MDOT Use Only
Checked _____
Loaded _____
Keyed _____

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SM No. CBWO9030250021

PROPOSAL AND CONTRACT DOCUMENTS

FOR THE CONSTRUCTION OF

(STATE DELEGATED)

16
Relocation and Construction of various metal buildings at the MDOT Shop Complex, known as State Project No. BWO-9030-25(002) / 502352301 & BWO-9041-25(001) / 502400301 & BWO-9721-25(001) / 502353301 & LWO-9002-25(006) / 501560303 in Hinds County.

Project Completion: January 31, 2014

NOTICE

BIDDERS MUST PURCHASE A BOUND PROPOSAL
FROM MDOT CONTRACT ADMINISTRATION DIVISION
TO BID THIS PROJECT.

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

SECTION 900

OF THE CURRENT
2004 STANDARD SPECIFICATIONS
FOR ROAD AND BRIDGE CONSTRUCTION
MISSISSIPPI DEPARTMENT OF TRANSPORTATION

JACKSON, MISSISSIPPI

BIDDER CHECK LIST
(FOR INFORMATION ONLY)

_____ 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.

_____ If the bid sheets were prepared using the Electronic Bid System, proposal sheets have been stapled and inserted into the proposal package.

_____ First sheet of SECTION 905--PROPOSAL has been completed.

_____ Second sheet of SECTION 905--PROPOSAL has been completed and signed.

_____ 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.

_____ DBE/WBE percentage, when required by contract, has been entered on last sheet of the bid sheets of SECTION 905 - PROPOSAL.

_____ Form OCR-485, when required by contract, has been completed and signed.

_____ The last sheet of the bid sheets of SECTION 905--PROPOSAL has been signed.

_____ Combination Bid Proposal of SECTION 905--PROPOSAL has been completed for each project which is to be considered in combination (See Subsection 102.11).

_____ Equal Opportunity Clause Certification, when included in contract, has been completed and signed.

_____ The Certification regarding Non-Collusion, Debarment and Suspension, etc. