penetrating any structural member.

- B. Repair and refinish disturbed finish materials and other surfaces indoors and out-of-doors to match adjacent undisturbed surfaces and/or to existing condition prior to work performed.
- C. Use experienced and skilled mechanics of the trades involved or employ appropriate sub-contractor to perform all repair and refinishing.
- D. All roof penetrations shall be weatherproofed by the Division 7 Contractor. Division 26 Contractor shall be responsible for procuring and coordinating with the Division 7 Contractor to weatherproof all roof penetrations created by the Division 26 work.

3.05 CLEANING & PROTECTING

- A. Properly protect equipment and installations during the construction period to ensure that components, coatings, finishes, cabinets and enclosures are without damage or deterioration at the time of acceptance by the Owner.
- B. On completion of construction within an area, inspect exposed finish of outlets, devices, fixtures, equipment, etc. Remove burrs, dirt, paint spots and construction debris.
- C. Provide touch-up paint on equipment finishes marred during the construction or installation process. Paint shall be as recommended by the equipment manufacturer and shall match the installed equipment finish.

END OF SECTION

SECTION 26 01 10 RACEWAYS & FITTINGS

PART 1 - GENERAL

1.01 RACEWAYS

- A. All power branch circuit/feeder wiring and other systems' wiring as specified shall be in metallic conduit unless specifically noted otherwise on the drawings or herein specified.
- B. Wiring gutters shall not be used unless specifically shown or noted on the drawings.
- C. Rigid non-metallic conduit (RNC) may be used only where specifically shown or noted on the drawings or herein specified.

PART 2 - PRODUCTS

2.01 METALLIC RACEWAYS

- A. Conduits shall be hot-dipped galvanized rigid steel (GRS) per ANSI C80.1/UL 6, intermediate conduit (IMC) per ANSI C80.6/UL 1242 or electrical metallic tubing (EMT) per ANSI C80.3/UL 797 unless specifically shown or noted otherwise on the drawings or herein specified.
- B. Size conduits as shown on the drawings or where size is not shown follow the requirements of the NEC. Four-wire branch circuit homeruns shall be 3/4 inch trade size minimum. Homeruns shall not exceed the number of conductors shown on the drawings unless specific approval is given by the Professional and MDOT Project Engineer.
- C. Where conduit bends/elbows for power circuits are required to be long radius, the minimum bend radius shall be eight (8) times the conduit trade size for conduits 2 inches or greater and six (6) times the conduit trade size for conduits less than 2 inches unless otherwise directed by the Professional and MDOT Project Engineer.
- D. Conduit bends/elbows for communication systems shall be long radius type. The minimum bend radius shall be ten (10) times the conduit trade size for conduits 2 inches or greater and six (6) times the conduit trade size for conduits less than 2 inches unless otherwise directed by the Professional and MDOT Project Engineer.
- E. All conduit bends/elbows uses in conduit systems for electrical service entrances and feeders shall be long radius type unless available installation space is prohibited by the building's structural elements, construction type, etc.

2.02 METALLIC CONDUIT MATERIAL

- A. Conduit shall be provided in accordance with the following schedule unless shown or noted otherwise on the drawings or herein specified:
 - 1. In suspended ceiling construction or non-masonry partitions: GRS, IMC or EMT.
 - 2. In masonry partitions: GRS, IMC or EMT.
 - 3. In any poured concrete: GRS or IMC.
 - 4. In exposed locations indoors: GRS, IMC or EMT.
 - 5. In exposed locations out of doors: GRS or IMC. All conduits buried in earth shall be GRS with polyvinyl, polyethylene or asphaltum coating.

6. All feeders shall be run in GRS or IMC.
7. All electrical power conduits in excess of 1-1/4 inch trade size shall be GRS or IMC.

2.03 FLEXIBLE CONDUIT

- A. Flexible conduit shall be steel. Use not to exceed six (6) feet of flexible metal conduit for connection to motors and/or recessed fixtures unless otherwise specified herein.
- B. Flexible conduit used for connections subject to moisture under normal conditions or where specifically indicated or noted shall be liquid-tight with proper liquid-tight fittings.
- C. All flexible conduit shall have properly sized bonding jumper installed within. The grounding conductor shall be sized as indicated or in accordance with the NEC.
- D. All final connections to motors, transformers or other vibrating equipment shall be with flexible conduit suitable for the environment installed.

2.04 CONDUIT FITTINGS/TERMINATIONS

- A. All conduit fittings shall be steel or malleable iron. Die cast fittings shall not be used.
- B. GRS and IMC conduit fittings:
 1. Steel or malleable iron threaded couplings, elbows and conduit bodies.
 2. Bushings: Shall be the insulating type of steel or malleable iron consisting of an insulating insert molded or locked into the metallic body of the fitting. Bushing for conduits 1-1/4 inch or larger shall be the grounding type with a ground lug.
 3. Locknuts: Shall be bonding type of steel or malleable iron with sharp edges for digging into the metal wall of enclosures/boxes.
- C. EMT conduit fittings:
 1. Couplings and connectors shall be insulated compression type of steel or malleable iron and shall be properly secured to each conduit or box.
- D. Expansion Fittings
 1. Expansion fittings shall be as manufactured by Crouse-Hinds Type XJG with internal grounding or equal approved by the Professional and MDOT Project Engineer.
- E. Seal-Off Fittings
 1. Fittings shall be as manufactured by Crouse-Hinds Type EYS for horizontal and vertical runs, Type EYS elbow seals or equal approved by the Professional and MDOT Project Engineer. All seals shall be properly installed in an accessible location using "Chico X" fiber and "Chico A" sealing compound.

2.05 RIGID NON-METALLIC CONDUIT (RNC)

- A. Where specifically noted and/or indicated on the drawings, wiring may be installed in polyvinyl chloride (PVC) conduit per NEMA TC-2/TC-3//UL651 or equivalent HDPE. PVC conduit shall be sunlight-resistant, electrical grade, Schedule 40 minimum or Schedule 80 where indicated on the drawings.

PART 3 - EXECUTION

3.01 INSTALLATION/ROUTING

- A. All conduits shall be routed concealed above/within ceilings, wall partitions, floors, etc. unless specifically shown or noted otherwise on the drawings or stated herein.
- B. Route conduits parallel and/or perpendicular to walls, ceilings or floors weather concealed or exposed. Homerun conduits shall be combined to form a common routing path and supported from the building structure by trapeze style hangers.
- C. Conduits shall NOT be routed horizontally on the roof without specific approval from the Professional and MDOT Project Engineer.
- D. Make field bends and offsets in conduits in accordance with the NEC and so as not to reduce the internal diameter.
- E. Install raceways with a minimum number of bends in the shortest practical distance, considering building construction and obstructions and other requirements of the drawings and this specification. Provide accessible junction/pull boxes per the NEC to limit distance between pull points to 100 feet or in conduit runs where total raceway bends exceed 360 degrees.
- F. Branch circuit, telecommunication and other systems' conduits shall not be routed in/under floor slab unless specifically shown or noted on the drawings to be installed in that manner, the adjacent building construction methods prohibit concealed overhead routing, or the nature of the connected device/box (i.e. floor boxes) requires this type of routing.
- G. Where conduits are shown or required to be concealed in concrete slabs in contact with earth, conduits 1/2 inch through 1 inch trade size shall be installed in and not under slabs. Conduits in excess of 1 inch trade size shall be installed under slab and shall have two coats of asphaltum paint applied or shall be coated with polyvinyl, polyethylene or other approved coatings. Where conduit symbol indicates conduit concealed in floor slab and concrete thickness is less than four (4) inches, conduits shall be installed below slab. Conduits shall be routed as required so as not to compromise the structural integrity of any concrete.
- H. Protect conduit stub-ups above floor slabs, finished grade, etc. from damage during and after the construction period. Provide temporary closures to prevent entrance of moisture or debris into conduits and make certain that conduits are clear of same before installing conductors.
- I. Pull into all empty conduits one nylon pull string with not less than 200 lb. tensile strength. Leave at least 12 inches of slack at each end.

3.02 SUPPORTS

- A. All conduits and conduit fittings shall be properly supported in accordance with the National Electrical Code and as follows:
 - 1. By one-hole or two-hole straps properly attached to the building elements.
 - 2. Where embedded in concrete, by at least three (3) rounds of #14 B&S gauge galvanized wire twisted around concrete reinforcing rods.

3. For exposed work, by one-hole or two-hole malleable iron clamps held in place by machine screws in expanding lead anchors in concrete or masonry or by screws in wood.
 4. By conduit clamps properly attached to bar joists.
 5. By bulb "T" clamps for conduits crossing bulb "T"s.
 6. Where groups of conduits occur or for feeder conduits where applicable, by trapeze hangers adequately supported by steel rods attached to the building structure using concrete inserts, welded supports, bolted supports, etc.
- B. In suspended ceiling construction, do not support conduits from ceiling support system. Conduit and box systems shall be supported independently of both the tie wires supporting the ceiling grid system and the ceiling grid system into which ceiling panels are placed.
- C. Supporting means shall not be shared between electrical raceways and mechanical piping or ducts unless specifically shown or noted otherwise.

3.03 TERMINATIONS/FITTINGS

- A. Couple conduits together and connect to boxes, fittings and cabinets so as to provide effective electrical continuity. Assure ground continuity on GRS feeder and branch circuits by two locknuts, one inside and one outside of all boxes, cabinets and enclosures. Do not use couplings dependent on screws bearing on conduit.
- B. Provide insulating bushing where conductors #4 or larger enter junction box, enclosure, cabinet or cutout box. Bushings shall be grounding type as manufactured by OZ/Gedney type "BLG", Thomas & Betts/Steel City or equal approved by the Professional and MDOT Project Engineer.
- C. Expansion fittings in conduits shall be provided where shown on the drawings or where conduits imbedded in concrete pass through an expansion joint(s).
- D. Provide seal-off fittings where shown on the drawings or as required by conditions encountered requiring seals. Seal-off fittings shall be installed where conduits are installed between areas of different temperatures where condensation may occur. These shall include, but not be limited to, refrigerators, freezers, air-handling units, environmental rooms and the building exterior. Seal-off fittings shall also be installed where conduits enter the building or a piece of equipment and there is a possibility of moisture migration thru the raceway to the equipment or into the building.

3.04 RIGID NON-METALLIC CONDUIT (RNC)

- A. Installation of PVC conduit shall follow the applicable provisions of conduit installation/routing hereinbefore specified for metallic conduits and the manufacturer's recommendation unless exceeded by requirements shown on the drawings or this specification. All joints shall be made using approved and proper solvent cement to make all joints water tight.
- B. Galvanized rigid steel (GRS) conduit shall be used where PVC conduit runs turn angles, rise vertically and/or are exposed.
- C. PVC conduit shall not be stored nor have been stored in direct sunlight.

- D. PVC boxes of equivalent dimension to those hereinafter specified under Section

26 01 20 "BOXES AND FITTINGS" shall be used with PVC boxconnectors.

- E. Where underground PVC conduits are shown and/or noted on the drawings to be used for communication systems and/or to be empty for future use, provide one #8 copper conductor in each conduit for full length of conduit for future locating purposes.

3.05 RACEWAY CONCRETE ENCASUREMENT

- A. Raceway concrete encasement where required by the drawings and/or this specification shall be minimum 2500 psi concrete with #6 reinforcing bars six (6) inches on center. Concrete encasement shall be such to provide a minimum of three (3) inches of concrete cover around perimeter of raceway duct bank on all sides. Concrete encasement shall be poured in a single continuous pour or all concrete pour joints shall be made utilizing a plywood vertical dam with #6 bars extending four (4) feet into each pour. Pour joint shall not occur at conduit couplings, angles, etc.

END OF SECTION

SECTION 26 01 20 BOXES & ENCLOSURES

PART 1 - GENERAL

- 1.01 Provide proper outlet box at all fixtures/devices and outlet provision locations as shown on the drawings by symbols or specified herein.
- A. Provide plates and/or covers on all boxes and outlets with or without devices. Plates shall be single, multi-gang or combination types to match corresponding devices. Securing screws shall have same finish as plate. Oversized or jumbo plates shall not be used without specific approval from the Professional and MDOT Project Engineer.
 - B. Exterior, in-grade pullboxes shall be provided where shown on the drawings or as required for installation of the Work, by the serving Utility Company(ies) or for compliance with the NEC.

PART 2 - PRODUCTS

2.01 OUTLET BOXES

- A. All outlet boxes and raised covers shall be galvanized stamped steel unless otherwise noted on the drawings or specified herein.
- B. Use boxes of cast or malleable iron with threaded hubs for damp or wet locations, locations exterior to the building and in any poured concrete.
- C. Outlet/junction boxes shall be as manufactured by Thomas & Betts/Steel City, Raco, Appleton or equal approved by the Professional and MDOT Project Engineer.
- D. Use outlet boxes at interior locations sized in accordance with the following schedule or in accordance with the NEC whichever dictates a larger box. Minimum conductor size to be used in determining power branch circuit box sizes shall be #12 AWG.
 - 1. Switch box, 3 inches by 2 inches by 2-1/2 inches - 5 conductors maximum.
 - 2. 4 inches octagon box, 1-1/2 inch depth - 6 conductors maximum.
 - 3. 4 inches square box, 1-1/2 inch depth - 9 conductors maximum.
 - 4. 4 inches square box, 2-1/8 inches depth - 13 conductors maximum.
 - 5. 4-11/16 inches square box, 2-1/8 inches depth - 18 conductors maximum.
 - 6. 4 inches octagon concrete box, 2-1/2 inches depth - 13 conductors maximum.

2.02 JUNCTION BOXES

- A. Provide junction boxes or pull boxes as required by the NEC, field conditions encountered, etc. whether or not shown on the drawings.
- B. Use stamped steel boxes for indoor junction/pull boxes where the appropriate box size is available for the conduit size(s) and the number of conductors encountered. Use screw cover metallic pull boxes indoors where larger boxes are required. Use cast iron boxes out of doors.
- C. Junction/pull boxes shall be as manufactured by Hoffman, Columbia, Hope or equal approved by the Professional and MDOT Project Engineer.

2.03 PULL BOXES - EXTERIOR

- A. In-grade pullboxes shall be of polymer concrete construction with solid bottom unless otherwise noted, of the size as indicated or as required by the NEC and of a minimum load rating for the box and cover for the area installed per this specification.
- B. In-grade pullboxes and covers shall have a minimum AASHTO H-20 (20,800lbs) load rating.

2.04 PLATES

- A. Plates on all flush mounted boxes/outlets shall be satin-finished, type 302 stainless steel (18% chrome, 8% nickel) as manufactured by Hubbell or equal in Pass & Seymour, Leviton or Arrow Hart.
- B. All surface mounted outlet/junction boxes shall be provided with galvanized steel plates.
- C. Weather proof receptacles installed outdoors in locations protected from the weather (roofed open porches, canopies, and the like) or in other indoor damp locations shall be provided with weather proof covers as manufactured by Hubbell or equal in Pass & Seymour, Leviton or Arrow Hart. Plates shall be Cat. No. CWP8H for non-GFI type receptacles and Cat. No. CWP26H for GFI type receptacles. Weather proof receptacles installed outdoors in locations unprotected from the weather shall be provided with "in-use" type weather proof covers as manufactured by Hubbell Cat. No. WP8MHP or equal approved by the Professional and MDOT Project Engineer.

PART 3 - EXECUTION

3.01 OUTLET BOXES

- A. Box locations shall be fully coordinated with the MDOT Project Engineer where boxes are to be exposed or where installation affects architectural elements, structural construction or mechanical systems.
- B. Close all unused knockout holes and install galvanized device cover or blank cover on surface boxes and proper device plate or blank plate as specified herein on flush boxes.
- C. Location of all outlets as shown on the drawings is approximate and representative unless dimensioned or specifically noted. See Architectural drawings, details and/or shop drawings for specific outlet locations. Any outlet/box and associated conduits/conductors may be moved from the location shown on the drawings in any direction up to a distance of ten (10) feet by direction of the Professional and MDOT Project Engineer if so directed before the outlet/box has been installed.
- D. Mount boxes flush with finished surface. Provide plaster rings or square corner raised covers for tile or block walls so that fixtures/devices/plates will be perfectly flush mounted. Do not install outlet boxes back to back. Face of boxes shall not be installed more than 1/4" behind finished face of wall.

- E. Where a single outlet box is installed in a metal or wood stud wall, the box shall be attached to the studs using a metal mounting bracket with support leg to prevent movement of box in wall at unattached side. Where two or three outlet boxes are shown and/or intended to be located adjacent to each other in a metal or wood stud wall, the boxes shall be attached to the studs using a common metal mounting bracket with bracket stabilizer leg to support the middle portion of the bracket. Outlet box mounting brackets shall be as manufactured by Erico/Caddy or approved equal.
- F. Outlet boxes installed in masonry walls shall be embedded in masonry grout so as to properly secure each box in place. The Division 26 Contractor is responsible for providing all materials and installing the outlet boxes as required.

3.02 JUNCTION/PULL BOXES

- A. Boxes sizes shall be as indicated on the drawings, herein specified, per the NEC for the conduit sizes, conductors and situation encountered, or as directed by the Professional and MDOT Project Engineer. Use above listed outlet box sizing schedule for stamped steel junction/pull boxes.
- B. All junction or pull boxes shall be labeled indicating system being served, branch circuit or feeder circuit identification, etc. Where installed in concealed locations (i.e. above accessible ceilings) or in unfinished areas, identification shall be made on outside of box cover. Where installed exposed in finished locations, identification shall be made on inside of box cover. Fire alarm system(s) junction box where not exposed in a finished space shall have covers painted "red" in color.
- C. Close all unused knockout holes in junction/pull boxes and install proper cover. Junction/pull boxes installed flush or exposed in finished spaces shall be installed with the same requirements as outlet boxes.

3.03 PLATES/COVERS

- A. Plates shall be properly secured to outlet box with corners in contact with finished and oriented parallel/perpendicular to adjacent building surfaces.

3.04 PULLBOXES - EXTERIOR

- A. In-grade pull boxes shall be set flush with the finished grade. Finished grade shall be adjusted as required to allow the pullbox to set level. Provide a minimum 6 inches (or as recommended by the manufacturer) bed of gravel or crushed rock, unless the box is shown or noted on the drawings to be fully concrete encased, under the box and extending a minimum of 6 inches on all sides. Fill around box with compacted select fill that is compacted in 6 inches layers. All pull boxes shall receive a concrete collar around the top perimeter of the box to provide added support.

END OF SECTION

SECTION 26 01 30 LOW-VOLTAGE CONDUCTORS

PART 1 - GENERAL

1.01 SCOPE

- A. Use #12 AWG minimum power branch circuit conductor size with exceptions as noted on the drawings or as stated herein. 120 volt branch circuit homerun conductors in excess of 50 feet in length and 277 volt branch circuit homerun conductors in excess of 100 feet in length of all 20 ampere branch circuits shall be #10 AWG minimum size whether or not shown or noted on the drawings.
- B. All shared neutral conductors of 20 ampere branch circuits serving receptacles shall be #10 AWG minimum.

PART 2 - PRODUCTS

2.01 LOW-VOLTAGE POWER CONDUCTORS

- A. Conductors shall be standard annealed copper rated 600 volts with mechanical strength, insulation, temperature and current carrying capacity adequate for the particular conditions under which they are used and in accordance with the following:
 - 1. In wet or dry locations type "THHN-THWN" complying with NEMA WC 5 unless specifically shown or noted on drawings or specified herein to be other type.
 - 2. Branch circuit conductors within three (3) inches of a ballast within the ballast compartment of fluorescent luminaires shall be recognized for use at temperatures not lower than 90°C.
 - 3. In un-wired luminaires where required by the NEC, use approved heat-resistant wire sized for current, voltage and temperature at which luminaire operates.
 - 4. Conductors entering the self-contained ballast compartment of gaseous vapor discharge fixtures shall be rated 600 volts, #10 AWG, stranded copper, silicone rubber insulation, glass outer-braid and 200°C. rated conductor temperature.
- B. Conductor sizes #8 AWG and larger shall be of the stranded type with Class B stranding. Conductor sizes #10 AWG and smaller shall be of the solid type with the exception that all final connections to motors or other vibrating equipment shall be made with stranded conductors regardless of conductor size.

2.02 SPLICES

- A. Use soldered and taped or approved mechanical splice connections on solid wire and pressure type solderless connectors well taped on stranded conductors. Conductor sizes #8 AWG and larger shall have irreversible compression type splice.
- B. Use Scotch 3M or approved equal plastic tape over mechanical and soldered splices applied in thickness equal to wire insulation.

PART 3 - EXECUTION

3.01 CONNECTIONS/SPLICES

- A. Tighten electrical connections and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Make splices and connections in accessible boxes, gutters or cabinets only. Conductors sizes #8 AWG and larger shall be spliced only with specific approval from the Professional.

3.02 CONDUCTOR INSTALLATION

- A. Use manufacturer approved pulling compound or lubricant where necessary. Compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage conductors or raceways.

3.03 COLOR CODING

- A. Color-code 208/120 volt, 3 phase, four wire, "wye" connected secondary electrical systems service entrance, feeder and branch circuit conductors throughout the secondary electrical system as follows:
 - 1. Phase A - Black, Phase B - Red, Phase C - Blue
 - 2. Three-way & four-way travelers - Purple
 - 3. Neutral - White, Equipment Ground - Green

3.04 TESTING

- A. Conductor insulation test shall be performed on all electrical service entrance conductors, switchboard/panelboard and transformer feeder conductors and branch circuit conductors #2 AWG and larger. An insulation test shall be performed on any feeder or branch circuit as requested by the Professional for trouble shooting purposes. The "600V Conductor Insulation Test Report" found at the end of this section shall be completed with test results and shall be submitted to the Professional and MDOT Project Engineer prior to substantial completion of the project.
- B. 600 volt conductor insulation tests shall be performed using a 500 volt megger. Each conductor shall be tested with all splices made but no equipment or devices connected. Feeder/branch circuits with paralleled conductors shall have conductors tested separately prior to paralleling. The ohmic value measured shall be recorded and the results shall meet the minimum requirements of the conductor manufacturer. Conductors not meeting these minimum requirements shall be replaced or repaired as directed by the Professional or MDOT Project Engineer.

END OF SECTION

SECTION 26 02 20

SECONDARY ELECTRICAL SERVICE SYSTEM

PART 1 – GENERAL

1.01 SCOPE

- A. The Division 26 Contractor shall verify the electrical service location, characteristics, routing, etc. with the serving Utility Company prior to any rough-in and/or material purchases or orders. The Contractor shall notify the Professional of any changes in the project required to meet the Utility Company's requirements. Failure to adhere to this requirement shall make this Contractor responsible for all corrections and/or changes to installed/purchased equipment, materials, etc. and associated rough-ins required to comply with the Utility Company requirements.

1.02 PRE-INSTALLATION CONFERENCE

- A. A pre-installation conference shall be scheduled by the Division. 26 Contractor prior to any installation of the secondary service entrance including the pad-mounted transformer. This conference will be used to discuss requirements and verify the requirements of the Contract Documents and the requirements and expectations of the Using Agency/Utility Company. Representatives from the Professional and MDOT Project Engineer, the Utility Company and the Contractor shall be present.

1.04 SECONDARY ELECTRICAL SERVICE ENTRANCE

- A. Electrical Secondary Service Voltage shall be 208/120 volts, three phase, 4 wire, 60Hz, "wye" connected.
- B. Electrical Service Entrance - Underground
 1. Provide underground electrical service entrance to the facility(ies) as shown or noted on the drawings. Number and size of service entrance conduits shall be as indicated on the drawings and as required for the installation of the service entrance conductors in accordance with the NEC.
 2. The point of connection to the Utility Company's medium voltage service facilities (i.e. riser pole, pad-mounted transformer, etc.) shall be fully coordinated with the Utility Company prior to any rough-in. Riser pole and pad-mounted transformer locations and orientations shall be verified with Utility Company prior to any associated rough-in.
- C. The secondary electrical service entrance duct bank shall be of the size and type as shown on the drawings and/or herein specified. The duct bank shall be installed a minimum of 48" below the finished grade to the top of the conduit(s). All conduit bends shall be factory made, long radius type with a minimum bend radius six (6) times the conduit diameter or as required for the conductor installation to maintain manufacturers maximum pulling tensions and sidewall pressure values.
- D. The electrical service entrance conduit(s) shall have the proper lengths of conductors protruding from an approved electrical service entrance fitting for the connection to the electrical service facilities.

1.05 ELECTRICAL METERING FACILITIES

- A. All electrical meters shall be furnished and installed by the serving Utility Company.
- B. Meter sockets, current transformer enclosures and/or boxes shall be provided by the Contractor in accordance with the requirements of the serving Utility Company including purchasing equipment from the serving Utility Company where required. Location, mounting procedures and connection requirements shall be fully coordinated with the Utility Company and all necessary equipment furnished by the Contractor to comply with their requirements.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 26 02 50 GROUNDING & BONDING SYSTEM

PART 1 - GENERAL

1.01 SCOPE

- A. Bonding and grounding of all electrical equipment, enclosures, raceways, etc. as shown on the drawings and in strict accordance with Article 250 of the NEC.

PART 2 - PRODUCTS

2.01 GROUND RODS

- A. Ground rods shall be 3/4 inch by 10'-0" copper-clad sectional, solid rods.

PART 3 - EXECUTION

3.01 WIRING DEVICES

- A. Equipment grounding terminal (green) of all grounding type receptacles/devices shall be bonded to the equipment grounding conductor and to the device's enclosure with a properly sized bonding conductor (green) unless the receptacle/device is approved and listed for self-bonding.

3.02 RACEWAYS, BOXES & ENCLOSURES

- A. Pull into all power branch circuit and feeder raceways one green equipment grounding conductor of the same size as the branch circuit conductors or size as noted on the drawings and bond this conductor to the box ground terminal, receptacle/device ground terminal (green), equipment grounding bus of panelboard, cabinet and/or enclosures.
- B. Where conduits in excess of 1-1/4 inch trade size and all feeder conduits enter an enclosure, box, etc. provide grounding bushing or bronze ground clamps with bonding conductors sized per the NEC (#10 AWG minimum) connected to all ground bushings/clamps and thence to equipment enclosure and/or equipment grounding bus.
- C. Couple conduits together and connect to boxes, fittings and enclosures so as to provide effective electrical continuity. Assure ground continuity on GRS feeder and branch circuits by two locknuts, one inside and one outside of all boxes, cabinets and gutters. Do not use couplings dependent on screws bearing on conduit.

3.03 GROUND RODS

- A. Ground rods shall be installed with top a minimum of 12 inches below the finish grade. All connections to ground rods shall be made by exothermic weld(s).

3.04 ELECTRICAL SERVICE ENTRANCE

- A. Bonding and grounding of the electrical service equipment enclosures, raceways and other non-current carrying metal parts shall be in accordance with Article 250 of the NEC. All sections, cubicles and conduits associated with the electrical service entrance equipment shall be bonded together and bonded to the grounded (neutral) with a #6 AWG bare copper equipment grounding conductor.
- B. The electrical service entrance equipment grounded (neutral) bus and equipment grounding bus shall be bonded together with a main bonding jumper (MBJ) of the same size as the grounding electrode conductor (GEC) herein specified. The grounded (neutral) conductor and the equipment grounding conductors shall not be bonded together at any other location in the system except at separately derived systems as defined by the NEC.
- C. The grounding electrode system shall consist of driven ground rods, the incoming metallic cold water pipe where present and of the proper characteristics and the building structural steel where present. Where multiple ground rods are necessary, indicated or required, they shall be installed in a straight line or triangular pattern such that each ground rod is a minimum of six (6) feet from any adjacent ground rod or other type of grounding electrode. The connection of the grounding electrode conductor to the incoming metallic underground water pipe shall be made within five (5) feet of the pipe's point of entry into the building and shall be accessible.
- D. The grounding electrode conductor (GEC) shall be bare copper sized as indicated on the drawings or per Table 250.66 of Article 250 of the NEC whichever size is largest. The grounding electrode conductor shall run continuous without splices and utilizing the most direct path from the electrical service entrance equipment's grounded (neutral) bus to each grounding electrode. The grounding electrode conductor shall be routed in electrical grade rigid PVC conduit to the point of connection to the grounding electrode system and/or to a point a minimum of 12 inches below the finished grade. All connections of the grounding electrode conductor to the grounding electrodes shall be made by exothermic weld(s).
- E. A grounding bus bar shall be provided adjacent to the electrical service entrance equipment and at an accessible location for the purpose of grounding/bonding ancillary systems in the building/facility. The grounding bus bar shall be copper of minimum dimensions 20"X4"X1/4" with wall mounting bracket with insulators to isolate the ground bar. The ground bar shall have pre-drilled termination holes of proper size for lugs properly spaced over the entire length and width of the bar to terminate #12 through #4 AWG copper wire. The grounding bus bar shall be connected to the grounded (neutral) bus of the electrical service entrance equipment using a bare copper conductor of same size as the grounding electrode conductor. The grounding bus bar shall be properly labeled as to its function.
- F. The grounding electrode system shall consist of the proper number of grounding electrodes properly connected per the NEC to limit the resistance to ground of the grounding electrode system to a maximum of 25 ohms. The resistance to ground of the installed grounding electrode system shall be verified using a ground tester.

- G. All metallic piping systems (water, natural gas, fire protection, etc.) within or attached to the building(s) and the building's structural steel shall be bonded to the grounding electrode system in accordance with Article 250 of the NEC. Where a lightning protection system is provided or exist on the building(s), the lightning protection system's grounding electrode system shall be bonded to the electrical service grounding electrode system.

END OF SECTION

SECTION 26 03 10 PANELBOARDS

PART 1 - GENERAL

1.01 SCOPE

- A. Commercial grade panelboards complete with feeders, circuit breakers and branch circuits as scheduled and/or shown on the drawings. Where shown on the drawings to be service entrance equipment, panelboards shall be specifically approved for that purpose and shall have all required accessories.
- B. Branch circuit homerun conductors shall be connected to circuit breakers served from separate phase busses of the panelboards. Loads shall be properly balanced on each phase. Only one conductor shall be connected to a lug and/or terminal.
- C. Panelboards and components shall be manufactured in accordance with applicable NEMA standards and the NEC and shall be UL listed. Installation and connection of all panelboards shall comply with the NEC and their UL listing.
- D. Bonding and grounding in accordance with Section 26 02 50 "GROUNDING AND BONDING SYSTEMS" of this specification.

PART 2 - PRODUCTS

2.01 PANELBOARDS

- A. Panelboards shall be dead front construction with solderless pressure terminals. Enclosures shall be for surface or flush mounting as shown or noted on the drawings and rated NEMA 1 for dry indoor installations or NEMA 3R for outdoor or wet indoor installations. Panelboards shall be provided with trim and door with lock and catch with two (2) keys. Keys shall be common to all new building panelboards.
- B. Main and neutral buses of capacity as shown on the drawings shall be completely tin and/or silver plated copper based on 1000 amps per square inch current density.
- C. Provide equipment grounding bus(es) of proper ampere rating and with adequate termination points for feeder and branch circuit ground conductors. Equipment grounding bus(es) shall be properly bonded to panelboard enclosure.
- D. Neutral and equipment grounding busses shall have proper number of terminals for the available panelboard circuits. Only one conductor shall be connected to a lug and/or terminal
- E. Panelboards required to have feed-through lugs shall have mechanical type lugs suitable for the conductors used located at the opposite end of the bus from incoming feed lugs or main device.
- F. Where panelboards are shown to be service entrance equipment, the panelboards shall be provided with a main bonding jumper (bus) between the grounded (neutral) bus and the equipment grounding bus of the panelboard. This busing shall be installed by the manufacturer.

- G. Circuit breakers shall be molded case, thermal magnetic type with bolted connections and characteristics as shown on the drawings including ampere and voltage ratings, minimum interrupt rating (KAIC) and accessories as shown on the drawings or herein specified. Circuit breaker fault current interrupt capacities shall be fully rated. Series ratings are not acceptable.
- H. All single pole 15 and 20 ampere circuit breakers shall be UL listed SWD for switching duty. All circuit breakers serving HVAC equipment shall be UL rated HACR. All 15 and 20 amp circuit breakers serving high magnetic (HM) or high intensity discharge (HID) loads shall be HM or HID rated, respectively.
- I. Panelboards served from the secondary side of a dry-type transformer constituting a separately derived system shall be provided with a main circuit breaker sized as shown on the drawings or per the NEC if size not indicated.
- J. Branch circuit breakers serving receptacles or equipment located under a kitchen range/exhaust hood equipped with a fire suppression system shall be the shunt-trip type controlled by the fire suppression system control panel. All circuitry (conduit and wiring) required for the interface of these systems shall be provided.
- K. Branch circuit breakers serving elevator motors shall be the shunt-trip type controlled by the building Fire Detection and Alarm System or the Fire Protection System as shown or noted on the drawings. All circuitry (conduit and wiring) required for the interface of these systems shall be provided.
- L. Branch Circuit Panelboard(s) with characteristics as shown on the drawings, herein specified, and as manufactured by General Electric Types AQ, AE, AD and/or Spectra Series or equal in Siemens, Square D Company or Cutler Hammer.
- M. Distribution Panelboard(s) with characteristics as shown on the drawings, herein specified, and as manufactured by General Electric Spectra Series or equal in Siemens, Square D Company or Cutler Hammer.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Panelboards shall be securely mounted with through bolts, anchors or other approved means to building structural elements (i.e. metal/wood studs, concrete block, etc.). Contractor shall provide required cross bracing between building structural elements and/or proper mounting surface and structure if wall is of insufficient strength. All wood or other flammable mounting surfaces shall be painted with two coats of flame resistant paint. Mount panelboards with top breaker handle not more than 6'-6" above floor. Installation of flush panelboards shall not compromise the fire rating of walls.
- B. Panelboard installations shall provide and maintain working space clearances and dedicated electrical equipment spaces as required by Article 110 of the NEC.

- C. Flush mounted panelboards shall have a minimum of four (4) spare 3/4" conduits stubbed up above the nearest accessible ceiling location for future use.
- D. Provide complete typewritten directory with transparent plastic cover inside of each branch circuit panelboard door. Branch circuit panelboard designation as indicated on the drawings shall be identified by 3/4 inch bakelite label, white with minimum 1/2 inch high, black engraved letters on front face if the panelboard is surface mounted or inside of door if panelboard is flush mounted. Typed copy of each branch circuit panelboard circuit directory shall be submitted with shop drawing submittal for approval.
- E. Each circuit breaker in distribution panelboards shall be labeled as to load served by 1/2 inch bakelite label, white with minimum 1/4 inch high, black engraved letters. Distribution panelboard designation as indicated on drawings shall be identified by 3/4 inch bakelite label, white with minimum 1/2" high, black engraved letters on front face if the panelboard is surface mounted or inside of door if panelboard is flush mounted.
- F. Branch circuit panelboard circuits shall be numbered in sequence vertically down the left side then vertically down the right side and all circuits shall be provided in the panelboard exactly as they are shown on the drawings. Numbering to be consecutive for double or triple section panelboards. Neutral connections shall be identified by adhesive number tags to identify with their associated branch circuit phase conductors.
- G. Branch/feeder circuit breakers shall be arranged in the distribution panelboard as shown on the drawings where possible. Circuit breaker arrangement may be modified to facilitate the installation and connection of feeders or as required to comply with the distribution panelboard manufacturer's circuit breaker arrangement limitations. Whenever modifications to the circuit breaker arrangement are made, the associated distribution panelboard shop drawings shall indicate the load designation as well as the circuit breaker size on the panelboard cut sheet.

END OF SECTION

SECTION 26 03 60 SURGE SUPPRESSION DEVICES (SPD)

PART 1 - GENERAL

1.01 SCOPE

- A. Where shown on the drawings or herein specified, high surge suppression device(s) (SPD) shall be provided and connected per the manufacturer's recommendations and as herein specified.

PART 2 - PRODUCTS

2.01 CONSTRUCTION

- A. SPD shall be rated for the voltage of the system at the point where it is installed. SPD shall have a minimum U.L. listed Short Circuit Current Rating (SCCR) as noted on the drawings or equal to or greater than the K.A.I.C. rating of the switchboard, panelboard, motor control center, etc. where connected. The SCCR of the SPD shall be fully rated and shall not require the use of any upstream over-current protection to obtain this rating.
- B. SPD shall be U.L. 1449 second edition listed as a transient voltage and surge suppresser and U.L. 1283 listed as an electromagnetic interference filter. The devices shall be designed, manufactured and tested in accordance with applicable portions of NEMA LS1 and ANSI/IEEE C62.41 and C62.45 standards, latest revisions.
- C. SPD shall provide specified protection in all modes on all phases - line to neutral (L-N), line to ground (L-G) and neutral to ground (N-G) in "wye" connected systems and line to line (L-L) and line to ground (L-G) in "delta" connected systems.
- D. SPD suppression components shall have maximum continuous operating voltage (MCOV) of not less than 115% nor greater than 130% of the nominal phase to neutral operating voltage of the system where installed.
- E. SPD shall be fused with surge rated fuses and incorporate thermal cutout device(s) capable of preventing thermal runaway of internal suppression components. The surge current rating of the installed fuses shall be greater than the maximum surge current rating of the device.
- F. SPD shall have integral high frequency filtering system of -50dB at 100kHz.
- G. SPD devices shall carry a five (5) year manufacturer's warranty from the date of final acceptance of the system supported by the manufacturer's local field service division or representative.

2.02 PERFORMANCE REQUIREMENTS

- A. Category "C" Locations
 - 1. Category "C" locations shall be defined for the purpose of this specification as electrical service entrance equipment.

2. The minimum surge current capacity of the SPD installed at Category "C" locations shall be 120 KA/mode. The single pulse surge current rating of the device shall be established and verified by device testing in accordance with NEMA LS-1. All testing shall be performed on a complete SPD assembly as provided.
3. The U.L. listed suppressed voltage rating of the SPD utilizing an IEEE C1/B3 combination wave shall be a maximum of:
 - a. 208Y/120 700V - LL, 400V - LN, 500V - LG, 500V - NG
 - b. 480Y/277 1500V - LL, 900V - LN, 1000V - LG, 800V - NG
4. The complete SPD assembly as provided shall be life-cycle tested using repetitive sequential ANSI/IEEE C62.41 Category C3 impulses. The assembly shall not malfunction, incur damage or experience a degradation in clamping voltage of more than 10 percent for a minimum of 5000 repetitive C3 strikes.
5. SPD installed at Category "C" locations shall be as manufactured by Current Technologies TG125 Series, or equal in APT TE/XGA Series, Siemens TPS Series, General Electric Tranquell HE Series, Cutler Hammer Visor Series or Liebert Interceptor II Series.

B. Category "B" Locations

1. Category "B" locations shall be defined for the purpose of this specification as electrical switchboards, distribution panelboards or motor control centers not used as service entrance equipment.
2. The minimum surge current capacity of the SPD installed at Category "B" locations shall be 75 KA/mode. The single pulse surge current rating of the device shall be established and verified by device testing in accordance with NEMA LS-1. All testing shall be performed on a complete SPD assembly as provided.
3. The U.L. listed suppressed voltage rating of the SPD utilizing an IEEE C1/B3 combination wave shall be a maximum of:
 - a. 208Y/120 LL - 700V, 400V - LN, 500V - LG, 500V - NG
 - b. 480Y/277 LL - 1800, 900V - LN, 1000V - LG, 900V - NG
4. The complete SPD assembly as provided shall be life-cycle tested using repetitive sequential ANSI/IEEE C62.41 Category C3 impulses. The assembly shall not malfunction, incur damage or experience a degradation in clamping voltage of more than 10% for a minimum of 4000 repetitive C3 strikes.
5. SPD installed at Category "B" locations shall be as manufactured by Current Technologies TG80 Series, or equal in APT TE/XT160 Series, Siemens TPS Series, General Electric Tranquell ME Series, Cutler Hammer Visor Series or Liebert Interceptor II Series.

C. Category "A" Locations

1. Category A locations shall be defined for the purpose of this specification as branch circuit panelboards not used as service entrance equipment.
2. The minimum surge current capacity of the SPD installed at Category A locations shall be 60 KA/mode. The single pulse surge current rating of the device shall be established and verified by device testing in accordance with NEMA LS-1. All testing shall be performed on a complete SPD assembly as provided.
3. The U.L. listed suppressed voltage rating of the SPD utilizing an IEEE C1/B3 combination wave shall be a maximum of:
 - a. 208Y/120 LL - 700, 400V - LN, 500V - LG, 500V - NG
 - b. 480Y/277 LL - 1800, 900V - LN, 1000V - LG, 900V - NG

4. The complete SPD assembly as provided shall be life-cycle tested using repetitive sequential ANSI/IEEE C62.41 Category C3 impulses. The assembly shall not malfunction, incur damage or experience a degradation in clamping voltage of more than 10% for a minimum of 4000 repetitive C3 strikes.
5. SPD installed at Category A locations shall be as manufactured by Current Technologies TG60 Series or equal in APT TE/XT Series, Siemens TPS Series, General Electric Tranquell ME Series, Cutler Hammer Visor Series or Liebert Interceptor II Series.

2.03 ACCESSORIES

- A. Each SPD shall be provided with LED indicator lights located on the front of the enclosure to indicate the status of the protection on each mode.
- B. Each SPD shall be provided with a minimum of one set of NO/NC dry contacts activated in the event of lost protection or reduced protection below 90% of the device rating.
- C. Each SPD device shall be provided with a surge counter.

PART 3 - EXECUTION

3.01 SCOPE

- A. SPD shall be parallel connected and installed where indicated and/or noted on the drawings or herein specified. SPD shall be located adjacent to (with appropriate enclosure) connected switchboard, panelboard, motor control center or other equipment.
- B. SPD shall be located in such a manner as to minimize the required conductor lengths and to keep the conductors as straight as practically possible. The SPD enclosure should be close-nipped to the protected equipment enclosure where possible. The grounding conductor shall be bonded to the connecting conduit on each end.
- C. Where SPD is connected to the electrical equipment using conductors, the conductors shall be minimum #6 AWG or size as recommended by the SPD manufacturer and shall be "gently" twisted together to minimize conductor impedance.
- D. SPD shall be connected to the designated equipment via a 60A3P circuit breaker for Category "A" and "B" locations or via an 100A3P circuit breaker for Category "C" locations. The device branch circuit breaker shall be provided and installed within the protected switchboard, panelboard or motor control center.

END OF SECTION

SECTION 26 04 10 WIRING DEVICES

PART 1 - GENERAL (Not Used)

PART 2 - PRODUCTS

2.01 WALL SWITCHES (Line Voltage)

- A. Wall switches shall be flush A.C. tumbler-type, back and side wired, and shall be installed to cut ungrounded conductors. Conductors shall be connected using side wired screw terminals.
- B. Wall switches shall be the following heavy-duty specification grade as manufactured by Hubbell or approved equal in Pass and Seymour (P&S), Leviton or Arrow Hart. Contractor shall verify device color with Architect prior to ordering devices.
 - 1. Single pole, 20A, 120/277V: Hubbell Cat. No. HBL1221, P&S Cat. No. PS20AC1, Leviton Cat. No. 1221-2.
 - 2. Double pole, 20A, 120/277V: Hubbell Cat. No. HBL1222, P&S Cat. No. PS20AC2, Leviton Cat. No. 1222-2.
 - 3. Three-way, 20A, 120/277V: Hubbell Cat. No. HBL1223, P&S Cat. No. PS20AC3, Leviton Cat. No. 1223-2.
 - 4. Four-way, 20A, 120/277V: Hubbell Cat. No. HBL1224, P&S Cat. No. PS20AC4, Leviton Cat. No. 1224-2.
 - 5. Single pole, key operated, 20A, 120/277V, with two keys: Hubbell Cat. No. HBL1221L, P&S Cat. No. PS20AC1-L, Leviton Cat. No. 1221-2L.
- C. Wall switches connected to branch circuits of the emergency power system shall be red in color.

2.02 POWER RECEPTACLES

- A. All convenience receptacles shall be specification or industrial grade as listed, straight blade type, 2 pole 3 wire grounding, back and side wired with nylon face. Conductors shall be connected using side wired screw terminals.
- B. Convenience outlets and receptacles as manufactured by Hubbell, as stated or equal in Pass and Seymour (P&S), Leviton or Arrow Hart. Contractor shall verify device color with Architect prior to ordering devices.
 - 1. Duplex grounding receptacle (HD specification grade), 20A, 125V: Hubbell Cat. No. HBL5352, P&S Cat. No. 5362, Leviton Cat. No. 5362-S.
 - 2. Duplex grounding receptacle, ground fault interrupter type (HD specification grade), 20A, 12 5V: Hubbell Cat. No. GF5352, P&S Cat. No. 2091, Leviton Cat. No. 8899.
 - 3. Duplex grounding receptacle, weatherproof, ground fault interrupter type (HD specification grade), 20A, 125V: Hubbell Cat. No. GF5352, P&S Cat. No. 2091, Arrow Hart Cat. No. GF5342, Leviton Cat. No. 6899. Plates shall be equal to Hubbell Cat. No. 5206WO or Cat. No. WP8MHP for permanent or "in-use" outdoor cord and plug connections.
 - 4. Duplex grounding receptacle on standby generator(s), red (HD specification grade), 20A, 125V: Hubbell Cat. No. HBL5352R, P&S Cat. No. 5362RED, Leviton Cat. No. 5362-SR.
 - 5.. Duplex grounding receptacle, isolated ground type (orange), 20A, 125V (HD specification grade): Hubbell Cat. No. IG5362, P&S Cat. No. IG6300, Leviton Cat. No. 5362-IG

- C. Special purpose receptacles shall have voltage, phase and ampere ratings as indicated on the drawings and of proper NEMA configuration. Each receptacle shall be HD specification grade. Special receptacles for power connection of equipment shall have proper NEMA configuration for equipment served and equipped with proper plug completely installed.

2.03 SAFETY SWITCHES

- A. Safety switches shall be heavy-duty type as defined by NEMA, fusible or non-fusible as indicated on the drawings and shall be rated for the voltage of the circuit in which installed. Switches shall have the proper number of poles as indicated on the drawings or as required for the phase characteristics of the circuit in which installed. A ground lug shall be provided in all safety switches.
- B. Safety switches shall have proper NEMA rated enclosure for the environment and conditions in which installed per the NEC and per the following:
 - 1. Indoor dry locations - NEMA 1
 - 2. Indoor wet locations - NEMA 3R
 - 3. Kitchen areas - NEMA 4X
 - 4. Outdoor locations - NEMA 3R
 - 5. Corrosive indoor/outdoor locations - NEMA 4X
- C. Where safety switches are indicated to be fusible, they shall have dual element, time delay fuses installed as manufactured by Bussman Fusetron Series or approved equal with proper voltage rating for the associated circuit and current size as indicated or as required for the connected equipment.
- D. Safety switches shall be the following as manufactured by the Square D Company or equal in General Electric, Siemens, Cutler Hammer or Allen Bradley.

Safety switch, heavy-duty, with ground lug	H200-H300 Series
Manual motor switch, single pole	Class 2510, Type FO-1
Manual motor switch, double pole	Class 2510, Type FO-2

PART 3 - EXECUTION

3.01 WALL SWITCHES

- A. Shall be ganged together under one non-sectionalized plate in gangable boxes where two or more switches occur at one point. Provide metal barrier within box between all adjacent switches served by circuit conductors of different phases or conductors of a different system.
- B. Shall be mounted 48" above finished floor to center of operating handle or as noted on the drawings. Mounting heights may be adjusted slightly to permit cutting of masonry block to the top or bottom of the block course nearest the specified height. All mounting heights shall be consistently cut above or below block coursing such that switches will be the same height above the finished floor.
- C. Wall switches shown at door ways shall be mounted adjacent to door ways on opposite side of door from hinges unless prohibited by wall space. Where switches must be mounted on same side of door as hinges, mount switches so as not to be located behind the opened door. First switch of single or ganged switch bank shall be mounted

within 12 inches of door frame and/or edge of door.

3.02 RECEPTACLES

- A. Convenience outlets and receptacles shall be mounted center line up 18" above finished floor unless shown or noted on the drawings otherwise. Convenience outlets and receptacles located at counters shall be mounted center line up 4" above counter top or backsplash unless shown or noted on the drawings otherwise. Mounting heights may be adjusted slightly to permit cutting of masonry block to the top or bottom of the block course maintaining the minimum specified height. All mounting heights shall be consistently cut above or below block coursing such that receptacles/outlets will be mounted the same height above the finished floor. Adjacent devices to be mounted at same height unless otherwise directed.
- B. Carefully review Architectural, Furniture and Interior Design drawings for furniture, casework or millwork. Do not rough-in receptacles behind equipment, millwork, etc. except where specifically noted. Where receptacle is shown behind equipment, verify proper mounting height with the Architect prior to rough-in.
- C. Where receptacles serve equipment (i.e. refrigerators, ranges, dishwashers, ice makers, etc.) intended to be installed flush with the adjacent millwork, walls, etc., receptacle locations and mounting heights shall be fully coordinated with the supplied equipment shop drawings so that neither the receptacle nor the associated cord and plug connection interferes with the correct placement of the equipment.

3.03 SAFETY SWITCHES

- A. Where installed indoors, surface mount safety switches 54" to center of operating handle above the finished floor. Where installed out-of-doors on exterior walls, surface mount safety switches 36" to center of operating handle above the finished grade. Where installed out-of-doors and behind equipment screen walls, surface mount safety switches with top of switch enclosure 6 inches below top of screen wall and bottom of enclosure a minimum of 18" above the finished grade or slab.
- B. Where power connections are made out-of-doors through safety switches and where there is no wall or proper equipment frames to which the switches may be mounted, Contractor shall furnish and install a galvanized angle iron frame independent of the equipment for the support of the switch(es). Frames shall consist of the steel frame sufficient to support all of the switches and a concrete footing not less than 12 inches deep and of sufficient width to assure that 4 inches of concrete surround all of the framing members.
- C. Safety switches shall be installed such that they are readily accessible as defined by the NEC with a clear and unobstructed path thereto. Fully coordinate safety switch mounting locations prior to rough-in with other trades to insure accessibility.
- D. Each safety switch shall be label on the face of the enclosure door as to the load connected. The label nomenclature shall read the same as the connected equipment label provided. The exterior label shall be suitable for the environment in which installed and shall be self-adhesive, 1/2 inch bakelite label, white with minimum 1/4 inch high, black engraved letters. On the interior side of the safety switch enclosure door, permanently label using a self-adhesive printed label the connected load designation, the serving panelboard designation and the serving branch circuit number designation.

END OF SECTION

SECTION 26 04 20 LIGHTING LUMINAIRES

PART 1 - GENERAL

- 1.01 Provide and connect all luminaires as shown on the drawings by symbols and as defined in the luminaire schedule(s). Luminaires shall be provided with all necessary mounting accessories. The installation of all luminaires shall be complete, safe and in full accordance with manufacturer's recommendations and these specifications. This contractor shall provide additional 1-1/2" x 1-1/2" x 12 ga. channel bridging where necessary to mount luminaires governed by the conditions encountered.
- 1.02 Substituted luminaires shall meet the performance and functional characteristics and the general appearance and dimensions (+/-10%) of the specified luminaires. Approval of submitted substitute luminaire(s) shall not eliminate the Contractor's responsibility to provide luminaires similar in characteristics to the specified luminaire(s).
- 1.03 The catalog numbers of recessed luminaires, where applicable, are for use in an exposed grid suspension type ceiling system. The Contractor is responsible for providing luminaires with the proper hardware and/or accessories for installation in the ceiling type encountered.
- 1.04 The lighting luminaire locations shown on the Electrical drawings are approximate and representative. Contractor shall refer to and coordinate with the Architectural reflected ceiling plans and elevation drawings for exact lighting luminaire mounting heights and locations.
- 1.05 See Section 260100 "Basic Electrical Materials & Methods" for additional requirements for hazardous locations and seismic areas.

PART 2 - PRODUCTS

2.01 INTERIOR LIGHTING LUMINAIRES

- A. Procure luminaires completely factory wired for proper operation in the application shown on the drawings. All luminaires shall be furnished with proper fittings and accessories for installation in the area encountered. This Contractor shall review the Architectural plans and specifications and provide luminaires compatible with the ceiling specified in each area.
- B. Lighting luminaire lenses specified by catalog number and/or by descriptive reference shall be virgin acrylic plastic and shall equal or exceed IES-SPI-NEMA test for yellowing factor of not to exceed three (3) after 2000 hours exposure in a Fade-o-meter for the standard test conditions. The flat portions of all lenses shall be not less than .125 inches thick and shall weigh not less than eight (8) ounces per square foot.
- C. Doors and other access means shall be smooth operating, free from light leakage under operating conditions and arranged to permit relamping without the use of tools. Arrange doors, frames, lenses, diffusers and other pieces to prevent accidental falling during relamping and when secured in operating position.
- D. All three and four lamp parabolic type fluorescent troffers shall be provided with two wireway covers for proper light distribution under half-light switching regardless of whether or not the wireway is required for the ballasts provided in the fixture.

- E. All luminaires containing HID lamps shall be equipped with protection to prohibit excessive UV radiation should outer globe of lamp be broken. Protection shall be in the form of extinguishing mechanisms or protective shield on base of luminaire.

2.02 EXTERIOR LUMINAIRES

- A. Metal parts shall be free from burrs, sharp corners and edges and shall be manufactured of corrosion-resistant aluminum, die-cast aluminum, steel or other material as shown on the drawings or specified herein. Steel or other materials subject to corrosion or rust shall have proper corrosion-resistant and weather proof finish applied after fabrication. Plastic and other non-metallic parts shall have a high resistance to yellowing and other changes due to aging, exposure to heat and ultraviolet radiation.
- B. Housings shall be rigidly formed, weather- and light-tight enclosures. Doors and other access means shall be smooth operating, free from light leakage under operating conditions and arranged to permit relamping without the use of tools. Arrange doors, frames, lenses, diffusers and other pieces to prevent accidental falling during relamping and when secured in operating position.
- C. All exposed hardware, screws and other fasteners shall be manufactured of stainless steel.

2.03 LED LUMINAIRES

- A. All LED luminaires shall be tested in accordance with IESNA-LM-79. Provide LM-79 test results for the total luminous flux, electrical power, efficacy and chromaticity on luminaire cut sheets. All LED light sources' lumen maintenance shall be tested in accordance with IESNA-LM-80. Provide LM-80 test results on luminaire cut sheets.
- B. All LED luminaires shall carry a minimum 5 year warranty on the entire luminaire and its components.
- C. All LED luminaires shall be listed on the Qualified Products List (QPL) of the DesignLights Consortium.
- E. LED luminaires shall be provided with proper driver and interconnecting wiring for proper operation with the supplied control device(s). Coordination of luminaire components and lighting control components is the responsibility of the Contractor.

2.04 EMERGENCY BATTERY PACKS

- A. Provide emergency battery packs for LED luminaires as required by the drawings. Battery packs for troffers and surface mounted luminaires shall be installed by the luminaire manufacturer within the luminaire housing unless otherwise noted on the drawings. Installation of all battery packs shall maintain accessibility from below regardless of ceiling type in which mounted. Battery packs shall be sealed, maintenance-free, high temperature nickel-cadmium type and provide minimum lighting lumen output of 1400 for ninety (90) minutes after interruption of normal power to the luminaire. Battery packs shall be as manufactured by Bodine or approved equal.

PART 3 - EXECUTION

3.01 INTERIOR LUMINAIRES

- A. Luminaires mounted level, plumb and square with ceiling and walls with bottom edge above finished floor as indicated on the drawings unless specifically noted otherwise. Luminaires shall be properly secured according to manufacturer's recommendations.
- B. Luminaire mounting shall be rigid and independent of the ceiling tile(s) and shall be supported from the major structural elements of the ceiling system. Luminaires mounted to concrete shall be anchored with concrete inserts or other means of similar strength as approved by the Professional or MDOT Project Engineer.
- C. Mounting of recessed luminaires shall be in accordance with Article 410 of the NEC. Luminaires installed in suspended ceiling systems shall be securely fastened to the ceiling framing members by mechanical means. Recessed fluorescent luminaires requiring a ceiling opening in excess of nine (9) square feet shall be supported independent of the ceiling system.
- D. All recessed luminaires in accessible ceilings shall be connected with 1/2" flexible conduit from accessible junction box with sufficient length to allow luminaire to be relocated to any adjacent ceiling panel without disconnecting. 3/8" flexible conduit may be used if furnished with the luminaire by the manufacturer. All recessed luminaires in non-accessible ceilings, unless otherwise indicated, shall be pre-wired from the factory with junction box for terminating branch circuit conduit.
- E. Recessed luminaires shall be installed to properly coordinate with and maintain the fire rating of the ceiling in which installed. Where fire rating installation requires covering over luminaire housing, ballast(s) of proper temperature rating as recommended by the manufacturer shall be furnished.
- F. Surface luminaires mounted on combustible ceilings or low density acoustical tile ceilings shall be UL approved for such mounting. Surface luminaires mounted on LAT ceilings shall be supported from and properly secured to the ceiling framing members and connected via flexible conduit similar to recessed luminaires. Where surface luminaires are served by exposed raceway, luminaires shall have surface conduit collar furnished by the luminaire manufacturer.
- G. The lighting luminaire locations shown on the Electrical drawings are approximate and representative. The Contractor shall review the Architectural reflected ceiling plans, elevation drawings, etc. for exact locations and mounting heights of lighting luminaires and for other elements which may effect luminaire mounting and/or operation. Mounting heights of all wall mounted luminaires shall be fully coordinated with the Architect prior to rough-in.

3.02 EXTERIOR LIGHTING LUMINAIRES

- A. Luminaires shall be mounted level, plumb and square with exterior elements of the building. Mounting heights indicated on the drawings are to bottom of luminaire above the finished floor unless specifically noted otherwise. Luminaires shall be secured according to the manufacturer's recommendations.
- B. The lighting luminaire locations shown on the Electrical drawings is approximate and representative. The Contractor shall review the Architectural reflected ceiling plans, elevation drawings, etc. for exact locations and mounting heights of lighting luminaires and for other elements which may effect luminaire mounting and/or operation. Mounting heights of all wall mounted luminaires shall be fully coordinated with the Architect prior to rough-in.

- C. Luminaire installation shall not allow water to penetrate luminaire housing or electrical outlet box. Gaskets and other weather proofing shall be provided and installed as required.
- D. Enclosed exterior mounted luminaires shall be properly sealed to prevent insects from entering the luminaire housing.
- E. Luminaires with adjustable mounting brackets shall be properly adjusted per the Professional or MDOT Project Engineer's direction. Once the luminaire adjustments have been approved by the Professional or MDOT Project Engineer, properly tighten and secure adjustments to prevent movement. Adjustment of luminaires may require after hours labor.
- F. Mounting of ground mounted luminaires shall include concrete bases as detailed on the drawings or if detail not shown as specified herein. Bases shall be of minimum 3000 p.s.i. concrete and provide a minimum of 3" of concrete coverage on all sides of luminaire stanchion or other support(s) as specified. A concrete pad on finished grade 4" thick shall be provided at each luminaire with a minimum dimension of 18" square with luminaire centered or as required to maintain a minimum 12" clear from edge of pad to luminaire.

END OF SECTION

SECTION 26 04 30 LIGHTING CONTROL SYSTEM

PART 1 - GENERAL

- 1.01 The lighting control system shall provide time-based, sensor-based and manual lighting control as indicated on the drawings.
- 1.02 Room/space lighting control devices shall be interconnected together into stand-alone lighting control zones enabling digital communication devices to allow proper operation and control of the associated room/space lighting as indicated on the drawings. Stand-alone lighting control zones shall be interconnected using network bridges such that the lighting control systems functions as a complete network system.
- 1.03 Gateway devices shall be provided (minimum one per floor) to allow time-of-day scheduling and programming and interface and access from building LAN. Gateway devices shall be connected and interfaced to building LAN via a Cat. 6 UTP cable.
- 1.04 A BacNet IP Interface Device shall be provided and connect to allow future connection and interface of Lighting Control System with Building Automation System (BAS).
- 1.05 The system may be wireless, wired or hybrid wireless/wired architectures.
- 1.06 All System components shall be UL listed or other acceptable national testing organization.
- 1.07 All System devices shall be warrantied for a minimum of 5 years. PART

2 - PRODUCTS

- 2.01 System devices shall be intelligent and communicate digitally over low-voltage wiring or wirelessly.
- 2.02 Lighting control zones shall consist of one or more intelligent lighting control devices, be capable of stand-alone operation, and be capable of being connected to a higher level network backbone.
- 2.03 Lighting control zones shall be capable of automatically configuring itself for default operation without any start-up labor required.
- 2.04 Power for lighting control zone devices shall come from one of the resident devices in the zone. If none of the indicated devices for a zone are capable of providing power or do not provide sufficient power, required additional devices capable of providing power shall be provided and connect in the associated zone.

2.05 All switching and/or dimming for a specific lighting control zone shall take place within devices located in the zone itself to facilitate System robustness and minimize wiring requirements.

2.06 SYSTEM COMPONENTS

A. Lighting Control System components shall be as manufactured by Sensor Switch nLight Network Control System or equal in Lutron or Hubbell.

B. Occupancy Sensors

1. Shall sense the presence of human activity within the associated space and fully control the on/off/enable function of the lighting in that space.
2. Sensors shall be dual-technology type utilizing passive infrared (PIR) technology to turn lights on from an off state. The second technology shall not utilize motion to detect occupancy.
3. Sensors shall have the capability to detect when it is not receiving valid communication and provide a visual indication. Sensors shall be capable of configuration via integral means.
4. Sensors shall be able to function together with other sensors in order to provide expanded coverage areas by simply daisy-chain wiring the sensors together using low-voltage cabling.
5. Sensors shall be equipped with an override function for 100 hour burn-in of lamps. This feature shall be available at any time for lamp replacements.
6. Sensors shall be the following:

Wall-box, line-voltage:	Cat. No. nWSX PDT Wall-
box, low-voltage:	Cat. No. nWSX-LV-PDT
Ceiling Mount, dual-technology, 360 degree:	Cat. No. nCM PDT
Wall-Corner Mount, dual- technology, 120 degree:	Cat. No. nWV PDT16

C. Power (Relay) Packs

1. Power packs shall incorporate one or more Class 1 16A relays, contribute low voltage power to the associated lighting control zone and shall be rated for connection to a 20A lighting branch circuit. Power packs shall accept 120 or 277 Vac, be plenum rated, and provide Class 2 power to the associated lighting control zone.
2. Power packs shall have the capability to detect when it is not receiving valid communication and provide a visual indication. Sensors shall be capable of configuration via integral means.

- 3. Emergency power packs shall sense loss of power at the normal power panelboard serving the area via a provided sensing circuit and shall automatically switch "ON" the emergency lighting circuit upon loss of normal power regardless of control commands.
- 4. Dimming power packs and emergency dimming power packs shall have the same switching and control features as standard power packs and emergency power packs and shall provide the control for automatic or manual 0-10V dimming of connected lighting luminaires.

Power/Relay Pack:	Cat. No. nPP16
Emergency Power/Relay Pack:	Cat. No. nPP16-ER
Dimming Power/Relay Pack:	Cat. No. nPP16-D
Dimming Emergency Power/Relay Pack:	Cat. No. nPP16-D-ER

D. Relay Panels

- 1. Relay panels shall have a minimum of 4 normally closed latching 20A relays capable of switching 120/277 Vac and four 0-10V dimming outputs for control of connected lighting circuits.
- 2. Relay panels shall power itself via an integral power supply.
- 3. Relay panels shall be capable of being interconnected via low-voltage cabling to any lighting control zone or System network.
- 4. Relay panel: Cat. No. nPANEL 4.

E. Wall Switches

- 1. Wall switch devices shall be recessed in a single-gang switch box, shall have mechanical pushbuttons and provide LED user feedback.
- 2. Wall switch devices shall be connected to the associated lighting control zone via low-voltage wiring.
- 3. L.V. Wall Stations shall be the following:

Single On/Off pushbuttons (SLV2):	Cat. No. nPODM
On-Low/On-High/Off pushbuttons (SLV3):	Cat. No. nPODM 2L
Dual On/Off pushbuttons (SLV4):	Cat. No. nPODM 2P
Quad presets, On/Off, w/dimming raise-lower (SLVD):	Cat. No. nPODM-4P-DX
Dual On/Off, w/dual dimming raise-lower (SLVD2):	Cat. No. nPODM-2P-DX
Quad On/Off (SLV8):	Cat. No. nPODM-4P
Graphic Wall Station (SLVG):	Cat. No. nPOD-GRX

F. DayLighting Sensors

1. Ceiling mount device providing automatic dimming photocell control and adjustable lighting level set point.

2. Daylight Sensor: Cat. No. nCM-ADCX

G. Network Bridge Device

1. Bridge, 8-port Cat. No. nBRG-8

H. Network Gateway Device

1. TCP/IP device that provides time-based control of lighting control system network and ethernet interface for lighting control system software with graphic user interface device and power supply.

Gateway controller & graphic interface: Cat. No. nGWY2

I. BACNet Interface Device

1. IP device that allows Building Automation System to communicate and control the Lighting Control System via standard BACNet/IP protocol.

BACNet Interface Device: Cat. No. nBACNET J.

SYSTEM DESIGN

1. Successful lighting control system manufacturer shall provide complete system design including device layout, specific device selection for proper operation in the room/space indicated, interconnecting wiring, etc.

2. Lighting control system network shall be designed by interconnecting individual lighting control zones using bridge devices. One bridge device shall be used for connection of a maximum of four lighting control zones.

3. System device layout and wiring drawings shall be submitted with the system component shop drawings for approval by the Professional.

PART 3 - EXECUTION

3.01 Devices located in/on walls or partitions shall be mounted in/on properly sized outlet boxes. A minimum 3/4" conduit shall be routed from each outlet box to above the accessible ceiling in the associated zone or to the next device outlet box where inaccessible ceilings exist.

3.02 All line voltage wiring shall be routed in conduit per the Division 26 specifications. Low-voltage communication wiring may be routed exposed above accessible ceilings when properly supported per EIA/TIA requirements. Where low-voltage wiring crosses ceiling areas open to overhead structure or otherwise visible from below in public spaces, it shall be routed in conduit that is routed tight to the overhead structure.

- 3.03 Non-user-interface control devices (bridges, power/relay packs, etc.) shall be mounted in/on proper outlet box above accessible ceilings. Where accessible ceilings are not available in the area of the installation, devices shall be mounted in properly sized recessed junction box.
- 3.04 All devices shall be installed and connected per the manufacturer's recommendations.

END OF SECTION

SECTION 26 04 50 EQUIPMENT ELECTRICAL SERVICES

PART 1 - GENERAL

- 1.01 Provide and connect proper branch circuit(s) and final connection(s) to all equipment requiring electrical service(s). Equipment electrical service connections shall be as indicated on the drawings and/or as recommended by the equipment manufacturer. Branch circuit and final connection conduits shall be in accordance with SECTION 260110 "RACEWAYS AND FITTINGS".
- 1.02 Review architectural drawings and specifications and provide adequate electrical services for and make proper connections to all equipment furnished by the General Contractor requiring electrical service.
- 1.03 Carefully review plumbing and HVAC drawings and Division 22 & 23 of the specifications for mechanical equipment requiring electrical services. Provide adequate electrical services for and make proper connections to all such mechanical equipment requiring electrical service.
- 1.04 Electrical services and connections to equipment shall follow the equipment manufacturer's recommended method. Where the equipment furnished exceeds the circuit capacity or requires different characteristics than that shown on the drawings, this information shall be brought to the attention of the Professional prior to the branch circuit or connection rough-in.
- 1.05 The Division 26 Contractor shall immediately upon notice to proceed and after verification of service with the serving Utility Company notify in writing the General Contractor, the Division 22 & 23 Contractor(s) and all other affected Contractors the characteristics of the electrical service(s) of the facility(ies) including voltage and phase. A copy of this notification shall be submitted to the Professional with the project electrical shop drawings.
- 1.06 The equipment electrical service connection locations shown on the drawings are approximate and representative. Verify and coordinate actual electrical service rough-in locations, requirements, etc. with the Contractor providing the equipment and the associated manufacturer's shop drawings.
- 1.07 MAINTENANCE DISCONNECTS
- A. All power connections to equipment shall include a maintenance disconnect of the type indicated or if not specifically indicated as recommended by the equipment manufacturer in compliance with the NEC.
- B. Maintenance disconnect switches for equipment shall be located adjacent to the associated equipment and readily accessible as defined by the NEC. Location of disconnect switches shall be fully coordinated with the equipment provider, the supplied equipment shop drawings and the adjacent building elements so as not to interfere with the correct placement and operation of the equipment. Maintenance disconnect switches shall be provided with lock-out provisions.

- C. On multi-motor equipment connections (i.e. condensing units, roof-top HVAC units, etc.), the Division 26 Contractor shall verify with the Division 22 & 23 Contractor(s) and obtain in writing the manufacturer's requirements for the equipment overcurrent devices. Provide HACR rated branch circuit breaker for each load in the serving panelboard of size as required by the manufacturer of the connected equipment. Where fuses or HACR breakers are permitted for overcurrent protection, utilize the serving HACR breaker for overcurrent protection and provide non-fused maintenance disconnect switch. Where fuses are required by the equipment manufacturer for overcurrent protection, provide fusible disconnect switch with fuse sizes as recommended by the manufacturer of the connected equipment. Obtain written approval from Division 22 & 23 Contractors of overcurrent device size and method before energizing equipment.
- D. See Section 260410 "Wiring Devices" for additional requirements for Safety Switches.

1.08 HVAC EQUIPMENT ELECTRICAL SERVICES

- A. Electrical service connections to ventilating fans shall include manual motor switch installed and connected where directed. Where fans are furnished with speed control devices, the Division 26 Contractor shall install the control device where directed and connect through it in addition to the manual motor switch. Where fans control or are controlled by other equipment such as timers, motorized louvers, firestats, EMCS control panels, etc., the Division 26 Contractor shall coordinate with the supplying Contractor and make connection to the fan through or with this device as required for proper operation.
- B. Electrical service connections to HVAC equipment to include branch circuit wiring to the line side of line voltage control device such as magnetic starter, contactor, VFD, etc. and from load side of control device through motor terminals or equipment connection lugs. The control devices shall be furnished by the Division 22 & 23 Contractor and installed where directed by the Division 26 Contractor. Control devices which are integral pre-wired parts of equipment require connection to the line side of the control device only by the Division 26 Contractor unless otherwise indicated. All additional wiring including control wiring shall be furnished and installed by the Division 22 & 23 Contractor. Line voltage thermostats and other temperature control devices regardless of voltage shall be furnished, installed, wired and connected by the Division 22 & 23 Contractor.

1.09 OTHER EQUIPMENT ELECTRICAL SERVICES

- A. The Division 26 Contractor shall provide proper branch circuit, disconnect device and final connection to all equipment requiring electrical service furnished under other Divisions of the specifications.
- B. Set disconnect switch or other approved device if disconnect switch not shown adjacent to equipment and make final connection to the equipment as required in accordance with SECTION 260110 "RACEWAYS AND FITTINGS". Connection to include power wiring to the line side of the equipment controller or to the power connection location as applicable.

- C. Division 26 Contractor shall obtain approved rough-in drawings for each item of equipment requiring connection and follow the manufacturer's recommendation as to the location and the method of connections.

- D. 1. Motorized Doors/Screens/Shades. Power connection locations shown on the drawings are approximate and representative. Verify exact power connection locations with equipment supplier prior to rough-in. Branch circuit connection shall include proper disconnect switch located adjacent to equipment as directed. Division 26 Contractor shall install remote operator station(s) furnished with the equipment and shall provide necessary conduit(s) from equipment to remote operator station(s). Operator station(s) shall be installed where directed by the Professional or MDOT Project Engineer and/or the equipment supplier. Verify all electrical service requirements with equipment shop drawings prior to rough-in.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 26 05 10 ELECOMMUNICATION RACEWAY SYSTEM

PART 1 – GENERAL

- 1.01 Applicable requirements listed in Sections 260110 “Raceways and Fittings” and 260120 “Boxes and Fittings” shall apply. All telecommunication raceway installations shall comply with the applicable requirements of the ANSI/EIA/TIA standards.
- 1.02 Raceway system including conduits, boxes, plates and backboards as shown on the drawings by symbols and as specified herein.
- 1.03 Provide bushing on all conduits.

PART 2 - PRODUCTS

- 2.01 Work Area Outlets. Outlet boxes shall be 4" square X 2.5" deep with appropriate depth single gang raised cover unless noted otherwise on the drawings or required for the number of receptacles installed.
- 2.02 Conduits serving work area outlets shall be 3/4" unless noted otherwise on the drawings and shall be routed to termination points as dictated by the drawing symbol(s) or notes. Conduit homeruns serving outlet boxes in rooms/spaces with accessible ceilings shall have in-line junction box mounted above the accessible ceiling to allow access to raceway for systems terminating within the space.
- 2.03 Backboards shall be 3/4" plywood minimum AC grade sized as shown on the drawings or 8' X 4' if size not indicated mounted with the long dimension vertical. Plywood backboards shall be void free and either fire-rated or treated on both sides with two coats of fire-resistant black enamel paint. Where required by local codes, cover plywood backboard w/sheet rock.

PART 3 - EXECUTION

3.01 OUTLETS

- A. Mount outlet boxes with center at same height as adjacent receptacles, as noted on the drawings or at eighteen (18) inches to centerline above the finished floor. Telecommunication outlets shall be mounted within 12" of adjacent power receptacle where shown on the drawings. Do not mount outlet boxes back-to-back.

3.02 HORIZONTAL RACEWAY SYSTEM

- A. Telecommunication system conduits and rough-in provisions shall not be less than six (6) inches from any source of alternating current unless separated by a grounded metallic partition.
- B. Conduit routing shall follow most direct route possible to the designated termination point(s) within constraints of Section 260110 with no more than two (2) 90 degree bends between pull points and/or junction boxes. For conduit runs greater than 100 feet, provide junction box(es) sized per NEC such that no conduit segment exceeds 100 feet.

- C. Conduit bend radius shall be minimum 6 times the internal diameter for conduits with internal diameters 2" or less and 10 times the internal diameter for conduits with internal diameters greater than 2".
- D. Provide a nylon pull string with a minimum test rating of 200 lbs. in all empty conduits.

3.03 TELECOMMUNICATION ROOMS.

- A. Provide telecommunication backboards as shown on the drawings or as a minimum one per telecommunication room.
- B. A grounding bus bar meeting the requirements of EIA/TIA 607 shall be provided in each telecommunication room or backboard location. The grounding bus bar shall be copper of minimum dimensions 20"X4"X1/4" with wall mounting bracket with insulators to isolate the ground bar. The ground bar shall have pre-drilled termination holes of proper size to terminate #12 through #4 AWG copper wire properly spaced over the entire length and width of the bar. The grounding bus bar shall be properly bonded to its associated grounding conductor using a properly sized mechanical lug.
- C. A #6 grounding conductor in 1 inch conduit or size as shown on the drawings shall be provided from the electrical service entrance equipment ground bus to each telecommunication room ground bus bar. The grounding conductor may be installed "daisy-chained" from backboard to backboard or radially from service entrance equipment. A grounding type bushing shall be used at each end of the conduit and shall be properly bonded to the ground conductor at all wire exit points. Grounding conductor splices, if required, shall be made with irreversible compression type splices.
- D. Provide a minimum of two double duplex grounding receptacles or number as shown on the drawings on dedicated branch circuit(s) at each telecommunication system backboard. The telecommunication room receptacle branch circuits shall be routed through a branch circuit junction box mounted at the overhead structure or above the accessible ceiling where present within the telecommunication room to allow for future receptacle additions. Receptacle(s) shall be mounted at the specified height or as directed by the Professional or MDOT Project Engineer and arranged so as not to be mounted behind conduits or cabling.
- E. Service entrance, backbone and work area outlet conduits shall be stubbed into the telecommunication room in an accessible location using the minimum number of bends and offsets possible. Conduits entering from the floor slab or overhead structure shall be stubbed into the space 4 inches above the slab or below the bottom of the overhead structure.

3.04 TELECOMMUNICATION SERVICE ENTRANCE.

- A. Verify the telecommunication service connection point and all requirements with the serving Telephone Company and/or campus/base Physical Plant prior to any rough-in.
- B. The telecommunication service entrance raceways shall be routed underground from the service connection point as shown or noted on the drawings or as required by the serving Utility Company or Using Agency to the telecommunication service entrance facilities within the building. The service entrance raceways shall be of the size and number as shown or noted on the drawings. The service entrance raceways shall be physically separated from any underground power duct bank(s) by a minimum of 24". All bends shall be long radius type unless specifically noted otherwise.

END OF SECTION

SECTION 27 00 10 COMMUNICATION SYSTEMS

PART 1 - GENERAL

1.01 GOVERNING CLAUSE

- A. For the sake of brevity, these specifications may omit phrases such as "Contractor shall provide", "unless otherwise indicated or specified", etc., but these phrases are nevertheless implied. Mention of materials and operations requires the Contractor to furnish, install and connect such materials and perform such operations to provide a complete and operating system to the satisfaction of the Professional.

1.02 GENERAL CONDITIONS

- A. The General Conditions, Supplementary General Conditions, Information to Bidders, General Requirements, Addenda, Alternates and other pertinent documents issued by the Professional are a part of these specifications and shall be complied with in every respect.
- B. Notwithstanding any reference in the specifications to any equipment, material or type of construction by name, make or catalog number, such reference shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. Where the phrase "or approved equal" is used in the Division 27 Specification, substitute equipment, equivalent in all respects to that specified, of any qualified manufacturer is permitted with the written approval of the Professional. Approval will not be considered until after award of contract and only if submitted by the successful Contractor. Where a list of manufacturers and/or catalog numbers is provided and the phrase "or approved equal" is omitted, substitute equipment, equivalent in all respects to that specified, from one of the listed manufacturers is permitted with the written approval of the Professional.

1.03 TEST AND OBSERVATIONS

- A. The complete project shall be, during and/or after construction, subject to the tests and observations as herein described and as noted on the drawings. Deficiencies found as a result of these tests and observations shall be corrected by the Contractor within a reasonable period and at no expense to the Owner.
- B. The complete project shall be subject to observations and tests conducted by the Professional or for him in his presence. Upon notice, the Contractor shall furnish not to exceed two men, one to include the job foreman, and tools to assist and be directed by the Professional for a reasonable amount of time to make such tests and observations as are requested by the Professional.
- C. The complete project shall be subject to observations and tests conducted by any Federal, State and/or local authority having jurisdiction. The Contractor shall make all corrections of any deficiencies required by the authority having jurisdiction to allow building occupancy.
- D. The complete project shall be subject to observations and tests conducted by the Owner's Insurance carrier. After inspection by this agency, Contractor shall make corrections of any deficiencies found adversely affecting the insurance to be carried by the Owner. Acceptance of this report or subsequent reports lie with the Professional or Owner.

1.04 RECORD DOCUMENTS

- A. The contractor shall provide to the Professional with the Close-Out Documents the following:
 - 1.. Two (2) sets of blue line “as-built” prints of same scale as original drawings legibly marked in red showing all variations in the installed work from the requirements of the original contract drawings. The “as-built” drawings shall include all addenda, approved and installed change orders, field condition changes and other departures from the original plans and specifications.
 - 2. Three (3) sets of shop drawings and other data required by the specifications reflecting the manufacturer's shop fabrication of the materials actually installed. The Division 27 shop drawings shall be separately post bound, indexed and tabbed by specification section. Faxed or copies of faxed material shall NOT be used in Close-Out Documents.
 - 3. Operation and maintenance manuals and manufacturer’s instructions for all equipment and systems installed.
 - 4. Copy of all reports of system, equipment or material test as required by this specification.

1.05 GUARANTEE

- A. The Contractor shall guarantee to the Owner all work performed under this contract to be free from defects in workmanship and materials for a period of one year from the date of final acceptance by the Professional and the Owner except as hereinafter noted.
- B. The Contractor shall correct, repair and/or replace upon notice from the Owner or his authorized representative within a reasonable period of time any defects in the work performed under this contract arising during the warranty period. This repair work shall be provided at no additional cost to the Owner.

1.06 COMMUNICATION SYSTEMS SCHEDULE

- A. Provide and connect all equipment and materials for complete and operative systems as follows:
 - 1. Structured Telecommunication Horizontal Cabling System.
 - 2. Miscellaneous Systems as shown on the drawings or stated herein.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 27 00 30 EQUIPMENT/MATERIAL SUBMITTALS

PART 1 - GENERAL

1.01 EQUIPMENT/MATERIAL SPECIFICATION

- A. Equipment is specified by manufacturer's name and catalog number and is intended to establish the minimum standards of quality acceptable.
- B. Substitute equipment, equivalent in all respects to that specified, is permitted with the written approval of the Professional. Approval will not be considered until after award of contract and only if submitted by the successful Contractor.
- C. The manufacturer's name and/or catalog number first mentioned in this specification is considered to be the specified equipment. The "or equal" manufacturers mentioned or other manufacturers proposed by the Contractor shall be considered as substituted equipment.
- D. Substituted equipment shall meet the dimensional and functional requirements of the building as represented by the plans and specifications. All revisions to the contract precipitated by the use of substituted equipment shall be incorporated by the Contractor, after approval in writing by the Professional, and at no additional cost to the Owner.
- E. The Professional's approval of the shop drawings is only for general conformance with the design concept of the Project and the information given in the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site; information that pertains solely to the fabrication process or to the means and methods of construction; coordination of work of all trades; and performing all work in a safe and satisfactory manner. Approval of the shop drawings does not modify the Contractor's duty to comply with the Contract Documents. Any equipment or work found in the judgement of the Professional to be defective or otherwise unsuitable shall be repaired or replaced by the Contractor at no additional cost to the Owner.
- F. If requested in writing by the Professional, the Contractor shall submit a scale drawing (scale as directed by the Professional) of any electrical equipment area, conduit layout or the like which in the opinion of the Professional may present difficulty regarding space allocation or clearances.

1.02 SUBMITTALS

- A. After the project notice to proceed has been issued and with promptness to assure reasonable time for review with no delay to the project, the Contractor shall submit to the Professional a minimum of six (6) copies of shop drawings for all equipment and material for the electrical systems for approval whether or not substituted equipment or materials.
- B. Shop drawings shall be post-bound, indexed and tabbed per the appropriate specification sections. All material/equipment shop drawing cut sheets shall be properly located under the appropriate specification section. All shop drawings shall be originals (no faxed copies) and shall be readable without being removed from the bindings. All information listed on the shop drawings shall be typed. Handwritten information will not be accepted.
- C. Space shall be provided on the title or index page of each section of the shop drawings for the Professional's review stamp and comments. This space shall be clearly labeled as to its use and shall have a minimum size of 7" wide X 5" high.

- D. All submitted equipment/material and associated options, accessories, special features, etc. shall be clearly marked and indicated on all copies of the shop drawings. Provide appropriate shop drawings on all required accessory equipment.
- E. All shop drawings for all systems, equipment and materials including any required one-line drawings, diagrams, etc. shall be submitted together. Partial submittals will not be reviewed without prior consent. Special systems provided by specialized vendors or distributors may be submitted in a separate binder.
- F. Provide complete shop drawings with all pertinent information for each system specified and all required components.
- G. Special Systems submittals shall include a complete System one-line diagram prepared by the Company supplying the System components and devices.
 - 1. The one-line diagram shall show each component and device, all interconnecting wiring and conduit, terminal strips with numbering, pull and junction boxes, device zoning or device addresses where applicable and any other information which is deemed necessary by the Professional. The type, size and number of wires shall be shown for each interconnection circuit. The number and size of all conduits and boxes shall be identified on the drawing. The conduit routing and wiring shown on the one-line drawings shall accurately depict the actual installation of the System in the field.
 - 2. The one-line diagram drawings shall be produced using a commercially available CAD software program capable of producing electronic drawing files compatible with AutoCad software. Drawing symbols and lettering shall be neat and legible and printing line weights used shall clearly distinguish System components/devices from background floor or site plan elements. All lettering shall be upper case. When background drawing (floor plan, site plan, etc.) requires paper size to exceed 11"X17", the scale of the System one-line drawing shall be one-half the scale of the Contract Drawings and printed on the smallest adequate standard size paper.
- H. Three (3) copies of complete operational and maintenance manuals for each installed System shall be provided to the Professional with the Close-Out Documents. These manuals shall be post-bound and indexed and shall include catalog information, operating procedures in detail, wiring diagrams of all components, complete system one-line diagrams, and the address and phone number of the service department of the supplying Company.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 27 01 10 TELECOMMUNICATION CABLING SYSTEM

PART 1 - GENERAL

1.01 CODES and STANDARDS

- A. Shall be installed in the telecommunication raceway system(s) as shown and/or noted on the drawings and herein specified. The cabling system though not shown on the drawings shall be furnished and installed by the contractor to accomplish the intent of the system as shown on the drawings by symbols and as herein specified.
- B. Applicable requirements listed in the following sections shall apply: Section 260110 "Raceways and Fittings", Section 260120 "Boxes and Fittings" and Section 260510 "Telecommunication Raceway Systems."
- C. All work shall comply with the applicable codes and standards as issued by NEC, ANSI/EIA/TIA, BISCI, IEEE, UL and NFPA.

1.02 SCOPE OF WORK

- A. The Contractor shall furnish all equipment, material and labor required to provide and connect in accordance with this specification and applicable drawings a fully operational Structured Telecommunication Horizontal Cabling Distribution System, hereinafter referred to as the "System" in this section of the specifications, to the complete satisfaction of the Professional.
- B. It is the intent of the drawings and this specification to provide a complete and operational System ready for the Owner's use. All equipment, accessories and/or material necessary for the proper operation of the System as herein specified not specified or described herein but normally provided in similar systems shall be deemed part of the specifications and shall be provided by the Contractor.

1.03 CONTRACTOR QUALIFICATIONS

- A. The structured cabling system Contractor, hereinafter referred to as the "Contractor" in this section of the specifications, shall be an experienced firm regularly engaged in the design and installation of cabling systems of similar size and complexity as required for this project and have the following minimum qualifications:
 - 1. Personnel trained and certified in the design of the approved structured telecommunication cabling system to be provided.
 - 2. Personnel trained and certified to install and connect the approved structured telecommunication cabling system to be provided.
 - 3. Personnel knowledgeable in local, state, province and national codes and regulations.
 - 4. Personnel trained and certified in fiber optic cabling splicing, termination and testing techniques. These personnel must also have experience using a light meter and OTDR.
 - 5. Personnel trained in the installation of pathways and supports for housing telecommunication horizontal and backbone cabling.
 - 6. A minimum of one Registered Communications Distribution Designer (RCDD) who is a permanent employee of the structured cabling system Contractor.
 - 7. Possess required licenses/permits to perform telecommunications installations in the jurisdiction in which the project is located.

- B. Provide with the System(s) shop drawings a copy of all certifications and registrations of the Contractor's personnel that will be involved with the design and/or installation of the System(s).
- C. The required RCDD shall be a responsible party in the Contractor's management and/or installation team for this project and shall be fully aware of the day-to-day operations of the project. The RCDD shall as a minimum make regular visits to the project site during the installation of the associated System raceways and cabling as required to insure proper installation of each per this specification and applicable codes and standards. The RCDD shall affix his stamp to the Contractor's shop drawings, as-built drawings, etc. to indicate that he has reviewed the item and that it is complete and accurate, complies with the project requirements, and/or is representative of the system as actually installed.
- D. At the request of the Professional, the System Contractor shall provide in writing references of a minimum of three successfully completed projects of similar size and complexity as this project which have been completed by this Contractor in the three year period preceding this project's bid date. References shall include project name, location, Owner's contact person and telephone number.

PART 2 - PRODUCTS

2.01 SYSTEM MANUFACTURERS

- A. The horizontal cabling and connectivity hardware shall be fully compatible and recognized by the manufacturers of each component as required to provide the specified performance and the System warranty herein specified. Each major component of the System (copper cabling, fiber optic cabling and connectivity hardware) shall be provided by a single approved manufacturer of that component.
- B. Approved Copper Cable Manufactures
 - 1. Mohawk
 - 2. Commscope
 - 3. Ber-Tek
 - 4. Belden
 - 5. Amp
 - 6. Superior Essex
- C. Approved Copper Connectivity Hardware Manufacturers
 - 1. Siemon
 - 2. Amp
 - 3. Ortronics
 - 4. Panduit
- D. Approved Fiber Optic Cable Manufacturers
 - 1. Mohawk
 - 2. Corning
 - 3. Belden
 - 4. Ber-Tek
 - 5. Avaya

E. Approved Fiber Optic Connectivity Hardware Manufacturers

1. Siemon
2. Amp
3. Ortronics
4. Corning

2.02 HORIZONTAL CABLING SYSTEM - COPPER

A. Cable:

1. Voice and data cabling shall be as manufactured by an approved cable manufacture as listed herein, shall comply with the appropriate category performance specifications outlined in ANSI/TIA/EIA-568-B.1, -B.2 & -B.3 and with this specification.
2. Voice cabling shall be unshielded twisted pair (UTP), four (4) pair, 100 ohm, Category 6-250MHz, 24 gauge. Outer cable jacket shall be grey in color or color coding as directed by the Owner.
3. Data cabling shall be unshielded twisted pair (UTP), four (4) pair, 100 ohm, Category 6-250MHz, 24 gauge. Outer jacket shall be blue in color or color coding as directed by the Owner.
4. All cables shall be appropriate for the environment installed)(plenum or non-plenum rated as appropriate for the environment installed.

B. Work Area Outlets:

1. Voice and data work area outlet receptacles shall be as manufactured by an approved connectivity hardware manufacture as listed herein and shall comply with the appropriate category specifications outlined in ANSI/TIA/EIA-568-B.1, -B.2 & -B.3 for the for the cable category in which connected and with this specification.
2. Provide and connect one RJ-45, Category 6 compliant receptacle at each voice outlet as shown on the drawings by symbols or specified herein.
3. Provide and connect one RJ-45, Category 6 compliant receptacle at each data outlet as shown on the drawings by symbols or specified herein.
4. Work area outlet receptacles shall have the following characteristic:
 - a. 310 style insulation displacement connectors with quadrant pair isolation and a pyramid wire entry system.
 - b. Backwards compatible to allow lower performing category cables or connecting hardware to be connected and perform at their full capacity.
 - c. Rear protective strain relief caps with side or rear entry.
 - d. Allow for a minimum of 200 terminations without signal degradation below standards compliance limits.
 - e. Support industry standards T568A and T568B wiring configurations.
 - (f. Color coded snap-in icons for circuit identification.
 - g. UL listed and constructed of high-impact, flame retardant thermoplastic.
 - h. Angled gravity-feed (45 degree angle) design.

C. Outlet Plates:

1. Telecommunication outlet plates shall be of the same material as specified for power wiring devices in Section 26 01 20 "Boxes and Enclosures". Work area outlet plates shall have the proper number of knockouts as required for the receptacles to be installed and/or two receptacle knockouts minimum. Provide blank cover on unused plate knockouts.

D. CONNECTION BLOCKS

1. Connection blocks shall be as manufactured by an approved connectivity hardware manufacture as listed herein and shall comply with the appropriate category specifications outlined in ANSI/TIA/EIA-568-B.1, -B.2 & -B.3 for the for the cable category in which connected and with this specification.
2. Connection blocks shall be Type 110 and shall be properly mounted on backboards to facilitate cross-connection and/or inter-connection using patch cords.

E. PATCH PANELS

1. Patch panels shall be as manufactured by an approved connectivity hardware manufacture as listed herein and shall comply with the appropriate category specifications outlined in ANSI/TIA/EIA-568-B.1 & -B.2 for the cable category in which connected and with this specification.
2. Patch panels shall be Category 6, shall be installed to facilitate cross-connection and inter-connection using modular patch cords and shall conform to EIA standard, 19" rack mounting requirements.
3. Patch panel shall be constructed of black anodized aluminum and shall have the following characteristic:
 - a. 310 style insulation displacement connectors with quadrant pair isolation and a pyramid wire entry system.
 - b. Backwards compatible to allow lower performing category cables or connecting hardware to be connected and perform at their full capacity.
 - c. Rear protective strain relief caps with side or rear entry.
 - d. Circuit boards tested in both directions.
 - e. Have a rear cable management bar for strain relief.
 - f. Port identification numbers on both the front and rear of the panel.
 - g. Individual port labeling provisions.
 - h. Support industry standards T568A and T568B wiring configurations.

F. TERMINATION RACKS

1. Provide termination racks as required by the drawings and/or as required for the number of patch panels and fiber optic termination shelves to be provided. A maximum of two-thirds of the available mounting space in any rack shall be used for cable terminations. The remaining one-third of the available mounting space shall be dedicated for Owner provided electronics.
2. Termination racks shall be open wall-mount, fully enclosed, swing-rack type, aluminum, with universal 19" EIA mounting with tapped holes and locking door(s). Rack height shall be 36".

3. Provide a rack mounted surge protection power strip with a minimum of six (6) receptacles, on/off switch and fifteen (15) foot cord & plug set.
4. Termination racks shall be as manufactured by Great Lakes Case & Cabinet Company, X-Mark/CDT, Hubbell, Siemon or approved equal.

G. WORK AREA CORDS/PATCH CORDS

1. Provide voice work area cords, one for each voice receptacle installed plus 25% spare. Cords shall be factory made Category 6-550MHz, ten (10) feet in length with RJ-45 connector at each end. Outer jacket color shall be the same as the corresponding horizontal cabling.
2. Provide data work area cords, one for each data receptacle installed plus 25% spare. Cords shall be factory made Category 6-250MHz, ten (10) feet in length with RJ-45 connector at each end. Outer jacket color shall be the same as the corresponding horizontal cabling.
3. Provide patch cords, one for each active port installed plus 25% spare. Cords shall be factory made Category 6-250MHz, three (3) feet in length with RJ-45 connector at each end. Outer jacket color of patch cords shall be the same as the corresponding horizontal cabling.

2.03 BACKBONE CABLING - FIBER OPTIC

- A. Copper and fiber optic backbone cabling shall be as manufactured by an approved cabling system manufacture as listed herein and shall comply with the specifications outlined in ANSI/TIA/EIA-568-B.1, -B.2, & -B.3 and with this specification.
- B. Provide the following backbone cabling between each horizontal cross connect (HC) and intermediate cross connect (IC) within the facility(ies) and the main cross connect (MC) and properly terminate each cable on each end with the specified equipment.
- C. Voice backbone cabling shall be high-pair Category 3 cable with a minimum of 50 pairs.
- D. Data backbone cabling shall be a multi-mode fiber optic cable 62.5/125 micron with a minimum of twelve (12) strands of fiber and a single-mode fiber optic cable (8.7/125 micron) with a minimum of six (6) strands of fiber.
- E. A minimum of ten (10) feet of slack cable shall be provided at each HC, IC and MC. Slack cabling shall be properly stored in an extended loop or figure 8 configuration.
- F. Unless otherwise noted on the drawings or herein specified, 100% of the backbone cabling pairs or strands shall be terminated.

PART 3 - EXECUTION

3.01 CABLE ROUTING

- A. Telecommunication cables shall be routed utilizing the raceway system(s) as shown on the drawings, as specified in Section 16510 "Telecommunication Raceway System" and the requirements listed herein.

- B. Telecommunication cables shall be routed in compliance with the following requirements:
1. Cable shall be routed in corridors, where possible, consistent with the requirements as listed herein.
 2. Cable routing to follow the shortest distance between termination points consistent with the building construction constraints, telecommunication raceway system provided and the other requirements listed herein. Horizontal cable runs, regardless of media type, shall not exceed 295 feet (90 meters) from the work area outlet to the horizontal cross connection termination point including cable slack.
 3. Cable routing shall avoid arcing or rotating electrical equipment, transformers and/or ballast and any type of signal transmitting equipment. Maintain cable manufacturer's recommended clearance from any interference source given the cable installation method/media (conduit, cable tray, J-hooks, open, etc.)
 4. Where cables are routed open (without a conduit or other raceway system), provide cable supports (i.e. J-hooks, etc.) whether or not shown on the drawings or specified herein. Cable supports shall be mounted independent of the ceiling support system and spaced as recommended by the cable manufacturer and at a maximum of 5 feet on center. The number of cables placed in any support device shall be limited to the number of cables as recommended by the cable manufacturer or to the number of cables that will not cause a change in the geometric shape of any cable in the support.
 5. Cables shall be routed parallel and perpendicular to walls, ceilings and/or floors where possible. Cable homeruns from a common area and terminating at a common backboard or termination rack shall be group together. All cables shall be installed in a neat and workmanlike manner.
 6. Maintain the manufacturer's minimum bending radius during and after installation.
 7. Cable pulling tensions shall remain within the manufacturer's recommendation during and after installation.
- C. The Contractor shall plan and design each horizontal and/or backbone cable routing path from termination point to termination point taking into account and coordinating with all building systems and construction prior to the installation of any cable. Any cable installation as required by the drawings and this specification that can not meet the requirements as specified herein using the Telecommunication Structured Cabling System or Telecommunication Raceway System as specified herein shall be brought to the attention of the Professional prior to any cable or raceway installation.
- D. Telecommunication cables (voice and data) shall be continuous (no splicing permitted) from the work area outlet receptacle termination to the designated backboard or patch panel termination. Work area cabling shall be installed in a "star" topology.

3.02 CABLE TERMINATIONS

- A. A minimum of 12 inches of slack cable at the work area outlet and a minimum of 10 feet of slack cable at the termination rack/backboard shall be provided for all UTP cables. Slack cabling at the termination rack/backboard shall be properly stored in an extended loop or figure 8 configuration.

- B. Each Cable shall have all pairs properly terminated per the required category specifications at the work area outlet receptacle and at the backboard connection blocks or patch panel receptacle.
- C. Voice cables shall be terminated at the designated telecommunication room/closet on Category 6 patch panels.
- D. Data cables shall be terminated at the designated telecommunication room/closet on Category 6 patch panels.
- E. Cables shall be terminated at each outlet, patch panel, etc. using the wiring configuration as directed by the Owner.

3.03 CONNECTION BLOCKS

- A. Provide connection blocks at each backboard as follows:
 - 1. One four pair cable termination for each work area outlet cable terminated at that backboard plus 50% spare.

3.40 PATCH PANELS

- A. Provide 48 port patch panels with RJ-45 receptacles at each termination rack as follows:
 - 1. One port per work area outlet cable terminated at the termination rack plus 25% spare. A minimum of 48 ports shall be provided at each termination rack.
 - 2. All ports provided whether connected in this project or are spare for future use shall have RJ-45 receptacle installed and ready for future connection.

3.05 TERMINATION RACKS

- A. Mount termination racks for maintenance access at front and rear. Maintain sufficient clearance for one (1) future additional termination rack to be mounted adjacent to the provided racks. Exact placement of each rack in the space shall be verified with the Professional and/or the Owner prior to rough-in.
- B. Each termination rack shall be bonded to the telecommunication ground bus using a #6 copper conductor. Ground conductor may be daisy-chained between multiple racks when installed side-by-side.

3.06 LABELING

- A. On the face of each telecommunication work area outlet plate, permanently label each data receptacle with an identification number corresponding to the associated termination rack designation and patch panel receptacle number in which the outlet is connected.
- B. Each horizontal cable shall be identified on each end by an adhesive wrap around printed label indicating the associated work area receptacle/patch panel receptacle identification number.
- C. Patch panel receptacle numbering shall be sequential and consecutive across multiple patch panels when installed in a common rack or system of racks installed in the same room for the same system.

- D. Telecommunication system labeling shall be fully explained to the Owner prior to installation and fully coordinated with the Owner's labeling requirements.

3.07 CABLE TESTING

A. HORIZONTAL - COPPER

1. All copper horizontal cabling shall be tested for compliance with the associated category performance using an approved Level IIe or III balanced twisted-pair field test device. A printed test report of each cable tested shall be provided to the Professional at substantial completion.
2. Backbone balanced UTP Category 3 copper whose length does not exceed 90 m (295 ft.) for the basic link shall be 100 percent tested according to ANSI/TIA/EIA-568-B.1. Test parameters shall include wire map, insertion loss, length and NEXT loss (pair-to-pair). NEXT testing shall be performed in both directions.
3. Horizontal balanced UTP Category 6 copper basic cable links shall be 100 percent tested according to ANSI/TIA/EIA-568-B.1. Test parameters shall include wire map, insertion loss, length, NEXT loss (pair-to-pair), NEXT loss (power sum), ELFEXT loss (pair-to-pair), ELFEXT loss (power sum), return loss, insertion loss, propagation delay, and delay skew.

A. BACKBONE - FIBER OPTIC

1. Backbone Fiber optic cables shall be 100 percent tested for insertion loss and length. A printed test report of each cable tested shall be provided to the Professional at substantial completion.
2. Insertion loss shall be tested at 850 nm or 1300 nm for 50/125 um and 62.5/125 um multimode cabling in at least one direction using the Method B (1 jumper) test procedure as specified in ANSI/TIA/EIA-526-14A. Length shall be tested using an OTDR.

3.08 WARRANTY

- A. The structured telecommunication cabling system shall be warranted by the System manufacturer for a minimum period of fifteen (15) years.

END OF SECTION

SECTION 28 00 10 SAFETY & SECURITY SYSTEMS

PART 1 - GENERAL

1.01 GOVERNING CLAUSE

- A. For the sake of brevity, these specifications may omit phrases such as "Contractor shall provide", "unless otherwise indicated or specified", etc., but these phrases are nevertheless implied. Mention of materials and operations requires the Contractor to furnish, install and connect such materials and perform such operations to provide a complete and operating system to the satisfaction of the Professional.

1.02 GENERAL CONDITIONS

- A. The General Conditions, Supplementary General Conditions, Information to Bidders, General Requirements, Addenda, Alternates and other pertinent documents issued by the Professional are a part of these specifications and shall be complied with in every respect.
- B. Notwithstanding any reference in the specifications to any equipment, material or type of construction by name, make or catalog number, such reference shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. Where the phrase "or approved equal" is used in the Division 28 Specification, substitute equipment, equivalent in all respects to that specified, of any qualified manufacturer is permitted with the written approval of the Professional. Approval will not be considered until after award of contract and only if submitted by the successful Contractor. Where a list of manufacturers and/or catalog numbers is provided and the phrase "or approved equal" is omitted, substitute equipment, equivalent in all respects to that specified, from one of the listed manufacturers is permitted with the written approval of the Professional.

1.03 TEST AND OBSERVATIONS

- A. The complete project shall be, during and/or after construction, subject to the tests and observations as herein described and as noted on the drawings. Deficiencies found as a result of these tests and observations shall be corrected by the Contractor within a reasonable period and at no expense to the Owner.
- B. The complete project shall be subject to observations and tests conducted by the Professional or for him in his presence. Upon notice, the Contractor shall furnish not to exceed two men, one to include the job foreman, and tools to assist and be directed by the Professional for a reasonable amount of time to make such tests and observations as are requested by the Professional.
- C. The complete project shall be subject to observations and tests conducted by any Federal, State and/or local authority having jurisdiction. The Contractor shall make all corrections of any deficiencies required by the authority having jurisdiction to allow building occupancy.
- D. The complete project shall be subject to observations and tests conducted by the Owner's Insurance carrier. After inspection by this agency, Contractor shall make corrections of any deficiencies found adversely affecting the insurance to be carried by the Owner. Acceptance of this report or subsequent reports lie with the Professional or Owner.

1.04 RECORD DOCUMENTS

- A. The contractor shall provide to the Professional with the Close-Out Documents the following:
1. Two (2) sets of blue line "as-built" prints of same scale as original drawings legibly marked in red showing all variations in the installed work from the requirements of the original contract drawings. The "as-built" drawings shall include all addenda, approved and installed change orders, field condition changes and other departures from the original plans and specifications.
 2. Three (3) sets of shop drawings and other data required by the specifications reflecting the manufacturer's shop fabrication of the materials actually installed. The Division 26 shop drawings shall be separately post bound, indexed and tabbed by specification section. Faxed or copies of faxed material shall NOT be used in Close-Out Documents.
 3. Operation and maintenance manuals and manufacturer's instructions for all equipment and systems installed.
 4. Copy of all reports of system, equipment or material test as required by this specification.

1.05 GUARANTEE

- A. The Contractor shall guarantee to the Owner all work performed under this contract to be free from defects in workmanship and materials for a period of one year from the date of final acceptance by the Professional and the Owner except as hereinafter noted.
- B. The Contractor shall correct, repair and/or replace upon notice from the Owner or his authorized representative within a reasonable period of time any defects in the work performed under this contract arising during the warranty period. This repair work shall be provided at no additional cost to the Owner.
- C. Lighting luminaire lamps are hereby exempt from the one-year guarantee as follows with the exception that all lamps are to be operating upon final acceptance of the project:
1. All incandescent lamps shall be warranted for thirty (30) days after the date of final acceptance by the Owner. Lamp burn-outs occurring within this time frame shall be recorded by the Owner and will be reported to the Professional at the end of this warranty period. Upon notice from the Professional, the Contractor shall furnish and install replacement lamps for each lamp burn-out reported.
 2. All gaseous vapor discharge lamps shall be warranted for one hundred eighty (180) days after the date of final acceptance by the Owner. Lamp burn-outs occurring within this time frame shall be recorded by the Owner and will be reported to the Professional at the end of this warranty period. Upon notice from the Professional, the Contractor shall furnish and install replacement lamps for each lamp burn-out reported.

1.06 ELECTRICAL SYSTEMS SCHEDULE

- A. Provide and connect all equipment and materials for complete and operative systems as follows:
1. Fire Detection & Alarm System
 2. Miscellaneous Systems as shown on the drawings or stated herein.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 28 00 30 EQUIPMENT/MATERIAL SUBMITTALS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. In addition to the requirements of Section 01 33 00, the information and requirements of this section shall apply to the electrical work.

1.02 EQUIPMENT/MATERIAL

- A. Equipment is specified by manufacturer's name and catalog number and is intended to establish the minimum standards of quality acceptable.
- B. Where the phrase "or approved equal" is used in the Division 26 Specification, substitute equipment, equivalent in all respects to that specified, of any qualified manufacturer is permitted with the written approval of the Professional. Approval will not be considered until after award of contract and only if submitted by the successful Contractor. Where a list of manufacturers and/or catalog numbers is provided and the phrase "or approved equal" is omitted, substitute equipment, equivalent in all respects to that specified, from one of the listed manufacturers is permitted with the written approval of the Professional.
- C. The manufacturer's name and/or catalog number first mentioned in this specification is considered to be the specified equipment. The "or equal" manufacturers mentioned or other manufacturers proposed by the Contractor shall be considered as substituted equipment.
- D. Substituted equipment shall meet the dimensional and functional requirements of the building as represented by the plans and specifications. All revisions to the contract precipitated by the use of substituted equipment shall be incorporated by the Contractor, after approval in writing by the Professional, and at no additional cost to the Owner.
- E. The Professional's approval of the shop drawings is only for general conformance with the design concept of the Project and the information given in the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site; information that pertains solely to the fabrication process or to the means and methods of construction; coordination of work of all trades; and performing all work in a safe and satisfactory manner. Approval of the shop drawings does not modify the Contractor's duty to comply with the Contract Documents. Any equipment or work found in the judgement of the Professional to be defective or otherwise unsuitable shall be repaired or replaced by the Contractor at no additional cost to the Owner.
- F. If requested in writing by the Professional, the Contractor shall submit a scale drawing (scale as directed by the Professional) of any electrical equipment area, conduit layout or the like which in the opinion of the Professional may present difficulty regarding space allocation or clearances.

1.03 SUBMITTALS

- A. After the project notice to proceed has been issued and with promptness to assure reasonable time for review with no delay to the project, the Contractor shall electronically submit to the Professional shop drawings for all equipment and material for the electrical systems for approval whether or not substituted equipment or materials.

- B. The Contractor shall include with his shop drawing submittals a copy of the electrical service characteristics letter required by Section 26 04 50. Shop drawings submitted without this letter attached will not be reviewed until this letter is provided.
- C. Shop drawings shall be submitted by specification section and shall be number as outlined in Section 01 33 00 with all material/equipment shop drawing cut sheets located under the appropriate specification section. All shop drawings shall be original pdf and shall be completely legible. Scanned copies and handwritten information will not be accepted.
- D. Space shall be provided on the title or index page of each section of the shop drawings for the Professional's review stamp and comments. This space shall be clearly labeled as to its use and shall have a minimum size of 7" wide X 5" high.
- E. All submitted equipment/material and associated options, accessories, special features, etc. shall be clearly marked and indicated on all copies of the shop drawings. Provide appropriate shop drawings on all required accessory equipment.
- F. All shop drawings for all systems, equipment and materials including any required one-line drawings, diagrams, etc. shall be submitted together. Partial submittals will not be reviewed without prior consent. Special systems provided by specialized vendors or distributors may be submitted in a separate binder.
- G. Provide complete shop drawings with all pertinent information for the following equipment and/or systems and all required components:
 - 1. Fire Detection & Alarm System

2PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 28 01 10 FIRE DETECTION & ALARM SYSTEM

PART 1 - GENERAL

1.01 CODES AND STANDARDS

- A. Provide all equipment, accessories, material and labor required to install and connect in accordance with these specifications and applicable drawings for fully operational Fire Detection and Alarm System(s) to the complete satisfaction of the Professional. All material and/or equipment necessary for the proper operation of the System(s) not specified or described herein shall be deemed part of the specifications and shall be provided by the Division 28 Contractor.
- B. The Fire Detection and Alarm System(s) and its/their installation shall comply with the latest revisions all applicable codes and standards including NFPA, IBC, SBC, NEC and the Americans with Disabilities Act (ADA).
- C. Each component of the system shall be listed under the appropriate category(ies) by Underwriters' Laboratories, Inc. (UL). The complete system installation shall conform to the applicable sections of NFPA-72, NEC 760, Local Code requirements and to the individual component's UL listings. All components and control panel(s) shall be by the same manufacturer.
- D. The requirements of Section 280010 "SAFETY/SECURITY SYSTEMS" and other applicable sections of this Specification shall apply and shall be fully complied with.
- E. System installation including all wiring connections, splices and terminations at all devices, panels, components, junction points, etc. and testing of installed wiring shall be performed by factory trained and certified personnel of the System manufacturer and/or NICET Level 2 certified personnel.

1.02 SCOPE OF WORK

- A. Provide and connect Fire Detection and Alarm System(s), hereinafter referred to as the "System" in this section of the specifications, consisting of non-coded, analog addressable, microprocessor based control panel(s), remote annunciator(s), addressable alarm initiating devices, visual and audio/visual alarm devices and a fully supervised wiring system for a complete and operational Fire Detection and Alarm System(s) conforming to NFPA 72, the drawings and this specification.

1.03 CONTRACTOR QUALIFICATIONS

- A. The Fire Detection and Alarm System Contractor, hereinafter referred to as the "Contractor" in this section of the specifications, shall be an experienced company with local representation regularly engaged in the design and installation of fire detection and alarm systems of similar size and complexity as required for this project and have the following minimum qualifications:
1. Personnel factory trained and certified in the design of the System to be provided.
 2. Personnel factory trained and certified to install and connect the System components to be provided.
 3. Personnel knowledgeable in local, state, province and national codes and regulations.
 4. Possess required licenses/permits to perform required installations in the jurisdiction in which the project is located.
 5. Operating as a business under the same name currently being used for a minimum of five (5) years.
- B. Provide with the System(s) shop drawings a copy of all certifications and registrations of the Contractor's personnel that will be involved with the design and/or installation of the System(s).
- C. At the request of the Professional, the System Contractor shall provide in writing references of a minimum of three successfully completed projects of similar size and complexity as this project which have been completed by this Contractor in the three year period preceding this project's bid date. References shall include project name, location, Owner's contact person and telephone number.

1.04 BASIC SYSTEM OPERATION

A. ALARM INITIATION

1. Actuation of any initiation device or interface device shall cause the following actions:
 - a. Activate general alarms (audible and visual).
 - b. Display individual initiating device address and description at control panel(s) and remote annunciator(s).
 - c. Provide activation signals and interfaces to other systems as herein specified.
 - d. Transmit signal over telephone lines to central fire reporting station via communicator.
 - e. Record the event in the historical log.
- B. The System shall monitor the connected devices and associated circuitry and shall initiate a supervisory or trouble notification as required by NFPA 72 for the wiring classification specified. A supervisory or trouble signal shall initiate the associated audible and visual alarms at the associated FACP and remote annunciator(s) and shall record the event in the historical log.

PART 2 - PRODUCTS

2.01 CONTROL PANEL(S)

- A. The Fire Alarm System Control Panel(s) (FACP) shall be configured and contain all hardware, software and power to supervise, monitor and control all the devices connected plus an additional 25% spare capacity. The control panel(s) shall have a minimum expandable point capacity as the specified equipment or as required for the connected devices including spare capacities which ever is greater.
- B. FACP(s) shall contain power supply(ies) of size and number as required for proper system operation for the number of devices and components connected plus 25% spare capacity. Activation or operation of any device(s) shall not interfere with the normal operation, subsequent activation and/or alarm operation of any other connected component due to system design, wiring or power limitations.
- C. Each FACP shall audibly and visually annunciate all alarm, supervisory and trouble conditions on the System. Visual annunciation shall be by liquid crystal display (LCD) with minimum 80 characters.
- D. Each FACP shall be fully enclosed in a lockable steel enclosure properly sized to accommodate all components and to maintain proper field wiring spaces. If more than one enclosure is required, the second enclosure shall match the first and shall be located directly adjacent to the first enclosure.
- F. Main control panel shall be equipped with a drill switch which when activated shall cause only the general alarm audible and visual signals to activate but no other general alarm functions shall be affected.
- G. FACP shall be provided with alarm silence, trouble/supervisory silence and alarm reset selector switches. Visual alarm indications shall not be canceled by the operation of an audible alarm silencing means. Cancellation of visual alarm indications shall be by Reset of the System only.
- H. Each main control panel shall be provided with an internal dual line digital alarm communicator transmitter (DACT) module and it shall be connected to the nearest active telephone system termination point using 24 gauge, 4 pair, category 5e UTP cables routed in 3/4" conduit. The digital communicator shall be capable of transmitting point I.D. information on every connected device.
- I. Operating software shall include the following features as a minimum: smoke sensor alarm verification, "walk test", event historical log with date and time indications, operator "password" access levels (minimum four) and addressable device custom labeling.
- J. System(s) operational programming shall be provided by certified factory-trained technician(s) and shall be customized for the facility(ies) in which the system(s) is/are installed per this specifications and applicable codes. Addressable device display labels shall be programmed for plain language readout per the direction of the Owner/Professional. Device display labels shall include associated room numbers in which the device is located and the room numbers shall be taken from the final room number designations issued by the Owner/Professional.

2.02 SYSTEM POWER

- A. Provide and connect a dedicated power branch circuit to each FACP or other System component(s) requiring power. The serving power branch circuit breaker(s) shall be clearly labeled using red lettering "Fire Alarm Circuit" and the associated circuit breaker(s) shall have a red identifying mark. The serving power branch circuit breaker(s) shall be equipped with a listed circuit breaker lock to prevent tampering. The associated serving power branch circuit panelboard designation, circuit number and panelboard room location shall be identified on the inside of the enclosure door of each FACP or other System component. The normal power source(s) to the system(s) shall be supervised so that any power failure must be audibly and visibly indicated at the control panel and the remote annunciator(s). A green "power on" LED shall be displayed continuously while incoming power is present.
- B. Standby battery(ies) shall be sealed, maintenance free type complete with metered charger(s) and shall be provided and connected as required to operate the complete System plus required spare capacities for 24 hours with 5 minutes of alarm operation at the end of this period. Standby batteries shall be located in the same cabinet as the associated FACP or immediately adjacent to the FACP cabinet in a separate cabinet.
- C. The System(s) shall automatically transfer to stand-by battery operation upon failure of the normal power source. All battery charging and recharging operations shall be automatic. Battery charger(s) shall be rated for recovery of batteries from full discharge to full charge in 24 hours or less.
- D. The System batteries shall be supervised so that a low battery condition or disconnection of the battery shall be audibly and visibly indicated at the control unit and the annunciator. If a "LOW BATTERY" condition is left unattended a second stage "DEPLETED BATTERY" trouble condition shall be audibly and visibly reported at the control unit indicating the batteries are below the listed system operating voltage. Systems that completely shut down and fail to indicate a "DEPLETED BATTERY" condition shall be unacceptable.
- E. Provide with the shop drawings complete battery calculations for both the alarm and supervisory power requirements for the System(s).

2.03 REMOTE ANNUNCIATOR(S)

- A. Shall be provided and connected where shown on the drawings or at the facility's main entrance where directed by the Professional if location not shown.
- B. Shall contain minimum 80 character LCD display. Displayed information shall include point address, point status (alarm, trouble, etc.), alarm type (smoke detector, manual station, etc.), number of system alarms, supervisory conditions and troubles, and a custom device location label. Alarm, supervisory and trouble conditions shall be indicated by dedicated LEDs and an audible signal. "Alarm Silence" and "System Reset" switches shall be provided.
- C. All switches and control functions on the annunciator shall be controlled by an "enable" key switch with the key removable in the "disable" position only.

2.04 ALARM DEVICES

- A. Audible/visual and visual alarm devices shall be provided and connected throughout the facility(ies) located as shown on the drawings and as required to produce audible and visual alarms in accordance with NFPA 72, ADA and the Contract Documents.

- B. Visual alarm devices provided in rooms (with the exception of corridors/hallways) whose effective rectangular (length X width) dimensions (measured from the longest points) exceed 20'L X 20'W shall have a light output of 110 candela. Visual alarm devices in corridors and other spaces shall have a light output of 15/75 candela unless noted otherwise on the drawings.
- C. Unless shown or noted otherwise, visual alarm devices shall be semi-flush, vertically wall mounted devices with red housing and white "FIRE" lettering on three sides utilizing a xenon flash tube with polycarbonate lens.
- D. Unless shown or noted otherwise, audible/visual alarm devices shall be semi-flush, horizontally wall mounted devices with red housing and white "FIRE" lettering on three sides utilizing a xenon flash tube with polycarbonate lens.
- E. When the FACP is provided with Voice Alarm, audible alarm devices shall be of the proper type and with proper output rating to produce alarm tones and voice alarm messages unless specifically shown or noted otherwise on the drawings or herein specified.
- F. When multiple alarm strobes and/or their reflections can be seen from one location, the strobe flash rates shall be synchronized.

2.05 PULL STATIONS

- A. Shall be semi-flush mounted, double action, non-coded addressable manual stations. Housings and levers shall be high-impact Lexan or cast metal with a red housing finish color. Reset of station shall be by key or wrench. Stations which require the replacement of any portion of the device after activation are not permitted.

2.06 SMOKE SENSORS

- A. Shall be analog photoelectric type, addressable and shall be provided as shown or noted on the drawings and/or as specified herein.
- B. Detectors shall have 30-mesh insect screens, LED power indicator and functional test switch (magnetically operated). Detectors requiring control interface with external systems (i.e. air handling units, etc.) shall be provided with all required NC & NO contacts or zone addressable control module(s) which shall be used for interface with other Sections of these Specifications. The operation of each contact shall be programmable at the control panel.

2.07 THERMAL SENSORS

- A. Shall be analog, fixed temperature and rate-of-rise sensing, 135 degree unless noted otherwise, addressable and shall be provided as shown or noted on the drawings and/or as specified herein.
- B. Sensors requiring control interface with external systems shall be provided with all required NC & NO contacts or addressable control module(s) which shall be used for interface with other Sections of these Specifications. The operation of each contact shall be programmable at the control panel.

2.08 DUCT-MOUNTED SMOKE SENSORS

- A. Shall be analog, addressable photoelectric type smoke sensors with duct housings, sampling tubes, etc. and shall be provided and properly installed at air handling duct systems as specified herein.
- B. Each duct detector shall be provided with a remote alarm and test station installed as directed by the Professional or as shown on the drawings.
- C. The sensors shall be provided with all required NC & NO contacts or zone addressable control module which shall be used by the Mechanical Contractor for air handling unit shut down. The operation of each contact shall be programmable within the System operational program. Programmable sensor base(s) and/or proper addressable control module(s) shall be provided as required. Interface wiring and connection requirements for air handling unit shut down shall be the responsibility of the Mechanical Contractor.

2.09 CONTROL/MONITOR MODULES

- A. Control/monitor modules shall be provided as shown and/or noted on the drawings and/or as required for system interfaces as specified herein.
- B. Control/monitor modules shall be individually addressable and shall be capable of configuration for latching or momentary contact operation. The operation and function of each contact shall be separately programmable at the FACP.
- C. Control/monitor modules shall have the minimum number of interface contacts or contact monitoring circuits to perform the function or operation specified or required. Where the number of interfaces exceeds the available number of contacts in a single module, multiple modules shall be provided as required.

2.10 SYSTEM MANUFACTURERS

- A. The Basis of Design Fire Detection and Alarm System(s) shall be as manufactured by Simplex/Grinnell 4010ES Series with compatible peripheral devices per this specification and with accessory components as required for proper system operation per this specification and associated Codes and Standards. Quantities shall be as shown on the drawings, as defined in this specification and/or as required for proper System(s) operation per the drawings and this specification. All cables and conductors shall be as recommended by the System manufacturer. All back boxes, junction boxes, etc. shall be as recommended by the System manufacturer for the installation situation encountered.
- B. The fire detection and alarm system shall have the operational functions as specified herein and shall be equal to the specified equipment in all respects. The following listed manufacturers are approved for consideration for this project. Other System manufacturers must obtain prior written approval from the Professional for substitution and submission for this project.

Approved System Manufacturers:

1. Simplex/Grinnell
2. Siemens (Cerberus/Pyrotronics)
3. Edwards Systems Technology (EST)
4. Notifier
5. Fire Control Instruments, Inc. (FCI)
6. Bosch

- C. The supplying vendor of the System shall be located within 100 miles of the campus and shall have a maintenance and repair staff and adequate local spare parts inventory.
- D. A service contract offering continued factory authorized service after the contract provided one (1) year parts and service warranty of the installed system shall offered in writing and be made available if requested by the Owner.

PART 3 - EXECUTION

3.01 CONTROL PANELS

- A. Control panels shall be wall-mounted per the manufacturer's recommendation where indicated on the drawings.
- B. All wiring shall be installed in a neat and workmanlike manner with conductors routed parallel or perpendicular to sides and/or back of the enclosure and properly tie wrapped and bundled. All wiring shall be properly labeled.
- C. A System smoke sensor as specified herein shall be provided and connected in each room/space where a FACP is located whether or not the device(s) is/are shown on the drawings. Where conditions of the room/space dictate for proper operation, a thermal detector may be substituted for the smoke sensor with approval by the Professional.

3.02 ALARM DEVICES

- A. Alarm devices indicated to be wall-mounted shall be mounted center line up 80" above the finished floor unless otherwise shown or noted on the drawings or herein specified.
- B. Alarm devices indicated to be ceiling-mounted shall be mounted on the ceiling.

3.03 INITIATING DEVICES

- A. Pull Stations
 - 1. Shall be provided and connected at all exterior exit doors and in each corridor where required to limit spacing between devices to 200 feet
 - 2. Shall be mounted centerline up 48" above the finished floor unless otherwise shown or noted on the drawings or herein specified. Where shown at exit door ways, pull stations shall be mounted within 5 feet of the edge of the door.
- B. Smoke Sensors
 - 1. Smoke sensors shall be ceiling mounted unless otherwise shown or noted on the drawings or herein specified. Ceiling mounted sensors shall not be less than 4 inches from a sidewall to the near edge. Wall mounted sensors shall be mounted at least 4 inches but not more than 12 inches below the ceiling.
 - 2. Smoke sensor locations shown on the drawings are approximate and representative. Sensors shall be located as required for proper operation, as recommended by the manufacturer, in compliance with NFPA 72 and to provide optimum coverage of the space installed. Sensors shall not be located in direct air flow or within 36 inches of an air supply diffuser.

3. Smoke sensors shall not be installed until after construction clean up or shall be provided with the proper covers to prevent the migration of debris into the sensor.

C. Thermal Sensors

1. Thermal sensors shall be ceiling mounted unless otherwise shown or noted on the drawings or herein specified. Ceiling mounted sensors shall not be less than 4 inches from a sidewall to the near edge. Wall mounted sensors shall be mounted at least 4 inches but not more than 12 inches below the ceiling.
2. Thermal sensor locations shown on the drawings are approximate and representative. Sensors shall be located as required for proper operation, as recommended by the manufacturer, in compliance with NFPA 72 and to provide optimum coverage of the space installed. Sensors shall not be located in direct air flow or within 36 inches of an air supply diffuser.

D. Duct-Mounted Smoke Sensors

1. Shall be installed in supply/return duct(s) of air handling systems as indicated on the drawings.

E. Control Modules

1. Mount device within 36 inches of monitored equipment.

3.04 SYSTEM INTERFACES

A. Air Handling Units

1. Duct mounted smoke sensors as specified herein and required accessories shall be provided, connected and properly installed at air handling duct systems in the main supply duct on the downstream side of filters and/or in the return duct prior to exhausting from the building or the introduction of outside air of air handling units as designated on the drawings.
2. Division 28 Contractor shall review Mechanical drawings and specifications for air handling unit locations, areas served, duct work routing, etc.

B. Fire Protection Systems

1. Proper addressable alarm initiating devices with required associated equipment shall be provided and connections shall be made to monitor each required component of the fire protection (sprinkler) system including wiring supervision. Monitoring devices and associated connections shall be provided for all flow indicating switches, post indicator valves (PIVs), wall indicator valves (WIVs) and OS&Y valves.
2. Operation of flow indicating switch(es) shall cause a general alarm and closing of PIVs/WIVs or OS&Y valve shall initiate a supervisory signal. Each flow switch and supervisory indication shall have a separate address.
3. Proper control/monitoring modules shall be provided and interfaced with each fire pump controller to monitor the controller operating conditions as required by NFPA 20. Fully coordinate requirements and connections with the Fire Protection System contractor.

3.05 System(s) components and device locations shown on the drawings are approximate and representative and are intended to establish the type of protection, monitoring or alarm notification required for the associated room, space and/or area. The final and actual number of devices, their coverage and/or output rating and their locations shall be determined by the System manufacturer to provide full coverage of the intended function of the area in accordance with NFPA 72. Locations of components and devices shall be fully coordinated with the architectural finishes encountered, other equipment and building structural elements. Additional devices required for proper operation of the System shall be shown on the submitted System one-line drawings.

3.06 INSTALLATION

- A. System wiring shall be installed in conduit. Conduit and wiring though not shown on drawings shall be provided by the Contractor to accomplish the intent of the System as shown on the drawings by symbols, as specified herein and as required to comply with governing codes and standards.
- B. System wiring and equipment installation shall be in accordance with good engineering practices as established by the EIA/TIA and the NEC and with the manufacturer's recommendations. All wiring terminations, splices and junctions shall be made using proper compression type connectors or terminal strips. Wire nut type connectors of any kind shall not be used on System wiring.
- C. System wiring shall be the following class and style designations as defined by NFPA 72 and shall initiate the proper signal per NFPA 72 at the FACP(s) and remote annunciators: Initiating Device Circuits (IDC) - Class B, Style A; Signaling Line Circuits (SLC) - Class B, Style 0.5; Notification Appliance Circuits (NAC) - Class B, Style W.
- D. The System and associated components shall be protected against transient over voltages in accordance with the applicable requirements of ANSI/IEEE C62.41 by proper devices installed on incoming power circuits and all circuits routed outdoors or terminated on devices located outdoors.
- E. Rough-in requirements (conduit, boxes, etc.) for all components, devices, etc. shall be as recommended by the System manufacturer and per applicable codes for the situation encountered.
- F. The component/device quantities, locations, etc. shown on the drawings and/or specified herein are intended to indicate the type of devices and associated sensing requirements in each room/space. The actual quantity, spacing, locations, etc. of devices and components shall be the responsibility of the System provider per his System's design requirements and limitations, applicable codes and standards, and the contract documents.

3.07 TESTING & DEMONSTRATION

- A. See Section 280010 "Safety/Security Systems" for additional testing and demonstration requirements.
- B. The installed and/or modified Fire Detection and Alarm System(s) and all associated devices and connections shall be tested in accord with the manufacturer's recommendations, applicable codes and standards, and testing guidelines as herein specified. Testing shall be performed by an independent, third-party Company qualified to test the system involved. Testing Company qualifications shall be submitted to the Professional for approval prior to the beginning of testing.

- C. A full test report as outlined in this specification shall be submitted to the Professional in writing prior to substantial completion. Where System(s) operations involve other Divisions of the Specifications, the affected Professional shall verify by signed written statement that the operation performed by the System(s) specified herein was correct and complete. Retesting as necessary to achieve a complete report(s) with no deficiencies shall be required. The Professional will perform random component testing at Substantial Completion at his discretion. Should any part of the System(s) not perform correctly, a complete re-test of the entire System(s) can be required with no additional or increase in Cost to the Owner. If more than one re-check of the System(s) by the Professional is required to verify proper System(s) operation, the Contractor will be billed for the time and expense of the Professional.
- D. A System Record of Completion as required and published in NFPA 72 shall be completed by the installing Contractor and submitted to the Owner and a copy of the report shall be included with the Close-Out Documents.

FIRE ALARM SYSTEM INSPECTION/TEST REPORT ON FOLLOWING PAGES

END OF SECTION

FIRE ALARM SYSTEM INSPECTION/TEST REPORT

I. Testing Organization

Company Name: _____ Test Date: _____

Representative: _____ Title: _____

Telephone Number: _____ Fax
Number: _____

		YES	NO
1	Prior to starting this test, has the Testing Organization been approved by the Professional?		

II. Project Information

Project Name: _____ W/O Job No.: _____

Project Address: _____

III. System Information

Fire Alarm System Manufacturer: _____

Model No.: _____ Serial No.: _____

Installed Software and Revision: _____

IV. Test Requirements

The system shall be tested by a representative of the testing organization and all test results shall be reported as witnessed by him. A negative answer to any of the following questions shall be explained in sufficient detail on a separate typed document.

A. General.

		YES	NO
1	Installed Fire Alarm and Detection System(s) and all associated equipment, devices, etc. are as submitted in the approved Shop Drawings?		
2	All devices, equipment, etc. have been installed correctly per the manufacturer's recommendations and the Contract Documents?		
3	All devices, equipment, etc. have been installed at the approximate locations and mounting heights as shown in the Contract Documents?		
4	After silencing of audible alarm, all visual alarm devices continued to operate until the System was reset?		
5	All wiring has been tested for shorts, grounds and open circuits?		
6	All alarm and initiating devices have been tested for proper operation and have been made to properly operate at least twice? Properly complete attached initiating test for each initiating and supervision device.		
7	Alarm and trouble indication is properly annunciated at control panel(s) and remote annunciator(s) for all connected initiating devices by address, description and location?		
8	Initiating device descriptions and locations as indicated at control panel(s) and remote annunciators(s) adequately describe and located the devices within the building?		
9	Installed battery back-up properly provides power to maintain proper system operation when the normal power source is de-energized?		
10	The installed automatic dialer properly operates?		
11	All single station smoke detectors have been tested for proper operation and have been made to properly operate at least twice?		

B. Interface with HVAC System(s).

A representative of the Division 24 Professional shall witness all functions of the HVAC system(s) which are initiated by and interfaced with the Fire Alarm System(s). The Division 24 Professional shall provide a signed statement of proper system operation as outlined in the Contract Documents and a copy of this statement shall be attached to this report when submitted for approval.

		YES	NO
1	All duct mounted smoke detectors have been installed per the manufacturer's recommendations and per the Contract Drawings?		
2	Upon smoke detection by the duct mounted smoke detectors in each duct system, the proper air handling unit equipment shut down to the satisfaction of the Division 24 Professional?		

C. Interface with Fire Protection System(s).

A representative of the Division 22 Professional shall witness all functions of the Fire Protection System(s) which are supervised by and interfaced with the Fire Alarm

System(s). The Division 22 Professional shall provide a signed statement of proper system operation as outlined in the Contract Documents and a copy of this statement shall be attached to this report when submitted for approval.

		YES	NO
1	Fire Alarm System connections have been made to all Fire Protection System supervisory devices (PIV, tamper switches, flow switches, etc.) and the Fire Alarm System recognizes each device connection?		
2	Operation of PIV or tamper switches causes a trouble signal at the Fire Alarm System and was properly annunciated at the control panel(s) and the remote annunciator(s)?		
3	Operation of the flow switch(es) causes a general alarm of the Fire Alarm System and was properly annunciated at the control panel(s) and the remote annunciator(s)?		
4	The proper time delay between each flow switch(es) activation and initiation of the Fire Alarm System general alarm was observed?		

D. Interface with Elevator Control System(s).

A representative of the Division 14 Professional shall witness all functions of the Elevator Control System(s) which are initiated by and interfaced with the Fire Alarm System(s). The Division 14 Professional shall provide a signed statement of proper system operation as outlined in the Contract Documents and a copy of this statement shall be attached to this report when submitted for approval.

		YES	NO
1	Smoke detectors are installed in each elevator lobby, in the elevator equipment room(s) and at the top of the elevator shaft(s)?		
2	Heat detectors are installed in the elevator equipment room(s) and at the top of the elevator shaft(s)?		
3	If the building has a fire protection system (sprinkler system), the Fire Alarm System initiates the shunt-trip of the circuit breakers serving the elevator equipment prior to water flow?		
4	Upon detection of smoke in the elevator lobby on any floor of the facility the Fire Alarm System provides the proper signal to the Elevator controller(s).		

E. Interface with Security System(s).

		YES	NO
1	When a general alarm and/or trouble signal is initiated at the Fire Alarm System, the proper signal was initiated at the Security System Control Panel?		

INITIATING AND SUPERVISORY DEVICE TEST LOG
(make copies as required)

Visual	Device Functional	Address Location	Pass	Device Fail Check	Type Check	Device
_____	_____	_____	_____	_____	_____	() () () ()
_____	_____	_____	_____	_____	_____	() () () ()
_____	_____	_____	_____	_____	_____	() () () ()
_____	_____	_____	_____	_____	_____	() () () ()
_____	_____	_____	_____	_____	_____	() () () ()
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_____	_____	_____	_____	_____	_____	() () () ()
_____	_____	_____	_____	_____	_____	() () () ()
_____	_____	_____	_____	_____	_____	() () () ()

Comments: _____

The above test report for the Fire Alarm and Detection System(s) is true and accurate to the best of my knowledge and per my system(s) testing and inspection, and the Fire Alarm and Detection System(s) appears to be properly operating per the Contract Documents for this project.

Signature: _____ Date: _____

Print Name: _____ Title: _____

End of Fire Alarm System Test Report

SECTION 28 01 30 SURVEILLANCE SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes: Surveillance System.
- B. The Surveillance System shall incorporate the following:
 - 1. Cameras
 - 2. Camera Mounts/Brackets/Housings
 - 3. Monitors
 - 4. POE Network Switch
 - 5. Digital Video Recorder
 - 6. Cabling System
- C. The Contractor shall provide all 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.

1.02 REFERENCES

- A. NFPA 70 – National Electrical Code
- B. UL 1449 – Surge Protective Devices
- C. ANSI/EIA/TIA Cabling Standards

1.03 SYSTEM DESCRIPTION

- A. System shall include the installation of surveillance cameras where indicated on the drawings, camera mounts/brackets/housings, network switch(es), digital video recorder, monitors and interconnecting cabling systems.
- B. System will have local video storage which shall be capable of sharing video information with the MDOT state wide security system.
- C. System shall be compatible with the MDOT security standard.
- D. The 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.

1.04 SUBMITTALS

- A. Product Data: Submit electronic file of manufactures supplied data. Each file shall contain:
 - 1. Specification/cut sheets for equipment provided
 - 2. Design guides
 - 3. Installation and operating instructions

- B. Shop Drawings: Submit electronic copy 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, 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.
 - h.
 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

1.05 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 Surveillance Systems.
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.
3. Contractor shall be licensed by the State of Mississippi for the installation of Surveillance Systems.

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 Surveillance 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. 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 Professional 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.

E. 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.

F. Comply with NFPA 70, "National Electrical Code."

G. Cabling installation shall comply with the ANSI/EIA/TIA standards and recommendations.

1.06 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. During Acceptance test, demonstrate video equipment and system features to the Professional and MDOT personnel. Any portions of the Work found to be deficient or not in compliance with the Project Drawings and Specifications may be rejected.
- C. Promptly correct deficiencies.

1.07 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 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. COHU
 - 2. Hitachi Visual Technologies.
 - 3. Honeywell
 - 4. JVC Professional Products.
 - 5. Panasonic Security Systems Group.
 - 6. Pelco.
 - 7. Philips Communication, Security & Imaging; Philips Electronics N.V.
 - 8. Samsung Opto-Electronics America, Inc.

9. Sensormatic Electronics Corporation.
10. Toshiba Security Products.
11. Vicon Industries, Inc.
12. Watec America Corporation.

B. Color Fixed Camera (All Interior Installations)

1. Type:
 - a. Normal Color Camera
 - b. Day Night camera with retractable IR cut filter for night operation
2. Imaging Device: 1/3 inch
3. Minimum Picture Elements:
 - a. Normal Color Camera: 1080p or 1920 X 1080
 - b. Day Night Color Camera: 1080p or 1920 X 1080
 - c. Scanning System: 2:1 Interlace.
4. Minimum Horizontal Resolution: 1944 pixels
5. Signal-to-Noise Ratio: Not less than 50 dB, with the camera AGC off.
6. Sensitivity:
 - a. Normal Camera: .3 lux
 - b. Day Night Camera:
 - 1) Day (color): 0.8 lux
 - 2) Night (B/W) .08 lux
7. Sensitivity: Camera shall deliver 1-V peak-to-peak video signal at the minimum specified light level. The illumination for the test shall be with lamps rated at approximately 2200-K color temperature, and with the camera AGC off.
8. Manually selectable modes for backlight compensation or normal lighting.
9. White Balance: Auto-tracing white balance, with manually settable fixed balance option.
10. Power Over Ethernet (POE).

C. Color Dome: (All Exterior Installations)

D. Assembled and tested as a manufactured unit, containing a dome assembly, color camera, zoom lens, and receiver / driver.

1. Horizontal Resolution: 1944 pixels
2. Signal-to-Noise Ratio: Not less than 50 dB, with the camera AGC off. With AGC, manually selectable on or off.
3. Sensitivity: Camera indicated shall be combination day/night cameras.
4. Sensitivity: Camera shall deliver 1-V peak-to-peak video signal at the minimum specified light level. The illumination for the test shall be with lamps rated at approximately 2200-K color temperature, and with the camera AGC off.
5. Manually selectable modes for backlight compensation or normal lighting.
6. White Balance: Auto-tracing white balance, with manually settable fixed balance option.
7. Software: Shall include the vendor supplied software necessary to control the Zoom features.

E. Lenses: Optical-quality coated optics, designed specifically for video surveillance applications, and matched to specified camera. Provide lenses for camera manufacture if available.

F. 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 POE NETWORK SWITCHES

2.05 Each core or edge switch shall have the minimum specifications as follows:

- A. 24 - 100 megabit switch ports with power over Ethernet (PoE) with a 190W power budget.
- B. Two dedicated SFP 1 gigabit uplink ports capable of supporting either fiber or copper media.
- C. Rack mountable
- D. The switch must provide the following Layer 2 services:
 1. Block unknown Multicast
 2. IGMP Snooping
 3. DOS Network Storm Protection
 4. RADIUS Accounting
- E. The switch must support the following IEEE protocols:
 1. IEEE 802.3 Ethernet
 2. IEEE 802.3i 10BASE-T
 3. IEEE 802.3u 100BASE-T
 4. IEEE 802.3ab 1000BASE-T
 5. IEEE 802.1Q VLAN Tagging
 6. IEEE 802.3x full-duplex flow control
 7. IEEE 802.3z Gigabit Ethernet 1000BASE-SX/LX
 8. IEEE 802.3ad Trunking (LACP)
 9. IEEE 802.1AB LLDP with ANSI/TIA-1057 (LLDP-MED)
 10. IEEE 802.1p Class of Service
 11. IEEE 802.3 af (PoE)
 12. IEEE 802.1D Spanning Tree (STP)
 13. IEEE 802.1s Multiple Spanning Tree
 14. IEEE 802.1w Rapid Spanning Tree (RSTP)
 15. IEEE 802.1x (MD5) Radius network access control
- F. Surveillance Systems switch(es) shall be dedicated to the System.
- G. 10 year minimum manufacturer's warranty

2.06 DIGITAL VIDEO RECORDERS

- A. Available Manufacturers:
 1. Dedicated Micros USA.
 2. Everfocus
 3. Honeywell
 4. Integral
 5. JVC Professional Products.
 6. Panasonic Security Systems Group.
 7. Pelco.

8. Philips Communication, Security & Imaging; Philips Electronics N.V.
9. Samsung Opto-Electronics America, Inc.

B. Requirements:

1. Camera Inputs 16 Analog
2. Video input: 1 V p-p at 75 Ohm
3. Monitor Out: 1 BNC Composite 1 V p-p at 75 Ohm.
4. Video Format: NTSC
5. Recording Rate: 480 FPS (NTSC)
6. Compression: MPEG-4 or MJPEG
7. Storage of 500 GB minimum.
8. Storage External:
 - a. SCSI connector
 - b. Hot swapping
 - c. Capacity Minimum 4 position for 2 TB drives
9. Display Resolution: 720 by 480
10. Display Format: 1, 4 and 8 Multiscreen display.
11. Network Interface: Ethernet RJ-45 network connection
12. Intelligent motion detection with programmable area and programmable sensitivity.
13. Time and Date Generator: Records time (hr:min:sec) and date legend of each frame.
14. Watermark time and date stamp for exported files.
15. Title: Minimum 12 characters for each camera.

2.07 LCD MONITORS

- 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. CAT 6 - 300 feet for network applications
 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. Comply with equipment manufacturers recommendations for wire and cable size and type.
- D. 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.

PART 3 - EXECUTION

3.01 FIELD INSTALLATION

- A. Field locate equipment where indicated.
- B. Provide and connect cameras and specified equipment including connecting cables as indicated.
- C. Align cameras as indicted.
- 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. 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. 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. 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.
- D. Wiring Method: Install wiring in raceway 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. Conceal raceway and cables except in unfinished spaces.
- E. Install LAN cables using techniques, practices, and methods that are consistent with Category 6 rating of components and that ensure Category 6 performance of completed and linked signal paths, end to end.
- F. Install cables without damaging conductors, shield, or jacket.
- G. 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.
- H. 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.
- I. 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.
- J. Camera

1. Install number of conductor pairs recommended by manufacturer for the functions specified.
2. Install UTP cable form 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 camera 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 camera 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 Surveillance System.

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 and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
 2. Foundations: 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.
 3. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.
- 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. 907-258-1

CODE: (SP)

DATE: 01/17/2017

SUBJECT: Miscellaneous Site Amenities

Section 907-258, Miscellaneous Site Amenities, 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 907-258 -- MISCELLANEOUS SITE AMENITIES

907-258.01--Description. This item shall consist of constructing and installing concrete picnic tables and benches, wooden picnic tables and benches, charcoal grills, drinking fountains, trash receptacles, water hydrants, sewage dump station, cast stone benches, sign (masonry and stone), metal benches, bollards, pavilions, survey monument, car stops, cigarette receptacles, and picnic shelters, each complete in place, in accordance with these Specifications and in reasonably close conformity with the locations, lines, grades, configurations, dimensions and other requirements shown on the Drawings or established.

907-258.02--Materials. Unless otherwise stipulated, the materials used in this construction, in addition to the general requirements of these Specifications and the plans shall conform to the provisions and requirements prescribed in the sections of the Standard Specifications for the several items which constitute the complete structure.

All items will require approval by the Engineer from the manufacturer. Contractor shall submit eight (8) copies of brochures or shop drawings for approval prior to ordering manufactured items. Other items may require testing as directed by the Engineer.

A. **Charcoal Grill.** Charcoal Grill shall be the Model No. 100001085 Rotating Grill with post as manufactured by Iron Mountain Forge, Dumor Site Furnishings – Model No. 22-00, PW Athletic Manufacturing Co. – Model No. 1140-00, or approved equal. Post shall be set within a Class C concrete footing, size as recommended by manufacturer.

B. **Drinking Fountain.**

1. **Waste Pipe.** Waste pipe shall be of the size and type as shown on the Drawings and shall be standard PVC drain waste and vent piping.
2. **Drain Pipe.** Drain pipe shall be the size shown on the Drawings and shall conform to or exceed Commercial Standard CS 272-65 or CS 272.65.
3. **Drinking Fountain.** The drinking fountain shall be designed similar to the details shown on the Drawings, freeze-proof, and conforming to approved Handicapped Standards by the Engineer.

4. Concrete. Concrete, unless otherwise specified, shall be paid for as sidewalk, and have an approved exposed aggregate finish to match the finish on the adjacent sidewalk.
5. Valves (Stop and Drain). The cut-off valve shall be a standard brass stop and drain cut-off valve of the proper size and type as shown on the plans.

C. Concrete Picnic Table and Benches.

1. Concrete. Concrete for table top, seat top, and end supports shall be Class "A" Concrete. Concrete for table slabs will be paid for as concrete sidewalks - Pay Item No. 608-B.
2. Reinforcing Steel. Reinforcing steel shall conform to Section 711.
3. Paint for Table top and Seats. Paint or coating for table top and seats shall be an approved HP Acrylic Latex paint conforming to or exceeding Master Paint Institute (MPI) numbers, primer MPI # 3 and topcoat MPI #141.

D. Wooden Picnic Tables and Benches. ADA Accessible Wooden Picnic Tables shall be the model number No.100000186, eight feet long with galvanized pipe frame and treated wood top and seats, as manufactured by Iron Mountain Forge, Picnic Table Source – Model No. M115-1061, All Picnic Tables – Model No. UPB158H-PT8, or approved equal.

Picnic tables shall be secured to the concrete with lead shields, anchors, or other means as approved by the Engineer.

E. Trash Receptacle.

1. Trash Receptacle. The trash receptacle shall be Upbeat Site Furnishings Model No. WR32AGBCT, 32-gallon Essence Receptacle Outdoor Trash Can with curved top, rounded corners and stone panels with leveling devices, rigid plastic liner, and hardware to secure the receptacle to the sidewalk, stone panel color shall be Golden Glo. United Receptacle, Inc. – Model No. R-38HT-202, Barco Products – Earth-Tone Panel Commercial Trash Cans, Model No. 38SQSTDMA, or approved equal.
2. Concrete. Concrete, unless otherwise specified, shall be paid for as sidewalk, and have a finish to match the finish on the adjacent sidewalk.

F. Water Hydrant.

1. Water Hydrant. Steel body, self-closing, anti-freezing hydrant with heavy stainless operating springs, with 3/4-inch supply as the model M-175 hydrant as manufactured by Murdock-Super Secur, The Kupferle Foundry Company model Total Eclipse #1 Yard Hydrant, , or approved equal. Color shall be black.
2. Concrete. Concrete, unless otherwise specified, shall be paid for as sidewalk and have same finish as finish on adjacent sidewalk.

3. Valves (Stop and Drain). The cut-off valve shall be standard brass stop and drain cut-off valve of the proper size and type as shown on the Drawings.

G. Travel Trailer Sewage Dump Station (Modifications).

1. Sewage Dump Station. The sewage dump station shall be constructed similar to the details shown on the Drawings, with Schedule 40 galvanized steel pipe and fittings complete with vacuum breaker, and hose, in accordance with the Drawing details, and State Health Department minimum standards.
2. Concrete. Concrete unless otherwise specified shall be Class "B" conforming to Section 804 of the Standard Specifications and have an approved trowel finish.
3. Stand Pipe. Water stand pipe shall be standard galvanized Schedule 40 of the size shown on the Drawings.
4. Vent Pipe. Vent pipe shall be standard galvanized Schedule 40 of the size shown on the Drawings.
5. Signs. The signs shall be designed as shown on the details on the Drawings, constructed of 0.080-inch aluminum or 14 Ga. galvanized steel. The signs shall be manufactured by an approved sign company. The Contractor shall submit shop drawings.

H. Cast Stone Bench. Cast stone benches shall be constructed from the same material or an approved equal material as concrete picnic tables and benches.

I. Sign (Masonry and Stone).

1. Brick and Mortar. Brick and mortar shall be produced by the same manufacturer(s), and be the same type and kind, including bullnose and watertable units, and shall match the existing brick used on the Welcome Center Building, or approved equal.
2. Concrete Masonry Units. The concrete masonry units shall be hollow non-load bearing, light-weight aggregate, concrete masonry units conforming to ASTM Designation: C331-64T. Units shall be normal modular size for typical 3/8-inch mortar joint.
3. Concrete. Concrete, unless otherwise specified, shall be Class "B" conforming to Section 804 of the Standard Specifications.
4. Reinforcing Steel. Reinforcing steel shall conform to Section 711.
5. Precast Architectural Panel.

a. General.

Cement: Portland Cement shall conform to ASTM Designation: C-150, Type I or III.

Fine and coarse aggregate: Fine and coarse aggregate shall conform to ASTM Designation: C-33. Variations from aggregate gradations are permissible for the facing mix.

Reinforcement shall conform to ASTM Designation: C-185 for welded wire fabric.

Hot-dip galvanizing shall conform to ASTM Designation: A-153

Anchoring devices, inserts, etc., shall be either galvanized or corrosion resistant types approved by the Architect and as detailed on the Drawings.

- b. Textures and Finishes. Precast architectural concrete shall be honed finish, lightly textured, approximating finish of limestone, with color as selected by the Engineer.
- c. Fabrication. Precast architectural concrete shall be sufficiently reinforced to withstand conditions on the sign, including handling and erection stresses. Deformed bars with one inch (1") or less clearance to an exterior face shall be galvanized.

Units shall be fabricated straight, smooth, and true to size and shape, with exposed edges and corners precise and square unless otherwise indicated.

Reglets, slots, holes, and other accessories shall be provided in units to receive cramps, dowels, reglets, waterstops, flashings, and other similar work as indicated.

Arises, inscriptions and details shall be faithfully executed to the Engineer's design.

Each precast item shall be marked to correspond to identification mark on shop drawings.

Location of anchors, inserts and blockouts shall be plus or minus 3/8 inch from center line of location shown on drawings.

Rust-inhibitive coating shall be applied on damaged areas at welded connections, same as shop-applied material. Galvanizing repair coating shall be used on galvanized surfaces.

- d. Mixes. Standard 6-inch by 12-inch cylinder strength of precast concrete shall not be less than 5,000 psi at 28 days when tested in accordance with ASTM Designation: C-39.

Absorption shall not be less than three percent (3%) and not more than seven percent (7%) when tested in accordance with ASTM Designation: C-97.

Minimum thickness of facing mix shall be 1½ inches thick. Backup concrete may be made with grey cement and aggregates conforming to requirements for cast-in-place concrete.

e. Joint Material. Joint material shall be as recommended by the precast architectural concrete manufacturer, and as approved by the Engineer.

6. Letters and Symbols. Letters, including custom letters, and symbols shall be brass, in the shapes and sizes noted on the drawings, as manufactured by Metal Arts, A. R. K. Ramos, Matthews, or approved equal.

The Engineer will provide camera ready art work of the symbols and custom letters to the Contractor for the manufacturer.

Method(s) of attaching letters and symbols to precast architectural concrete panel shall be approved by the Engineer.

J. Metal Bench. Garden – Style all – steel bench, six feet long, color – green, as Bench 118 series as manufactured by DuMor, Inc., Highland Products Group – 6-foot ‘Sunshine’ Thermoplastic-Coated expanded Metal Bench, Columbia Cascade Co. – Manor Bench No. 2824-6, or approved equal.

Metal Bench shall be secured to pavement. Method of securing shall be reviewed with and approved by the Engineer.

K. Bollard. Pipe shall be schedule 40 steel pipe, in the size as noted on the drawings. Finial shall be the Linn Park Ball Finial, as manufactured by Robinson Iron, Tennessee Fabricating Company, Reliance Foundry Co., Ltd., or approved equal. Pipe and finial shall be painted with 1 shop coat of a rust inhibitive primer and two (2) field coats of an oil base exterior paint, color selected by the Engineer. Class B concrete required for pipe infill.

L. Pavilion:

1. Masonry Components, Concrete, and Cast Stone. Masonry components, concrete, and cast stone shall conform to the specifications described in Sign (Masonry and Stone), above.

2. Steel. Steel shall be provided in the shapes, sizes, and fabricated as noted on the Drawings.

Steel shall receive the following paints/ coatings, all as manufactured by PPG, Sherwin Williams, Tnemec Company, Inc., or approved equal, and applied in strict accordance with the manufacturer’s written instructions.

PPG Products

First Shop Coat (primer)	UC65147 Zinc	3.0 – 4.0 Mils Dry Film Thickness
Field Spot Primer (if necessary)	UC65147 Zinc	3.0 – 4.0 Mils Dry Film Thickness
Second Field Coat	94-2800 pitthame*	3.0 – 6.0 Mils Dry Film Thickness
Third Field Coat	94-2800 pitthame*	3.0 – 6.0 Mils Dry Film Thickness

Sherwin Williams Products

First Shop Coat (primer)	B65G10 Zinc	3.0 – 4.0 Mils Dry Film Thickness
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Field Spot Primer (if necessary)	B65G10 Zinc	3.0 – 4.0 Mils Dry Film Thickness
Polyurethane finish		
Second Field Coat	B65-600 Series*	3.0 – 6.0 Mils Dry Film Thickness
Third Field Coat	B65-600 Series*	3.0 – 6.0 Mils Dry Film Thickness
Tnemec Products		
First Shop Coat (primer)	90-97 Tneme Zinc	2.5 – 3.5 Mils Dry Film Thickness
Field Spot Primer (if necessary)	90-97 Tneme Zinc	2.5 – 3.5 Mils Dry Film Thickness
Second Field Coat	74 Endura-Shield*	2.0 – 2.5 Mils Dry Film Thickness
Third Field Coat	74 Endura-Shield*	2.0 – 2.5 Mils Dry Film Thickness

*Color of second and third field coat shall be selected by the Engineer.

3. Metal Roof. Metal roof shall be copper roofing sheet, 16 ounce per square foot, with 1½ inch standing seam “S” lock located 16 inches on center. Contractor shall design fabrication and fastening of the system for an I-60 wind uplift rating, using the purlins as noted on the drawings.

Product data for materials, and fastening devices as well as shop drawings noting assembly and finished product appearance shall be submitted for review and approval of the Engineer. A minimum of eight (8) copies of each is required.

Roof panel system shall be guaranteed by the manufacturer for a period of five (5) years.

4. Display Panel. The display panel shall be an exterior rated panel, with a top hinged impact resistant acrylic cover, cylinder lock and gas cylinder cover supports; baked on enamel finish, metal back with magnetic back (interior); for wall mounting, in a 40-inch high by 60-inch wide size, as the Module x Wide Profile as manufactured by ASI Sign Systems, Matthews International Corp., Mohawk Sign Systems, Inc., or approved equal.

Color of panel shall be selected by the Engineer.

Mounting of panel to metal work shall be reviewed with and approved by the Engineer.

M. Survey Monument.

1. Masonry Components and Concrete. Masonry components and concrete shall conform to the specifications described in Sign (Masonry and Stone), above.
2. Granite. Polished (finish) granite veneer, in the thickness as noted on the drawings. Color shall be selected by the Project Engineer. Method of attachment to masonry and devices for attachment shall be reviewed with and approved by the Engineer.

- N. Car Stop. Car stops shall be six (6) foot long concrete curb (car) stops. Curb stops shall be secured to pavement with two (2) No. 3 reinforcing bars, 24 inches long.

- O. Cigarette Receptacle. Cigarette Receptacles shall be Aladdin Smoker' Station – Model Number R1639E-HCHAR- steel smokers' station, 39 inches high by 16 inches diameter, color – Hammertone Charcoal, as manufactured by Gilmore-Kramer Company, Johnson Environmental Products –Smokers Outpost-black Model Number 710101 , Ashtrays And Urns – Smoker' Station Model Number LL144-1645 , or approved equal.

Cigarette Receptacle shall be secured to pavement with anchoring kit. Method of securing shall be reviewed with and approved by the Engineer.

P. Picnic Shelter:

1. Building Type. Building shall be Icon HIP 16 x 24T as manufactured by Icon Shelter Systems Inc., American Building Products “Navajo Shelters”, Litchfield Industries “Pittsburg Hip End”, or approved equal.
2. Concrete. Concrete shall conform to the specifications described in Sign (Masonry and Stone), above.
3. Description. Picnic shelter shall be 16 feet by 24 feet galvanized steel frame hipped rectangle shelter with standard 24 gage Multi-rib metal roof panels, overhead “Linear” ornaments and square stepped base columns.
4. Submittals. Product data for materials, color charts and fastening devices as well as shop drawings noting assembly and finished product appearance shall be submitted for review and approval of the Engineer.
5. Steel Framing and Finishes. Steel framing, columns, base covers and overhead ornaments shall receive hot-dipped zinc galvanizing prior to finish. A double coat of TGIC polyester powder coating shall be applied. Color shall be “Surrey Beige”, unless another color is selected by the Engineer from manufacturer’s standard 14 colors
6. Base Connection. Base connection shall be surfaced mounted with base covers.
7. Metal Roof Materials. Metal roof material shall be standard 24 gage Galvalume® Multi-rib roof panels with Kynar 500 finish. Color “Copper Penny”, or other color selected by the Engineer. Design fabrication and fastening of system for an UL 90 wind uplift rating. Roof pitch shall be 4:12, unless noted otherwise on Drawings.
8. Warranty. Product shall carry a manufacturer’s standard 10-year warranty

907-258.03--Construction Requirements. The method of construction, unless otherwise stipulated, shall conform to the provisions and requirements where applicable, prescribed in the standard specifications with the additions shown hereafter. All work shall be performed in a good workmanlike manner, to the satisfaction of the Engineer.

- A. Charcoal Grill. The charcoal grill with concrete footing shall be installed in accordance with

the manufacturer's written instructions in the locations as noted on the Drawings.

- B. Drinking Fountain. The drinking fountain shall be installed by skilled plumbers, concrete finishers, and workmen in an approved manner to the satisfaction of the Engineer, to the dimensions and details shown on the Drawings, or approved by the Engineer.

The fountain drain shall be located to drain to the existing drain field or an approved ditch as directed by the Engineer.

The concrete base shall be constructed as shown on the Drawings or as directed by the Engineer. The concrete will be paid for under separate pay item for that class of concrete.

- C. Concrete Picnic Tables and Benches. Concrete picnic tables and benches shall be constructed to the detailed dimensions shown on the Drawings. The handling and placing of concrete shall conform to Subsection 804.10. The top and edge surfaces of the table and benches shall receive a slick smooth finish.

The concrete shall be free of honeycomb and air pockets and in no case have a slump greater than one and one-half inches.

The ground under the slab shall be graded or shaped and compacted when necessary to insure a smooth, firm foundation for the slab. The ground adjacent to the slab shall be sloped to drain away from the slab in a manner so as to preserve the natural shape of the terrain as close as possible.

The concrete slab shall be poured around the table and benches in place and correctly aligned. Care shall be taken to place the expansion joint material around the top and bench supports as shown on the plans in a neat, secure manner. The slab shall be sloped to drain and receive an approved exposed aggregate finish to match the finish on the sidewalk.

The placing and fastening of reinforcement shall conform to Subsection 805.05.

The table shall be located as shown on the Drawings and as directed by the Engineer.

- D. Wooden Picnic Tables and Metal Benches. Wooden picnic tables and metal benches shall be located and secured in an approved manner as shown on the Drawings and as directed by the Engineer.

- E. Trash Receptacle. The trash receptacle shall be installed on and secured to a square concrete pad four inches thick, with outside dimensions six inches greater than the width of the trash receptacle, in locations designated by the Engineer.

The excavation when required to place the trash receptacle into the ground shall be disposed of as directed by the Engineer.

The concrete shall be placed and finished to match the adjacent sidewalk. On locations adjacent to existing sidewalks, top of concrete pad for the receptacle shall meet flush with

existing walk. Slope elevation of pads no more than 1/8 inch per foot in order that water will not stand.

The method to secure the trash receptacle to the concrete pad shall be submitted to the Engineer for approval.

- F. Water Hydrant. Install water hydrant in accordance with the manufacturer's written instructions and the Drawings.
- G. Travel Trailer Sewage Dump Station. The travel trailer sewage dump station shall be constructed by skilled plumbers, concrete finishers, and workmen in an approved manner to the satisfaction of the Engineer, to the details and dimensions shown on the Drawings.
- H. Cast Stone Bench. The cast stone benches shall be a similar design and size as shown on the Drawings. Brochures or shop drawings shall be submitted.

The benches shall be secured to the sidewalk or bench pad in an approved manner with epoxy cement or other approved cement, to the satisfaction of the Engineer.

- I. Sign (Masonry and Stone), Pavilion, and Survey Monument. The excavation required to place the sign and survey monument into the ground shall be disposed of as directed by the Engineer.

The concrete base shall be constructed as shown on the Drawings or as directed by the Engineer. The placing and fastening of reinforcement shall conform to Subsection 805.05.

Concrete Masonry Unit and Brick construction shall be in accordance with Section 611, and to the satisfaction of the Engineer.

Precast architectural concrete panels shall be set straight, plumb, level, and square. Exposed facings shall be cleaned to remove dirt and stains which may be on the units after erection and completion of joint treatments. Panels shall be washed and rinsed in accordance with precast manufacturer's recommendations. Other work shall be protected from damage due to cleaning operations. Do not use cleaning materials or processes which could change the character of exposed concrete finishes.

Letters and symbols shall be attached in accordance with the Drawings, approved shop drawings, and to the satisfaction of the Engineer.

Pavilion and survey monument shall be constructed straight, plumb, level, and square, in accordance with the drawings and to the satisfaction of the Engineer. Welds shall be grinded smooth prior to painting/ coatings application.

- J. Metal Bench. Metal bench shall be located where noted on the Drawings. Metal bench shall be secured to pavement as approved by the Engineer.
- K. Bollard. Bollards shall be constructed plumb and in accordance with the drawings to the satisfaction of the Engineer. Welds shall be ground smooth prior to painting/ coatings

application.

- N. Car Stop. Drive reinforcing bars through holes in car stop and through new asphalt pavement. Top of reinforcing bar shall be driven to a point 1/4 inch below the top of the car stop.
- O. Cigarette Receptacle. Cigarette receptacles shall be located where noted on the Drawings. Secure to pavement as approved by the Engineer.
- P. Picnic Shelter. The excavation required to place the picnic shelter into the ground shall be disposed of as directed by the Engineer.

The concrete base shall be constructed as shown on the Drawings or as directed by the Engineer. The placing and fastening of reinforcement shall conform to Subsection 805.05

Picnic shelter shall be constructed straight, plumb, level, and square, in accordance with the drawings and to the satisfaction of the Engineer. Care shall be taken to protect paint finishes and touch up with matching paint and color to the satisfaction of the Engineer. Items that can not be successfully repaired in the field shall be replaced.

907-258.04--Method of Measurement. Miscellaneous Rest Area Facilities, constructed and complete in accordance with the requirements of the contract, and accepted, will be measured by the unit quantity per each unit.

A unit of concrete picnic tables and benches shall consist of one table, two benches, the concrete slab shall be as indicated on the Drawings.

A unit of wooden picnic tables shall consist of one table with benches, and the devices to secure the table when required.

A unit of charcoal grill shall consist of the grill complete with steel post and concrete footing.

A unit of drinking fountain shall consist of all concrete, steel, masonry elements, piping, plumbing elements, and drains as shown on the Drawings.

A unit of trash receptacle shall consist of the receptacle, complete, with leveling devices and approved devices to secure the trash receptacle to the pavement.

A unit of water hydrant shall consist of the hydrant complete with connection to water supply, piping, cut off valve, drain and drain line (where shown), and concrete footing, located where shown on the plans and installed in accordance with manufacturer's directions.

A unit of travel trailer sewage dump station shall consist of one tower, one drain, signs and concrete as shown in the plan details.

A unit of cast stone bench shall consist of one bench seat and three bench supports.

A unit of sign (masonry and stone) shall consist of all concrete, steel, masonry elements, letters,

as symbols shown on the plans.

A unit of bollard shall consist of steel pipe with finial, and concrete for footing and infill, as shown on the plans.

A unit of metal benches shall consist of one bench, and the devices to secure the bench when required.

A unit of pavilion and survey monument shall consist of concrete (not including sidewalk), steel (painted), metal roof, masonry elements, granite, re-location of survey monument, and display panel as applicable and as shown on the Drawings.

A unit of cigarette receptacle shall consist of one receptacle, and the devices to secure the receptacle when required.

A unit of picnic shelter shall consist of concrete (not including sidewalk), steel framing, metal roof, steel columns, and overhead ornaments, as shown on the Drawings.

Separate measurement for excavation and other individual items will not be made, it being understood that the cost thereof is included in one contract price bid per complete items.

907-258.05--Basis of Payment. Charcoal grills, drinking fountains, concrete picnic tables and benches, wooden picnic tables and benches, trash receptacles, water hydrants, travel trailer sewage dump station, cast stone benches, sign (masonry and stone), metal benches, bollards, pavilion, survey monument, car stops, cigarette receptacles, and picnic shelters each unit shall be paid for at the contract unit price bid per each, which price shall be full compensation for furnishing all materials and supplies; for performing all work necessary for each completed unit; and for all equipment, tools, labor and incidentals necessary to complete the work.

Payment will be made under:

- 907-258-A: Charcoal Grill - per each
- 907-258-B: Drinking Fountain - per each
- 907-258-C: Concrete Picnic Table and Benches - per each
- 907-258-D: Wooden Picnic Table and Benches - per each
- 907-258-E: Trash Receptacle - per each
- 907-258-F: Water Hydrant - per each
- 907-258-G: Travel Trailer Sewage Dump Station - per each
- 907-258-H: Cast Stone Bench - per each

907-258-I: Sign, Masonry and Stone	- per each
907-258-J: Metal Bench	- per each
907-258-K: Bollard	- per each
907-258-L: Pavilion	- per each
907-258-M: Survey Monument	- per each
907-258-N: Car Stop	- per each
907-258-O: Cigarette Receptacle	- per each
907-258-P: Picnic Shelter	- per each

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-260-1

CODE: (SP)

DATE: 07/10/2017

SUBJECT: Utility Work - Sewer

PROJECT: BWO-5231-51(001) / 503006301 & LWO-5001-51(008) / 503006302 -- Newton County

Section 907-260, Utility Work - Sewer, is hereby added to and becomes a part of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-260 -- UTILITY WORK - SEWER

907-260.01--Description. This work also consists of furnishing labor, materials, services, equipment, and other necessary items required for accompanying the construction of the sanitary sewer systems. This shall include, but not be limited to, the following: sanitary sewer drainage piping, fittings and accessories, cleanouts, and bedding.

This work also consists of furnishing materials, equipment and tools including specially developed application equipment as required for installation and testing of the field applied monolithic manhole surfacing system. Surfacing shall be applied to precast manhole, 48-inch diameter.

This work also consists of furnishing and placing a waterproofing material on precast concrete manholes in accordance with the plans, and this special provision

This work consists of furnishing all labor, materials, equipment and incidentals necessary to provide all precast sanitary sewer manholes and pump station wetwells shown, specified and otherwise required to complete the work.

907-260.01.1--Sanitary Sewer System. This work also includes setting lines, elevations, and grades for sanitary sewer system work and control system for duration of work, including careful maintenance of benchmarks, property corners, monuments, or other reference points.

907-260.01.1.1--Related Requirements. The following are related requirement.

- Construction Plans
- Special Provision 907-260, entitled Utility Work
- Local governing authority and code requirements.
- All necessary construction permits.
- MDOT Standard Specifications for Road and Bridge Construction.

907-260.01.1.2--References. The sanitary sewer system shall be manufactured in accordance with the following Reference Standards.

- ANSI/ASTM A74, Cast Iron Soil Pipe and Fittings
- ANSI/ASTM C12, Practice for Installing Vitrified Clay Pipe Lines
- ANSI/ASTM C14, Concrete Sewer, Storm Drain, and Culvert Pipe
- ANSI/ASTM C76, Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
- ANSI/ASTM C425, Compression Joints for Vitrified Clay Pipe and Fittings
- ANSI/ASTM C443, Joints for Circular Concrete Sewer and Culvert Pipe, using Rubber Gaskets
- ANSI/ASTM D698, Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop
- ANSI/ASTM D3034, Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- ASTM C564, Rubber Gaskets for Cast Iron Soil Pipe and Fittings
- ASTM D1785, Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120
- ASTM D2922, Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- ASTM D3017, Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures

907-260.01.1.3--Submittals. The Contractor shall provide catalog materials indicating pipe, pipe accessories, and fittings.

The Manufacturer shall certify that the products meet or exceed ASTM designations.

907-260.01.1.4--Coordination. Coordination shall be performed with termination of sanitary sewer connection outside building, connection to municipal sewer utility service, and trenching.

907-260.01.2--Monolithic Manhole Surfacing System. When required, the use of specialized application equipment combined with rigorous surface preparation requirements shall be used to apply the monolithic manhole surfacing system without the use of solvents. The equipment adds high heat and pressure to the monolithic surfacing system resulting in a high build and quick set of the completed system.

Product application requirements and procedures described include surface preparation, mixing, application, material handling and storage, qualification of applicator, and application quality control.

In order to be considered as an equal a product will have the minimum characteristics as measured by the applicable ASTM standards as specified in this section.

Equal products must be approved a minimum of three weeks prior to bid date.

907-260.01.2.1--Quality Assurance. When required, the applicator shall initiate and enforce quality control procedures consistent with applicable ASTM and NACE standards together with the monolithic surfacing system manufacturer and the Engineer's recommendations.

The applicator shall use an adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts. These workmen shall be completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

The applicator shall use approved specialty equipment adequate in size, capacity and number sufficient to accomplish the work of this Section in a timely manner.

The product shall be manufactured at a facility that is certified as meeting ISO-9002 quality management standards.

The product shall be manufactured using the following appropriate Reference Standards.

ASTM D638	Tensile Properties of Plastics
ASTM D790	Flexural Properties of Unreinforced and Reinforced Plastics
ASTM D695	Compressive Properties of Rigid Plastics
ASTM D4541	Pull-off Strength of Coatings Using a Portable Adhesion Tester
ASTM D2584	Volatile Matter Content
ASTM D2240	Durometer Hardness, Type D
ASTM D543	Water Vapor Transmission of Organic Coating Films
ASTM D543	Resistance of Plastics to Chemical Reagents
ASTM C297	Flatwise Tensile Strength of Sandwich Constructions
ASTM	The published standards of the American Society for Testing and Materials, West Conshohocken, PA
NACE	The published standards of National Association of Corrosion Engineers (NACE International), Houston, TX

907-260.01.2.2--Submittals. When required, the Contractor shall submit data on the monolithic surfacing system and application procedures.

The applicator shall apply the system and be responsible for the complete performance of the system, including materials, application, and quality control. The applicator shall provide documentation that the applicator is an approved installer and licensed by the monolithic surfacing manufacturer and specialized equipment supplier.

907-260.01.2.3--Deliver, Storage, and Handling. When required, materials shall be kept dry, protected from weather, stored under cover and stored between 50°F and 100°F. Material shall not be stored near flame, heat, or strong oxidants.

Protective coating materials shall be handled according to their material safety data sheets.

907-260.01.3--Crystalline Concrete Waterproofing.

907-260.01.3.1--References. The product shall be manufactured in accordance with the following Reference Standards.

- American Society for Testing and Materials (ASTM)
- Army Corp. of Engineers (CRD)
- American Concrete Institute Reference 308

907-260.01.3.2--Storage, Delivery And Handling. The manufacturers sealed and labeled material containers shall be stored in a dry, protected environment off the ground.

907-260.01.4--Manholes. Structures shall conform in shape, size, dimensions, material, and other respects to the details shown on the Plans or as ordered by the Engineer. Metal frames, grates, covers and similar required items shall be as shown and as specified in Subsection 907-260.02. Inverts shall conform accurately to the size and elevation of the adjoining pipes. Side inverts shall be curved and main inverts, where direction changes, shall be laid out in smooth curves of the longest possible radius which is tangent to the centerlines of adjoining pipelines.

907-260.01.4.1--Quality Assurance. Quality assurance shall be in accordance with the following.

- ASTM C 139, Concrete Masonry Units for Construction of Catch Basins and Manholes.
- ASTM C 140, Sampling and Testing Concrete Masonry Units.
- ASTM C 207, Hydrated Lime for Masonry Purposes.
- ASTM C 478, Precast Reinforced Concrete Manhole Sections.

907-260.01.4.2--Submittals. If requested by the Engineer, the Contractor shall submit for approval samples of gaskets and all accessories required for the manholes.

Shop Drawings of design and construction details of all precast concrete manholes shall be submitted for approval.

If required by the Engineer, manufacturer's data on ceramic epoxy lining material, joint gasket, and flexible pipe gasket material shall be submitted.

The Contractor shall submit an affidavit from the coating supplier that each manhole sections and special has been coated in accordance with this specification.

907-260.02--Materials.

907-260.02.1--Sanitary Sewer System.

907-260.02.1.1--Sewer Pipe – General. All pipes shall be furnished by a pipe manufacturer having experience in manufacturing the specific type of pipe in the specific sizes required for use on this project.

907-260.02.1.2--Polyvinyl Chloride (PVC) Gravity Flow. Polyvinyl Chloride (PVC) gravity flow pipe shall meet the following.

- A. Pipe and Fitting Material:
 - 1. Standard: ASTM D 1784.
 - 2. Type: Cell Classification as specified in ASTM D 3034, ASTM F 679, or ASTM F 1803.
- B. Pipe Standard:
 - 1. ASTM D 3034, SDR-26, sizes 4 inch through 15 inch diameter.
 - 2. ASTM F 679, PS-46, sizes 18 inch through 36 inch diameter.
 - 3. ASTM F 1803, PS-46 psi, sizes 21 inch through 54 inch diameter.
- C. Joints:
 - 1. Standard: ASTM D 3212.
 - 2. Type: Integral bell and spigot.
 - 3. Flexible seals: Elastomeric, conforming to ASTM F-477.
 - 4. Lubricant: As recommended by manufacturer.
 - 5. Gaskets shall be factory applied.
- D. Fittings:
 - 1. Standard: ASTM D 3034 and F 679 and F 1803.
 - 2. Joint Standard: ASTM D 3212.
 - 3. Schedule: SDR-26, sizes 4 inch through 15 inch diameter PS-46, sizes 18 inch through 36 inch.
- E. Lateral Connectors:
 - 1. Lateral connectors can be employed in the connection of service line to sewer trunk line.
 - 2. Lateral connectors shall consist of a PVC hub, rubber sleeve, and stainless steel band.
 - 3. PVC hub shall meet ASTM D 3034 and be SDR 26 and gasket in hub shall meet ASTM F 477. Rubber sleeve shall meet ASTM C 443. Band and housing shall be Type 301 stainless steel and screw shall be Type 305 stainless steel.
 - 4. Model and Manufacturer:
 - a. Inserta Tee by Inserta Fittings Company.
 - b. Or approved equal.

907-260.02.1.3--Pipe Accessories. Pipe fittings shall be made of the same material as the pipe, molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

907-260.02.1.4--Cleanouts. Lids and frames shall be made of heavy duty cast iron construction, manufactured by Mueller with Closed Lid Design.

Shafts shall be constructed of cast iron of internal diameter as specified on plans with 2,500 psi concrete collar for cleanouts located in paved areas.

The base pad shall be cast-in-place with 2,500 psi concrete. It shall have a leveled top surface to receive cast iron shaft sections, sleeved to receive sanitary sewer pipe sections.

907-260.02.2--Monolithic Manhole Surfacing System.

907-260.02.2.1--Existing Products. When required, quick setting high strength concrete with latex or curing agent additives shall not be used unless successfully tested with the coating for compatibility or approved for use by the protective coating and concrete manufacturer. Proper surface preparation procedures shall be followed to ensure adequate bond strength to any surface to be coated. New cement or concrete shall cure at least 30 days prior to coating.

Existing coatings shall be removed or thoroughly abraded to provide an adequate surface profile for mechanical bond by the surfacing system. The applicator shall maintain strict adherence to the monolithic surfacing system manufacturer's recommendations with regard to proper surface preparation and compatibility with existing coatings.

907-260.02.2.2--Manufacturer And Equipment Supplier. When required, the manufacturer and equipment supplier shall be Warren Environmental, Inc., Raven 404, Poly Spec Corp, or an approved equal.

907-260.02.2.3--Repair Materials. When required, repair materials shall be accepted and approved by the monolithic surfacing system manufacturer for compatibility with the specified monolithic surfacing system and shall only be used as determined necessary by the Engineer and applicator.

907-260.02.2.4--Monolithic Surfacing System. When required, the Monolithic Surfacing System shall be a unique non-toxic, 100 percent solids, solventless epoxy resin laminar system applied with a patent protected process and exhibiting the following characteristics.

Product type	Amine cured epoxy	Test Method
Color	White	
Solids Content (vol percent)		100
Compressive Strength	12,000 psi	ASTM D695
Flatwise Tensile Strength of Sandwich Constructions	2,608 psi	ASTM C297
Tensile Strength	7,200 psi	ASTM D638
Tensile Elongation	2%	ASTM D638
Flexural Strength	13,000 psi	ASTM D790
Flexural Modulus	548,000 psi	ASTM D790
Bond Strength – Concrete	900 psi	ASTM D4541
Chemical Resistance to:		
Sulfuric Acid, 10 percent	Immersion Service	ASTM D543
Sodium Hydroxide, 20 percent	Immersion Service	ASTM D543

The monolithic surfacing system shall be applied in the field after all other work to the manhole is complete. This will insure a monolithic coating across the joints and connections.

The monolithic surfacing system shall be continuously bonded to all brick, mortar, concrete, chemical sealant, grout, pipe, and other surfaces inside the manhole and therefore shall be designed for hydrostatic loading.

The finished system shall provide a minimum total thickness of 60 mils. The cured surfacing shall be monolithic with proper sealing connections to all unsurfaced areas and shall be placed and cured in three applications in conformance with the recommendations of the monolithic surfacing system manufacturer.

When cured, the system shall form a continuous, tight-fitting, hard, impermeable surface that is suitable for sewer system service and chemically resistant to any chemicals, bacteria, or vapors normally found in domestic sewage.

The system shall effectively seal the interior surfaces of the manhole and prevent any penetration or leakage of groundwater infiltration.

The system shall be compatible with the thermal conditions of the existing sewer manhole surfaces.

907-260.02.2.5--Protective Coating Application Equipment. When required, the protective coating application equipment shall be heated, plural component equipment specially designed for use in the spray or spincast application of the specified system and shall be approved for use by the monolithic surfacing system manufacturer.

907-260.02.3--Crystalline Concrete Waterproofing. The concrete waterproofing admixture shall be of the cementitious crystalline type that chemically controls and permanently fixes a non-soluble crystalline structure throughout the capillary voids of the concrete.

The design shall include the use of the crystalline waterproofing repair materials that generate a non-soluble crystalline formation in the concrete.

907-260.02.3.1--Manufacturers. Waterproofing material shall be manufactured by Xypex Chemical Corporation, or an approved equal.

907-260.02.3.2--Admixture. Xypex Admix C-1000-T shall contain red dye to ensure detection in the concrete.

907-260.02.3.3--Mixes. The dosage rate for the Xypex Admix C-1000-T shall be 3.5 percent by weight of cement.

907-260.02.4--Manholes.

907-260.02.4.1--Precast Concrete Manholes. Precast manholes shall conform to the details shown. Manhole bases may be precast unless cast-in-place is required by the plans.

Except where otherwise specified, manhole sections shall conform to ASTM C 478.

Precast manhole bases shall be of approved design and of sufficient strength to withstand the loads to be imposed upon them. An approved joint shall be provided to receive the pipe sections forming the barrel.

The date of manufacture and name or trademark of manufacturer shall be marked on the inside of the barrel.

Unless a larger size is required by the plans, the barrel of precast manholes shall be constructed of 48-inch diameter standard reinforced concrete manhole sections. The barrel shall be constructed of various lengths of pipe in combination to provide the correct height with the fewest joints. Wall sections shall not be less than five inches thick. For 72-inch and larger manholes, a transition slab, as shown on the plans, is required for manholes greater than 12 feet deep.

Joints shall be preformed mastic joint compound or rubber and concrete using O-ring gaskets conforming to ASTM C 443. For rubber ring joints, the base of the bell shall be buttered with 1 to 2 cement mortar to provide a uniform bearing for the spigot of the entering pipe.

A precast or cast-in-place slab or precast eccentric cone, as shown or approved, shall be provided at the top of the manhole barrel to receive the cast iron frame and cover. The slab or cone shall be of acceptable design and of sufficient strength to safely support an H-20 loading. Concrete slabs shall be not less than eight inches thick.

When required, all manhole sections shall be lined with an approved epoxy coating in accordance with Special Provision 907-260, entitled Monolithic Manhole Surfacing System.

All pre-cast manholes and wet-wells shall be waterproofed in accordance with Special Provision 907-260, entitled Crystalline Concrete Waterproofing.

907-260.02.4.2--Miscellaneous Metals. Metal frames, covers, toe pockets and similar required items shall be provided as shown and in accordance with the plans.

907-260.02.4.3--Drop Inlet Connections. Drop inlet connections for manholes shall be constructed where shown and shall conform to the design and details shown. Pipe and fittings shall be ductile iron or reinforced concrete as shown or otherwise approved. Concrete shall be bonded to manhole in a manner shown or otherwise approved by Engineer.

907-260.02.4.4--Flexible Connectors. Flexible connections complying with ASTM C 923 shall be employed in the connection of each sewer pipe with outside diameter less than 59 inches to precast manholes.

Connector shall consist of rubber EPDM and elastomers designed to resist ozone, acids, alkalis, oils and petroleum products.

Banding mechanism shall be non-magnetic, 304 stainless steel, and torqued for 60-70 inch/lbs.

Connectors shall be manufactured by Kor-N-Seal, Press Seal Gasket Corporation, or an approved equal.

907-260.02.4.5--Manhole Waterstops. Elastomeric PVC manhole waterstops shall be employed in the connection of each sewer pipe with outside diameter greater than 59 inches to precast manholes. Waterstop shall consist of elastomeric PVC designed to resist ozone, acids, alkalis, oils and petroleum products.

Banding mechanism shall be totally non-magnetic stainless steel, torqued for 60 inch/lbs. and furnished with a waterstop.

Installation shall be as follows.

- Slide waterstop over clean end of entrance pipe
- Position waterstop on centerline of manhole wall
- Tighten the stainless steel band to required torque
- Use waterplug around the waterstop to close the opening in the manhole

Manhole waterstops shall be manufactured by Fernco, Inc., DFW Plastics, Inc., or an approved equal.

907-260.02.4.6--Castings. Castings and frames for manholes shall be manufactured by EJIW (Vulcan), C. L. Dews, Neenah, or an approved equal.

Castings shall be fabricated true to pattern so that component parts fit together.

All identification markings shall be subject to review by the Engineer. Markings shall include Utility Owner's Standard.

The iron shall be coated with asphaltic paint standard with the manufacturer.

907-260.03--Construction Requirements.

907-260.03.1--Sanitary Sewer System. Excavations shall be hand trimmed to required elevations. Over excavation shall be corrected with fine aggregate.

Large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction shall be removed.

907-260.03.1.1--Bedding. Pipe trenches shall be excavated in accordance with Section 203 for work of this Section. Excavation shall be hand trimmed for accurate placement of pipe to elevations indicated. Bedding material shall be placed at the bottom of the trench, leveled in continuous layer not exceeding eight inches of compacted depth, and compacted to 95 percent density. Optimum moisture content of bedding material shall be maintained to attain required compaction density.

907-260.03.1.2--Installation - Pipe. Pipe, fittings, and accessories shall be installed in accordance with ASTM C12, ASTM C14 and/or manufacturer's instructions. Seal joints watertight.

Pipe shall be laid to the slope gradients on the plans; with maximum variation from true slope of 1/8 inch in 10 feet.

Bedding shall be installed at sides and over top of pipe to minimum compacted thickness of 12 inches compacted to 95 percent density.

Trenching requirements shall meet the requirements of the MDOT Standard Specification for Road and Bridge Construction. The pipe shall not be displaced or damaged when compacting.

Installed sleeves shall be used to connect to building sanitary sewer outlet and municipal sewer system.

907-260.03.1.3--Installation – Cleanouts. The bottom of excavation shall be clean and smooth to correct elevation.

The cast-in-place concrete base pad shall be formed and placed, with provision for sanitary sewer pipe end sections.

The elevations and pipe inverts for inlets and outlets shall be established as indicated.

Lids and frames shall be mounted level in the grout, and secured to the top cone section to the elevation indicated.

907-260.03.1.4--Field Quality Control. Compaction testing will be performed in accordance with ANSI/ASTM D698, ASTM D2922 or ASTM D3017.

If tests indicate that the installation does not meet specified requirements, the installation shall be removed, replaced ,and retested at no additional cost to the State.

Deflection tests shall be performed on all flexible pipe. The test shall be conducted after the final backfill has been in place at least 30 days.

No pipe shall exceed a deflection of five percent (5%).

If the deflection test is to be run using a rigid ball or mandrel, it shall have a diameter equal to 95 percent of the inside diameter of the pipe. The test shall be performed without mechanical pulling devices.

Low Pressure Air Test (Uni-Bell's UNI-B-6). Installed gravity sewer pipe shall be air-tested prior to acceptance. Specified pressure drop of 0.5 psig shall be used to determine the required time the pipe is tested. Manholes are not required to be tested. Sections of installed pipe shall be tested from manhole to manhole.

907-260.03.2--Monolithic Manhole Surfacing System.

907-260.03.2.1--Pre-Coat Inspection. When required, all structures to be coated shall be readily accessible to the applicator.

Appropriate actions shall be taken to comply with local, state, and federal regulatory and other applicable agencies with regard to the environment, health, and safety.

All surfaces including benches, invert, joints, lift holes and walls shall be made smooth and suitable for application of the interior surfacing system. All benches and invert shall be in place and complete.

Active flows shall be dammed, plugged, or diverted as required to ensure that the liquid flow is maintained below the surfaces to be coated.

Installation of the protective coating shall not commence until the concrete substrate has properly cured in accordance with this Section.

907-260.03.2.2--Surface Preparation. When required, the applicator shall inspect all surfaces specified to receive the monolithic surfacing system prior to surface preparation. The applicator shall notify the Engineer of any noticeable disparity in the surfaces that may interfere with the proper preparation or application of the monolithic surfacing system.

All concrete that is not sound or has been damaged by chemical exposure shall be removed to a sound concrete surface. All contaminants including: oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants shall be removed.

Surface preparation method(s) shall be based upon the conditions of the substrate and the requirements of the monolithic surfacing system to be applied.

Surfaces to receive protective coating shall be cleaned and abraded to produce a sound concrete surface with adequate profile and porosity to provide a strong bond between the monolithic surfacing system and the substrate.

The applicator shall follow all regulations for contained space entry. The first procedure upon entering each structure will be to blast all specified surfaces by low pressure water cleaning as defined by NACE Standard 5. When all loose and/or contaminated debris has been removed, the surface shall be water blasted by the use of a held wand again. The wash water shall include a dilute solution of chlorine to diminish microbiological bacteria growth and to kill any bacteria residing on or in the surface. The surface will be tested at this point to ensure that the pH is within acceptable limits (not to exceed 8.5). These tests will be performed with litmus paper on various areas within the structure. All test results will be retained for review by the Engineer.

Surfaces that require additional cleaning or profiling will be prepared by abrasive blast to rough the surface sufficient to obtain and ensure adequate bonding of the system. A minimum surface profile of 8 to 10 mils or 10 percent of the total recommended coating system thickness must be achieved to assure proper adhesion. Detergent water cleaning and hot water blasting may be necessary to remove oils and grease from the concrete. Whichever methods are used, they shall be performed in a manner that provides a uniform, sound clean surface that is not excessively damaged.

Active water infiltration shall be stopped by using a cementitious water plug or hydroactive grout that is compatible and suitable for topcoating with the specified monolithic surfacing system.

907-260.03.2.3--Application Of Repair Materials. When required, application of repair materials shall be made by the applicator.

Repair materials shall meet the specifications of this Specification. The materials shall be trowel or spray applied utilizing proper equipment on the specified surfaces.

When using approved cementitious repair materials, such shall be troweled to provide a smooth surface with an average profile equivalent to coarse sandpaper to optimally receive the protective coating. No bugholes or honeycomb surfaces should remain after the final trowel procedure of the repair mortar.

The repair materials shall be permitted to cure according to manufacturer recommendations. Curing compounds may not be used unless approved by the monolithic surfacing system manufacturer for compatibility with the specified system.

Areas to be coated must be prepared after receiving a cementitious repair mortar and prior to application of the monolithic surfacing system.

All surfaces shall be inspected during and after preparation and prior to application of the monolithic surfacing system. Any evidence of remaining contamination or laitance shall be removed by additional water or abrasive blast, or other approved method before proceeding with the application of the monolithic surfacing system.

All surfaces shall be sufficiently smooth and even, to ensure good flow handling characteristics when complete.

907-260.03.2.4--Application Of Monolithic Surfacing System. When required, application procedures shall conform to the recommendations of the monolithic surfacing system manufacturer, including material handling, mixing, environmental controls during application, safety, and equipment.

The equipment shall be specially designated to accurately ratio and apply the specified materials and shall be regularly maintained and in proper working order.

The specified materials shall be applied by an approved installer of the monolithic surfacing system.

All specified surfaces will be lined with the monolithic surfacing system to provide a minimum total thickness of 60 mils. The cured surfacing shall be monolithic with proper sealing connections to all unsurfaced areas and shall be placed and cured in three applications in conformance with the recommendations of the monolithic surfacing system manufacturer.

Specially designed spray and/or spincast application equipment shall be used to apply each coat of the system.

907-260.03.2.5--Testing And Inspection. When required, during application, a wet film thickness gage, such as those available through Paul N. Gardner Company, Inc. meeting ASTM D4414 – Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages, shall be used to ensure a monolithic coating and uniform thickness during application.

After the system has set hard to the touch it shall be inspected by the Engineer verifying the following:

- Groundwater infiltration of the system shall be zero.
- All pipe connections shall be open and clear.
- No cracks, voids, pinholes, uncured spots, dry spots, lifts, delamination, or other type defects shall be evident in the system.

After a minimum of 24 hours following completion, the lining system shall be spark tested to assure a pinhole-free lining. Defects must be patched per the manufacturer's instructions. The test voltage shall be a minimum 6,000 volts. The holiday detector shall be a Tinker Razor Model AP/W or an approved equal. The applicator may enlist the services of an independent certified NACE inspector if desired.

A final visual inspection shall be made by the ENGINEER and applicator. Any deficiencies in the finished system shall be marked and repaired according to the procedures set forth herein by the applicator.

907-260.03.2.6--Cleaning. When required, trash and loose debris shall not be permitted to accumulate at the project site. All items shall be regularly removed and disposed of at an approved site in accordance with applicable regulatory agencies.

907-260.03.3--Crystalline Concrete Waterproofing.

907-260.03.3.1--Materials Preparation. Xypex Admix C-1000-T shall be added to the concrete at the time of batching. It is recommended that the Admix powder be added first to the rock and sand and blended thoroughly for 2 to 3 minutes before adding cement and water.

The total concrete mix shall be blended using normal practices to ensure formation of homogeneous mixture.

For precast concrete manufacturers, this usually means adding the Xypex C-1000-T into their pan type mixers.

For ready-mix batch plants, the Xypex Admix C-1000-T shall be evenly distributed on a plant conveyor belt carrying the rock and sand, or the dry powder Admix can be added to the truck first and then 30 to 50 percent of the required water for the concrete batch is dispensed along with 300 to 500 pounds of aggregate and mixed thoroughly for 2 to 3 minutes. The rest of the materials shall then be added to the truck and mixed for at least five minutes.

907-260.03.3.2--Application. Placement of concrete shall be in accordance with the Standard Specifications.

Retardation of set may occur when using Xypex Admix C-1000-T. The amount of retardation shall depend upon the concrete mix design and the dosage rate of the admixture. The manufacturer shall be consulted regarding proper dosage rate.

Concrete that contains Xypex Admix C-1000-T shall be cured as per "Standard for Curing Concrete" (ACI 308).

Normal backfilling procedures shall be used after concrete has cured for at least seven days.

After the base and joints of the precast manhole have been grouted, two coats of Xypex Concentrate shall be applied to all grouted surfaces at a rate of 1.5 lbs. per square yard to a properly prepared surface in accordance with manufacturer's written instructions.

907-260.03.4--Manholes.

907-260.03.4.1--Laying Masonry. Each grading ring shall be laid in a full bed of mortar and shall be thoroughly bonded.

907-260.03.4.2--Plastering. The outside of grading rings shall be neatly plastered with ½ of an inch of cement mortar as the work progresses.

907-260.03.4.3--Manhole Bases. Precast bases shall be set on a concrete foundation or compacted granular material as shown. Precast bases shall be set at the proper grade and carefully leveled and aligned.

907-260.03.4.4--Precast Manhole Sections. Manhole section shall be set in true alignment.

Sections, joints and gaskets shall be set in accordance with manufacturers recommendations.

Lifting holes shall be sealed tight with a solid rubber plug driven into hole and the remaining void filled with 1 to 2 cement-sand mortar.

907-260.03.4.5--Manhole Channels. For straight through flow, channels shall be formed from pipe laid through the manholes. A bench of concrete shall be built up to the 2/3 point of the vertical sewer diameter before the top of the sewer pipe is broken out.

Where side channels and curved sections occur, the channels within the manholes shall be formed of concrete and shall be given a hard trowel finish.

907-260.03.4.6--Grading Rings. Grading rings shall be used for all precast manholes where required. Stacks shall be a maximum of 12 inches in height, constructed on the roof slab or cone section on which the manhole frame and cover shall be placed. The height of the stack shall be such as is necessary to bring the manhole frame to the proper grade.

907-260.03.4.7--Grading at Manholes. All manholes in unpaved areas shall be built as shown or directed to an elevation higher than the surrounding ground.

The ground surface shall be graded to drain away from the manhole. Fill shall be placed around them to the level shown on the plans, and the surface evenly graded on a 1 to 5 slope to the existing surrounding ground unless otherwise shown. The slope shall be covered with four inches (4") of top soil, seeded and maintained until a satisfactory growth of grass is obtained.

907-260.03.4.8--Manhole Watertightness. All manholes shall be free of visible leakage. Each manhole shall be tested for leaks and inspected, and all leaks shall be repaired in a manner subject to Engineer's approval.

907-260.03.4.9--Flexible Pipe Connector and Waterstop at Manhole Base. An approved flexible connector or waterstop shall be provided between each pipe entering and exiting manhole. The joint into the manhole base shall be completely watertight.

907-260.03.4.10--Casting. When installing the castings, the Contractor shall follow the manufacturer's installation instructions. Castings shall be set accurately to required location. Alignment and elevation, plumb, level, true and free of rack, shall be measured from established lines and levels. The casting shall be braced temporarily or anchored temporarily in the formwork.

Castings which are cracked, chipped, distorted or otherwise damaged will not be acceptable.

907-260.04--Method of Measurement. Utility Work - Sewer, Improvements will be measured as a lump sum quantity.

907-260.05--Basic of Payment. Utility Work - Sewer, Improvements, measured as prescribed above, will be paid for at the contract bid price of lump sum, which price shall be full compensation for sanitary sewer pipe, crystalline concrete waterproofing, manhole, steel casing

with end caps and spacers, sanitary sewer cleanout, all labor, materials, tests and incidentals necessary to complete the work.

No separate pay item will be made for sewer connection to existing sewer line or proposed building service lines. Costs shall be included in other items bid.

Payment will be made under:

907-260-A: Utility Work - Sewer, Improvements

- per lump sum

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-262-1

CODE: (SP)

DATE: 07/10/2017

SUBJECT: Utility Work - Water

PROJECT: BWO-5231-51(001) / 503006301 & LWO-5001-51(008) / 503006302 -- Newton County

Section 907-262-A007, Utility Work - Water, is hereby added to and becomes a part of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-262 -- UTILITY WORK- WATER

907-262.01--Description. This work consists of furnishing labor, materials, services, equipment, and other necessary items required for accompanying the construction of the water distribution systems. This shall include, but not be limited to the pipe and fittings for site water line including domestic water line and fire water line, valves and fire hydrants, set lines, elevations, and grades for water distribution systems work and control system for duration of work including careful maintenance of benchmarks, property corners, monuments, or other reference points.

This work also consists of furnishing all labor, materials, equipment and incidentals required for ductile-iron pipe systems and ductile-iron pipe fittings and specials in accordance with the plans and this special provision.

This work also consists of furnishing all labor, materials, equipment and incidentals required to provide all valves and appurtenances as shown and specified.

907-262.01.1--Water Distribution Systems.

907-262.01.1.1--Related Sections. The following related sections shall be followed.

- Special Provision 907-262, entitled Utility Work
- Local Governing Authority and Code Requirements
- All Necessary Construction Permits
- Standard Specifications for Road and Bridge Construction

902-262.01.1.2--References. The following references shall be followed.

- American Association of State Highway and Transportation Officials (AASHTO): T180, Moisture-Density Relations of Soils Using a 10-lb (4.54 kg) Rammer and an 18-Inch (457 mm) Drop.
- ANSI/ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings

- ANSI/ASME B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
- ANSI/ASTM D1557, Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-Kg) Rammer and 18-Inch (457-mm) Drop
- ANSI/ASTM D2466, Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
- ANSI/AWS A5.8, Brazing Filler Metal
- ANSI/AWWA C104, Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
- ANSI/AWWA C105, Polyethylene Encasement for Ductile Iron Piping for Water and Other liquids
- ANSI/AWWA C11, Rubber-Gasket Joints for Ductile Iron and Grey-Iron Pressure Pipe and Fittings
- ANSI/AWWA C151, Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids
- ANSI/AWWA C500, Gate Valves, 3 through 48 in NPS, for Water and Sewage Systems
- ANSI/AWWA C502, Dry Barrel Fire Hydrants
- ANSI/AWWA C504, Rubber Seated Butterfly Valves
- ANSI/AWWA C508, Swing-Check Valves for Waterworks Service, 2 in through 24 in NPS
- ANSI/AWWA C509, Resilient Seated Gate Valves 3 in through 12 in NPS, for Water and Sewage Systems
- ANSI/AWWA C600, Installation of Ductile-Iron Water Mains and Appurtenances
- ANSI/AWWA C606, Grooved and Shouldered Type Joints
- ANSI/AWWA C900, Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 inch through 12 inch, for Water
- American Society for Testing Materials (ASTM):
 - B88, Seamless Copper water Tube
 - D1785, Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
 - D2241, Poly (Vinyl Chloride) (PVC) Plastic Pipe(SDR-PR)
 - D2855, Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings
 - D2922, Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
 - D3017, Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures
 - D3139, Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals
 - D3035, Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter
- AWWA C901, Polyethylene (PE) Pressure Pipe, Tubing, and Fittings, 1/2-inch through 3-inch, for Water
- UL 246, Hydrants for Fire-Protection Service

907-262.01.1.3--Submittals. The Contractor shall provide data on pipe materials, pipe fittings, hydrants, valves and accessories.

The manufacture shall certify that products meet or exceed state or local requirements.

907-262.01.1.4--Project Record Documents. The Contractor shall accurately record actual locations of piping mains, valves, connections, and invert elevations. The Contractor shall

identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

907-262.01.1.5--Quality Assurance. The Contractor shall perform work in accordance with utility company and/or municipality requirements.

The valves shall have the manufacturer's name and pressure rating marked on valve body.

907-262.01.2--Ductile-Iron Pipe And Fittings.

907-262.01.2.1--Quality Assurance. All pipes and fittings shall be obtained from no more than one manufacturer.

Pipes and fittings shall comply with the following Standards:

- AWWA C104 (ANSI A21.4), Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
- AWWA C105 (ANSI A21.5), Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids
- AWWA C110 (ANSI A21.10), Gray-Iron and Ductile-Iron Fittings, 3 in. through 48 in., for Water and Other Liquids
- AWWA C111 (ANSI A21.11), Rubber Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
- AWWA C150 (ANSI A21.50), Thickness Design of Ductile-Iron Pipe
- AWWA C151 (ANSI 21.51), Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids
- ASTM A 48, Gray Iron Castings
- ASTM A 123, Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- ASTM A 307, Carbon Steel Externally Threaded Standard Fasteners
- ASTM A 354, Quenched and Tempered Alloy Steel Bolts, Studs and Other Externally Threaded Fasteners

907-262.01.2.2--Submittals. The Contractor shall submit detailed drawings and data on pipe, fittings, gaskets and appurtenances.

907-262.01.3--Valves and Appurtenances.

907-262.01.3.1--Quality. Valves and appurtenances shall be the standard product in regular production by manufacturers whose products have proven reliable in similar service for at least two years. Insofar as possible all valves of the same specific type shall be the product of one manufacturer.

Valves and appurtenances shall comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

- AWWA C500, Gate Valves - 3 Inch through 48 Inch - For Water and Other Liquids
- AWWA C502, Dry Barrel Fire Hydrants
- AWWA C504, Rubber-Seated Butterfly Valves
- AWWA C506, Backflow Prevention Devices – Reduced Pressure Principle and Double Check Valve Types
- AWWA C507, Ball Valves, Shaft or Trunnion-Mounted, 6-Inch Through 48-Inch, For Water Pressure up to 300 PSIG
- AWWA C508, Swing Check Valves for Ordinary Waterworks Service
- ANSI B16.1, Cast-Iron Pipe Flanges and Flanged Fittings
- ANSI B16.4, Cast-Iron Screwed Fittings
- ASTM A 307, Carbon Steel Externally and Internally Threaded Standard Fasteners
- ASTM D 1784, Rigid Polyvinyl Chloride Compounds and Chlorinated Polyvinyl Chloride Compounds
- ASTM D 2464, Threaded-Type Schedule 80 PVC Pressure Fittings
- ASTM D 2467, Socket-Type Schedule 80 PVC Pressure Fittings
- MSS SP-80, Bronze Gate, Globe, Angle and Check Valves
- Standards of National Electrical Manufacturer's Association

907-262.01.3.2--Submittals. The Contractor shall comply with the following submittal requirements.

Shop Drawings: The Contractor shall submit for approval detailed drawings, data, and descriptive literature on all valves and appurtenances, including:

- a. Dimensions
- b. Size
- c. Materials of construction
- d. Weight
- e. Protective coating
- f. Wiring diagram including:
 - (1) Ladder diagrams
 - (2) Point-to-point wiring.

Manufacturer's Certificates: The Contractor shall submit the Manufacturer's certificates of compliance with ANSI, AWWA and other Standards listed herein.

Manufacturer's Service Report: The Contractor shall certify that valves are properly installed except as noted. The Contractor shall also submit recommended corrective action for any deficiencies noted.

Operation and Maintenance Data: The Contractor shall submit a detailed operation and maintenance manual for all valves and appurtenances provided under this Section including the following information:

- a. Product name and number
- b. Name, address and telephone number of manufacturer and local distributor

- c. Instruction bulletins for operation, maintenance and recalibration
- d. Complete parts and recommended spare parts lists.

907-262.01.3.3--Product Delivery Storage and Handling. All valves and appurtenances shall be handled with care. Valves and appurtenances which are cracked, chipped, distorted or otherwise damaged or dropped will not be acceptable. All valves and appurtenances shall be store off the ground in enclosed shelter.

907-262.02--Materials.

907-262.02.1--Water Distribution System.

907-262.02.1.1--Pipe. Pipe sizes less than three inches (3”) that are installed below grade and outside building shall comply with Seamless Copper Tubing: Type “K”, soft annealed temper, to comply with ASTM B88-62 and installed with wrought copper (95-5 tin antimony solder joint, ASTM B32, Sb5) fittings in accordance with ASTM B16.22.

Pipe sizes three inches (3”) and larger that are installed below grade and outside building shall comply with:

1. Polyvinyl Chloride (PVC) Pipe for Water Transmission and Distribution Mains:
 - a. Pipe Fitting Material:
 - i. Standard: ASTM D 1784.
 - ii. Type: Cell Classification, 12454-B.
 - b. Pipe:
 - i. Standard: ASTM D 2241, AWWA C900, Size 4-inch thru 12-inch, AWWA C905, size 14-inch thru 48-inch
 - ii. Schedule: DR 18, PC-150
 - c. Joints:
 - i. Type: Integral bell and spigot.
 - ii. Flexible seals: Elastomeric, conforming to ASTM F 477.
 - iii. Lubricant: As recommended by the manufacturer.
 - d. Fittings:
 - i. Mechanical Joint Ductile Iron Fittings as specified in Contract Documents.
 - ii. Restraint Devices: Megalug by EBAA Iron Sales, Inc., or equal.

907-262.02.1.2--Valves And Appurtenances. Valves and appurtenances shall meet the requirements of Special Provision 907-262, entitled Valves and Appurtenances

907-262.02.1.3--Accessories. Joint Restraint Pieces: EBAA Iron Sales Megalug Series 1100 or approved equal. Joint restraints shall be installed on all fittings, specials, valves, and hydrants in accordance with manufacturer’s recommended spacing.

Meter Box shall be as required by Utility Owner.

907-262.02.2--Ductile-Iron Fittings. Ductile-Iron pipe and fittings shall comply with the following:

1. Ductile-Iron Fittings:
 - a. Joints:
 - i. Flanged:
 - (1) Standard: AWWA C110 (ANSI A21.10)
 - (2) Gaskets: 1/8-inch thick red rubber, full face
 - (3) Bolts and Nuts:
 - (a) Standard: ANSI B18.2.1 and ANSI B18.2.2, respectively
 - (b) Material, Exposed Service: ASTM A 307, Grade B, cadmium plated or hot dipped galvanized
 - (c) Material, Buried or Submerged Service: Type 304 stainless steel
 - ii. Mechanical Joint:
 - (1) Standard: AWWA C111 (ANSI A21.11)
 - (2) Gaskets: Plain rubber gaskets
 - (3) Bolts and Nuts: High strength low alloy steel
 - iii. Push-On: Comply with AWWA C111 (ANSI A21.11)
 - b. Fittings:
 - i. Standard: ANSI/AWWA C153/A21.53
 - ii. Pressure Rating: 350 psi
 - iii. Material: Ductile iron or cast-iron
 - iv. Gaskets: Comply with specifications for joints
 - v. Bolts and Nuts: Comply with specifications for joints
 - c. Coatings and Linings:
 - i. Inside Wall of Fittings (Except Sewer Pipe):
 - (1) Standard: AWWA C104 (ANSI A21.4)
 - (2) Cement-Mortar Lining Thickness: Standard
 - (3) Seal Coat: Asphaltic
 - ii. Outside Wall of Fittings:
 - (4) Buried:
 - (a) Coating: Bituminous
 - (b) Thickness: 1 mil approximate
 - (5) Exposed:
 - (a) Surface Preparation: SSPC-SP 6 Commercial Blast Cleaning as specified in 3.0C
 - (b) Product and Manufacturer: Provide one of the following:
 - 1) Carboline/Kop-Coat:
 - a) Shop Primer: 340 Gold epoxy – 2 coats, 1.5-2.0 mils per coat, 525-700 square feet per gallon per coat.
 - b) Field Primer or Field Touchup: 340 Gold Epoxy – 1 coat, 1.5-2.0 dry mils per coat, 525-700 square feet per gallon.
 - c) Finish: Hi-Gard – 2 coats, 2.0-3.0 dry mils per coat, 250-370 square feet per gallon per coat.
 - 2) Tnemec:
 - a) Shop Primer; 66-1211 Epoxy – 2 coats, 1.5-2.5 dry mils

- per coat, 270-469 square feet per gallon per coat.
 - b) Field Primer or Field Touchup: 66-1211 Epoxy – 1 coat, 1.5-2.5 dry mils per coat, 270-460 square feet per gallon.
 - c) Finish: 14 H.S. Epoxy – 2 coats, 2.0-3.0 dry mils per coat, 240-360 square feet per gallon per coat.
- 3) Or approved equal.
2. Restrained Joints:
- a. Megalug by EBAA Iron Sales, Inc.
 - b. Or approved equal.
3. Specials:
- a. Transition Pieces:
 - i. Furnish suitable transition pieces for connections to existing piping.
 - ii. Expose existing piping to determine material, dimensions and other data required for transition pieces unless details are shown on Drawings.
 - b. Pipe Adapters: Provide necessary adapters to join pipe of different types. Comply with specifications for respective joints.

907-262.02.3--Valves and Appurtenances.

907-262.02.3.1--Valves. Valves shall meet the following requirements.

- A. General:
- 1. All valves shall have manufacturer's name and working pressure cast in raised letters on valve body.
 - 2. All manual valve operators shall turn right to close unless otherwise specified. Valves shall indicate the direction of operation.
 - 3. Unless otherwise specified all flanged valves shall have ends conforming to ANSI B16.1, Class 125.
 - 4. All buried valves shall be provided with adjustable three piece valve boxes, extension stems, operating nuts, and covers unless otherwise shown or specified.
 - 5. All bolts, nuts and studs on or required to connect buried or submerged valves shall be stainless steel.
 - 6. Bolts and nuts shall have hexagon heads and nuts.
 - 7. Gasket material and installation shall conform to manufacturer's recommendations.
- B. Water Air Release Valves: (When Required)
- 1. Type: Float with compound lever.
 - 2. Size: As shown on the Drawings.
 - 3. Construction:
 - a. Body and cover: Semi-steel or cast iron
 - b. Float: Stainless steel
 - c. Seat: BUNA-N

- d. Lever Arms: Bronze or stainless steel
- 4. Manufacturer and Model:
 - a. Valve and Primer Corp., APCO Model No. 200A
 - b. Val-Matic Model No. 38
 - c. G-A Industries, Fig. No. 2-AR
 - d. Or approved equal
- C. Ball Valves: (When Required)
 - 1. Type: Standard circular port ball.
 - 2. Construction:
 - a. Body and Ball: Bronze
 - b. Stem: Bronze or composition alloy
 - c. Seat, Stem Seal and Body Seal: TFE
 - 3. End Connections: Threaded unless otherwise shown.
 - 4. Manufacturer and Model:
 - a. Jenkins, Fig. 32-A
 - b. Or approved equal
- D. Corporation Stops: (When Required)
 - 1. Standard: AWWA C800
 - 2. Material: Red brass: 85-5-5-5
 - 3. End Connections: Male Taper Thread and Grip Joint
 - 4. Manufacturer and Model:
 - a. Mueller H-1500
 - b. Hans No. 5200
 - c. Or approved equal
- E. Curb Stops: (When Required)
 - 1. Standard: AWWA C800.
 - 2. Material: Red brass: 85-5-5-5
 - 3. End Connections: Grip Joints
 - 4. Manufacturer and Model:
 - a. Mueller H-15175
 - b. Ford Meter Box Company, Inc., Catalog No. B66 - 444G.
 - c. Or approved equal
- F. Tapping Saddles:
 - 1. Study: AWWA Manual M23.
 - 2. Material: Red Brass: 85-5-5-5 with Stainless Steel Straps
 - 3. Connection: Saddle thread shall match the threads of the corporation stop.
 - 4. Manufacturer and Model:
 - a. Ford Meter Box Company, Inc., Model 101BS
 - b. Or approved equal
- G. Fire Hydrants: (When Required)
 - 1. Standard: AWWA C502, except as modified herein.

2. Main Valve:
 - a. Nominal Size: 5¼ inches
 - b. Type: Compression type closing with water pressure for positive sealing.
 - c. Direction of Opening: Left
 3. Nozzle Connections (Verify with Utility Owner)
 - a. Number and Size: Two 2½ (3.09 inches O.D.) inch hose nozzles with National Standard threads and one steamer nozzle with 4½ inch I.D. with 6 threads per inch.
 - b. Threads: All threads are to be 6 threads per inch to match Utility Owner's equipment.
 - c. Field replaceable
 4. Inlet Connection: Shoe inlet with six inch mechanical joint hub inlet, complete with accessories with hydrant bury being suitable for three to eight foot depth.
 5. Operating Assembly:
 - a. 1½ inch (point to flat) pentagon operating nut.
 - b. Operating threads sealed from water in an oil reservoir by two O-ring seals; one sealing the oil and one sealing the water.
 - c. Protect by use of weather shield or nut.
 6. Cover:
 - a. 3-foot minimum.
 - b. Provide barrel and stem extension where cover exceeds 3 feet.
 7. Materials of Construction:
 - a. Hydrant barrels, bonnet, and shoe: ASTM A126, Class B.
 8. Required Features:
 - a. Provide ground line breakable component that will shear off upon impact at the ground line without damage to the barrel.
 - b. Provide cast iron safety stem coupling that will separate upon impact.
 - c. Drain assembly: Two drain valves and at least two drain openings to insure quick and complete drainage.
 - d. Hydrants shall incorporate no parts which require field adjustments.
 - e. Hydrant design shall place nozzles at least 18 inches from ground line when measured not more than two inches below the mating of ground flange complying with NFPA handbook.
 - f. Friction losses through the hydrant not to exceed the following:
 - (1) 2.5 psi at 1000 gpm through the pumper nozzle.
 - (2) 1.25 psi at 1000 gpm through two hose nozzles simultaneously.
 - g. Hydrant repair kits and extensions shall interchange with existing City of Jackson equipment.
 9. Location: As shown on the drawings.
 10. Manufacturer and Model:
 - a. M & H.
 - b. Or approved equal.
- H. Gate Valve:
1. 2½ inches Diameter and Smaller:

- a. Type: Rising stem with solid wedge and union bonnet.
- b. Construction:
 - (1) Body: Bronze.
 - (2) Packing: TFE impregnated asbestos.
 - (3) Trim: Bronze.
- c. End Connections: Threaded.
- d. Manufacturer and Model:
 - (1) Jenkins Brothers, Fig. 47-U.
 - (2) Walworth, Fig. 2.
 - (3) Or approved equal.
- 2. 3 inches Diameter and Larger:
 - a. Standard: AWWA C515.
 - b. Type: Non-Rising Stem, resilient seated.
 - c. Construction:
 - (1) Body and Bonnet: Cast iron.
 - (2) Wedges and Trim: Bronze.
 - (3) Packing: O-ring.
 - d. End Connections:
 - (1) Exposed Valves: Flanged, conforming to ANSI B16.1, Class 125, unless otherwise shown.
 - (2) Buried Valves: Mechanical joint, conforming to ANSI B21.11.
 - e. Manufacturer:
 - (1) American Flow Control, Series 500.
 - (2) Or approved equal.
- I. Sewage Air and Vacuum Valves: (When Required)
 - 1. Type: Elongated Body and Dual Float.
 - 2. Size: 2-inch inlet and 1-inch outlet.
 - 3. Construction:
 - a. Body, Cover and Baffle: Cast iron.
 - b. Float: Stainless steel.
 - c. Seat: Buna-N.
 - d. Other Internal Parts: Bronze.
 - 4. Required Features:
 - a. Backflush attachments:
 - (1) Flushing water inlet valve.
 - (2) Blowoff valve.
 - (3) 6 feet of hose for flushing.
 - (4) Quick-disconnect couplings.
 - b. Isolation valve to isolate valve from line.
 - c. End Connection: Threaded.
 - 5. Manufacturer and Model:
 - a. Valve and Primer Corp., APCO Model 401.
 - b. Or approved equal.
- J. Check Valve: (When Required)

1. Swing Check Valve.
 - a. Type: Counter-weighted swing check.
 - b. Construction:
 - (1) Body, Cover, Disc and Levers: Cast iron.
 - (2) Counterweight Arm: Cast iron or manufacturer standard.
 - (3) Shaft: 18-8 Stainless steel.
 - (4) Body Seat: Bronze.
 - (5) Seat Ring: Rubber.
 - (6) Shaft Packing Gland: Compression type.
 - c. Manufacturer and Model:
 - (1) Clow F-5382.
 - (2) American Flow Control 50SC.
 - (3) Or approved equal.

- K. Post Indicator Valve: (When Required)
 1. Manufacturer: American flow control or approved equal.
 2. Series A240-Field adjustable to fit various trench depths.

- L. Backflow Preventor: (When Required)
 1. Type: Reduced Pressure Principle
 2. Components:
 - a. Reduced Pressure Zone Assembly
 - b. Two Gate Valves
 - c. All other components recommended by the manufacturer.
 3. Required Features:
 - a. Max working pressure: 175 psi
 - b. Temp. Range: 33°F to 140°F
 4. Manufacturer and Model:
 - a. Watts Series 909
 - b. or approved equal
 5. Installation:
 - a. According to Manufacturer unless noted on plans.
 - b. Provide insulated aluminum box for temperatures to -30°F.
 6. Standard: AWWA C 506

907-262.02.3.2--Valve Appurtenances. Valves Appurtenances shall meet the following requirements.

- A. Valve Boxes:
- B. Location: Provide for all buried valves.
- C. Construction:
 - a. Heavy pattern cast iron box.
 - b. Type: Three-piece adjustable, telescoping.
 - c. Inside Diameter: 4½ inches minimum.
 - d. Cover: Heavy-duty cast iron.
 - e. The word "WATER" shall be cast in cover.

- D. Provide extension stem and operating nut.
- E. Operating nut and stuffing box enclosed by lower section which rests on bonnet.

907-262.03--Construction Requirements.

907-262.03.1--Water Distribution System.

907-262.03.1.1--Examination. The existing conditions shall be verified by the Contractor. The Contractor shall verify that building service connection and municipal utility water main size, location and invert are as indicated.

907-262.03.1.2--Preparation. The pipe and tube ends shall be reamed to remove any burrs. Scale and dirt, both inside and outside, shall be removed before assembly. The pipe connections to equipment shall be prepared with flanges or unions.

907-262.03.1.3--Bedding. The pipe trench shall be excavated in accordance with Standard Specification, for work of this section. Excavation shall be hand trimmed for accurate placement of pipe to elevations indicated.

Bedding material shall be placed at the bottom of the trench. The fill materials shall be leveled in one continuous layer not exceeding eight inches compacted depth, compacted to 95 percent.

Fill material shall be used to backfill around the sides and the top of pipe, then tamped in place and compacted to 95 percent.

Optimum moisture content of bedding material shall be maintained to attain required compaction density.

907-262.03.1.4--Installation - Pipe. The Contractor shall maintain separation of water main from sanitary and storm sewer piping in accordance with state or local code. Water mains shall be laid at least 10 feet horizontally and 18 inches vertically from any sanitary sewer or manhole. The bottom of the water line should be at least 18 inches from the top of the sewer line. Sewer lines should always be below water lines.

The pipe shall be installed to the indicated elevation to within a 1-inch tolerance.

Ductile iron piping and fittings shall be installed to ANSI/AWWA C600.

Pipe shall be routed in straight line.

Pipe shall be installed to allow for expansion and contraction without stressing pipe or joints.

Locate wire shall be installed on all pipes 2-inch or larger pipe using No. 12 Solid Copper with Splices as all valves.

Access fittings shall be installed to permit disinfection of water system performed under this Specification.

Water pipe shall be sloped and positioned to drain at low points.

Where connections are made between new work and existing piping, connections shall be made using suitable fittings for conditions encountered. Each connection shall be made with existing pipe at time and under conditions which least interfere with operation of existing pipeline.

Concrete for thrust blocks shall be formed and placed at each elbow or change of direction of pipe main.

Elevations of buried piping shall be established to ensure not less than 36 inches of cover over the top of pipe. In northern climates, elevations of buried piping shall be established to ensure six inches between top of pipe and frost line.

Trench shall be backfilled in accordance with the Standard Specification.

907-262.03.1.5--Installation - Valves And Hydrants. Gate valves shall be installed as indicated on the plans and supported on concrete pads with valve stem vertical and plumb. Valve boxes shall be installed in a manner that will not transmit loads, stress, or shock to valve body. Valve box shall be centered over operating nut of valve vertical and plumb. Valve box shall be securely fitted together leaving cover flush with finished surface.

907-262.03.1.6--Disinfection Of Domestic Water Piping System. All piping shall be thoroughly cleaned and flushed in a manner approved by Engineer prior to placing in service. Piping 48 inches in diameter and larger shall be inspected from inside and all debris, dirt and foreign matter removed.

All filtered water piping and potable water piping shall be disinfected.

Interior of all piping and flush piping shall be completely cleaned prior to disinfection with water at a minimum velocity of 2.5 feet per second.

The procedures shall conform to AWWA C651 unless otherwise approved by Engineer.

Water for flushing, testing and chlorination shall be furnished and paid for by the Contractor. The Contractor shall provide all temporary piping, hose, valves, appurtenances, and services required.

Chlorine shall be supplied by the Contractor.

Bacteriologic tests shall be sampled by the Engineer or a certified water plant operator of the Utility and analyzed by the Mississippi State Department of Health. Bacteriological samples shall be taken from every dead-end line and every major looped line in the project when construction is completed.

Chlorine concentration in the water entering the piping shall be between 50 and 100 parts per million, such that a minimum residual concentration of 25 mg/l will be left after a 24-hour retention period. The operation shall be repeated as necessary to provide complete disinfection. Water being collected for testing shall not have a chlorine residual higher than normally maintained in the water system. No chlorine shall be present as a result of line disinfection.

Complete disinfection shall be defined as no confluent growth for samples taken on two consecutive days.

907-262.03.1.7--Service Connections. Water service shall be provided to utility company requirements with reduced pressure backflow preventer if required and water meter with by-pass valves and sand strainer if required.

All costs for installation of service connection(s) shall be absorbed by Contractor.

907-262.03.1.8--Field Quality Control. The Contractor shall test the water distribution system pipe sized installed below grade and outside building in accordance with following procedures.

All pipework shall be tested at the pressure and leakage tests equal to the design working pressure of the pipe and maintain said pressure for not less than two hours.

The Contractor shall furnish, install, and operate the necessary connections, pump, meter, and gauges. Leakage shall not exceed that permitted by AWWA C600-64 for mechanical joint and push-on joint pipe. Prior to running any field test, meter shall be tested, sealed, and approved by applicable governing authority at no additional cost to the State.

All leaks shall be located and repaired and repeatedly tests until test results are satisfactory and in compliance with this specification.

A copy of results of meter test and hydrostatic pressure test shall be furnished to the Engineer upon completion of water distribution backfilling operations.

907-262.03.2--Ductile-Iron Pipe and Fittings. Ductile-Iron pipe and fittings shall be installed in accordance with this special provision and the plans.

907-262.03.3--Valves and Appurtenances.

907-262.03.3.1--Installation. All valves and appurtenances shall be installed in accordance with manufacturer's instructions.

Suitable corporation stops shall be installed at all points shown and required where air binding of pipe lines might occur.

Unless otherwise approved, all valves shall be installed plumb and level. Valves shall be installed free from distortion and strain caused by misaligned piping, equipment or other causes.

Valve boxes shall be set plumb, and centered with the bodies directly over the valves. Earth fill shall be carefully tamped around each valve box to a distance of four feet on all sides of the box, or to the undisturbed trench face, if less than four feet.

Hydrants and connecting pipe shall have at least the same depth of cover as the distributing pipe. The hydrants shall be set upon a slab of concrete not less than four inches (4") thick and 15 inches square. Where restrained hydrants are not used, the side of hydrant opposite the pipe connections shall be firmly blocked against the vertical face of the trench with a concrete thrust block. Not less than 1/2 cubic yard of washed gravel shall be placed around the base of the hydrant at the location of the drain holes.

907-262.03.3.2--Field Test and Adjustments. All parts and components shall be adjusted as required correct operation.

Functional field test shall be conducted of each valve in presence of the Engineer to demonstrate that each part and all components together function correctly. All testing equipment required shall be provided.

907-262.04--Method of Measurement. Utility Work - Water, Improvements will be measured as a lump sum quantity.

Connection to existing water line and proposed building sewer line will be an absorbed item with no separate pay item.

907-262.05--Basic of Payment. Utility Work - Water, Improvements, measured as prescribed above, will be paid for at the contract bid price of lump sum, which price shall be full compensation for water pipe and tubing of the type specified, ductile-iron fittings, gate valve with cover box, water meter with cover box, casing pipe, testing, all labor, materials, testing, and all incidentals necessary to complete the work.

No separate pay item will be made for water connection to existing water line or proposed building service lines. Costs shall be included in other items bid.

Payment will be made under:

907-262-A: Utility Work - Water, Improvements - per lump sum

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-626-4

CODE: (SP)

DATE: 03/06/2017

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. 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. After the last pay item listed in Subsection 626.05 on page 496, add the following:

907-626-H: Thermoplastic Legend, Handicap Symbol, Color

- per each

S E C T I O N 9 0 5 - P R O P O S A L

Date _____

Mississippi Transportation Commission
Jackson, Mississippi

Sirs: The following proposal is made on behalf of _____
_____ of _____

for constructing the following designated project(s) within the time(s) hereinafter specified.

The plans are composed of drawings and blue prints on file in the offices of the Mississippi Department of Transportation, Jackson, Mississippi.

The Specifications are the current Standard Specifications of the Mississippi Department of Transportation approved by the Federal Highway Administration, except where superseded or amended by the plans, Special Provisions and Notice(s) to Bidders attached hereto and made a part thereof.

I (We) certify that I (we) possess a copy of said Standard and any Supplemental Specifications.

Evidence of my (our) authority to submit the Proposal is hereby furnished. The proposal is made without collusion on the part of any person, firm or corporation. I (We) certify that I (we) have carefully examined the Plans, the Specifications, including the Special Provisions and Notice(s) to Bidders, herein, and have personally examined the site of the work. On the basis of the Specifications, Special Provisions, Notice(s) to Bidders, and Plans, I (we) propose to furnish all necessary machinery, tools, apparatus and other means of construction and do all the work and furnish all the materials in the manner specified. I (We) understand that the quantities mentioned herein are approximate only and are subject to either increase or decrease, and hereby propose to perform any increased or decreased quantities of work at the unit prices bid, in accordance with the above.

Attached hereto is a certified check, cashier's check or Proposal Guaranty Bond in the amount as required in the Advertisement (or, by law).

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) enclose 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 execution 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.

Construction of District 5 Warehouse, known as State Project Nos. BWO-5231-51(001) & LWO-5001-51(008) / 503006301 & 302 in Newton County.

I (We) agree to complete the entire project within the specified contract time.

*****SPECIAL NOTICE TO BIDDERS*****

**BIDS WILL NOT BE CONSIDERED UNLESS BOTH PRICES AND ITEM TOTALS ARE ENTERED.
BIDS WILL NOT BE CONSIDERED UNLESS THE BID CERTIFICATION LOCATED AT THE END OF THE BID SHEETS IS SIGNED**

*****BID SCHEDULE*****

Line No.	Item Code	Adj Code	Quantity	Units	Description	Unit Price		Item Amount	
						Dollar	Ct	Dollar	Ct
Roadway Items									
0010	202-B007		3,268	Square Yard	Removal of Asphalt Pavement, All Depths				
0020	202-B125		1	Each	Removal of Fence Gate, All Types, All Sizes				
0030	202-B126		548	Linear Feet	Removal of Fence, All Types				
0040	203-A002	E	515	Cubic Yard	Unclassified Excavation, LVM, AH				
0050	203-EX031	E	7,723	Cubic Yard	Borrow Excavation, AH, LVM, Class B17				
0060	203-G002	E	4,300	Cubic Yard	Excess Excavation, LVM, AH				
0070	209-A005		6,285	Square Yard	Geotextile Stabilization, Type V, Non-Woven				
0080	221-A001	S	20	Cubic Yard	Concrete Paved Ditch				
0090	234-A001		1,056	Linear Feet	Temporary Silt Fence				
0100	237-A002		70	Linear Feet	Wattles, 20"				
0110	246-B001		30	Each	Rockbags				
0120	403-A003	BA1	908	Ton	12.5-mm, ST, Asphalt Pavement				
0130	403-A015	BA1	306	Ton	9.5-mm, ST, Asphalt Pavement				
0140	407-A001	A2	370	Gallon	Asphalt for Tack Coat				
0150	607-B026		769	Linear Feet	72" Type I Chain Link Fence, Class I , With Top Guard				

Line No.	Item Code	Adj Code	Quantity	Units	Description	Unit Price	Bid Amount		
0160	607-D002		769	Linear Feet	Barbed Wire Fence, 3 Strands, Galvanized Steel				
0170	607-G059		1	Each	Gate, 12' x 6' Chain Link With Top Guard				
0180	607-G062		2	Each	Gate, 12' x 6' Double Chain Link with Top Guard				
0190	607-P1018		78	Each	Line Post, 9' x 2" Galvanized Steel				
0200	607-P2013		9	Each	Brace Post, 10' x 2 1/2" Galvanized Steel				
0210	607-P3008		6	Each	Gate Post, 9' x 2 1/2" Galvanized Steel				
0220	608-B001	S	75	Square Yard	Concrete Sidewalk, With Reinforcement				
0230	620-A001		1	Lump Sum	Mobilization	XXXXXXXX	XXX		
0240	626-G001		104	Linear Feet	Thermoplastic Detail Stripe, Blue-ADA				
0250	626-G002		635	Linear Feet	Thermoplastic Detail Stripe, White				
0260	630-A001		2	Square Feet	Standard Roadside Signs, Sheet Aluminum, 0.080" Thickness				
0270	630-C003		11	Linear Feet	Steel U-Section Posts, 3.0 lb/ft				
0280	699-A001		1	Lump Sum	Roadway Construction Stakes	XXXXXXXX	XXX		
0290	907-258-K001		24	Each	Bollard				
0300	907-258-N001		32	Each	Car Stop				
0310	907-260-A005		1	Lump Sum	Utility Work - Sewer, Improvements	XXXXXXXX	XXX		
0320	907-262-A007		1	Lump Sum	Utility Work - Water, Improvements	XXXXXXXX	XXX		
0330	907-626-H001		1	Each	Thermoplastic Legend, Blue-ADA Handicap Symbol				
ALTERNATE GROUP AA NUMBER 1									
0340	304-F001	GT	2,441	Ton	3/4" and Down Crushed Stone Base				
ALTERNATE GROUP AA NUMBER 2									
0350	304-F002	GT	2,441	Ton	Size 610 Crushed Stone Base				

Line No.	Item Code	Adj Code	Quantity	Units	Description	Unit Price	Bid Amount		
ALTERNATE GROUP AA NUMBER 3									
0360	304-F003	GT	2,441	Ton	Size 825B Crushed Stone Base				
Building Items									
0370	907-242-A001		1	Lump Sum	Construction of Warehouse Building	XXXXXXXX	XXX		

*** BID CERTIFICATION ***

TOTAL BID.....\$ _____

*** BID STATEMENT ***

BIDDER ACKNOWLEDGES THAT HE/SHE HAS CHECKED ALL ITEMS IN THIS PROPOSAL FOR ACCURACY AND CERTIFIED THAT THE FIGURES SHOWN THEREIN CONSTITUTE THEIR OFFICIAL BID.

BIDDER'S COMPANY

BIDDER'S FEDERAL TAX ID NUMBER

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.

COMBINATION BID PROPOSAL

I. 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 option (a) has been selected, then go to II, and sign Combination Bid Proposal.

B. If option (b) has been selected, then complete the following, go to II, and sign Combination Bid Proposal.

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. _____	_____ _____	_____ _____	_____ _____	_____ _____	

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 option (c) has been selected, then initial and complete one of the following, go to II. and sign Combination Bid Proposal.

_____ 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.

II. 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), the undersigned, agree to complete each contract on or before its specified completion date.

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-5231-51(001)/ 503006301000 & LWO-5001-51(008)/ 503006302000**,

in **Newton** 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

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 and attachments (when indicated) is true and correct.

(1/2016S)

S E C T I O N 9 0 2

CONTRACT FOR BWO-5231-51(001)/ 503006301000 & LWO-5001-51(008)/ 503006302000

LOCATED IN THE COUNTY(IES) OF Newton

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. _____.

S E C T I O N 9 0 3
PERFORMANCE AND PAYMENT BOND

CONTRACT BOND FOR: **BWO-5231-51(001)/ 503006301000 & LWO-5001-51(008)/**
503006302000

LOCATED IN THE COUNTY(IES) OF: **Newton**

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 District 5 Warehouse, known as State Project Nos. BWO-5231-51(001) & LWO-5001-51(008) / 503006301 & 302 in Newton 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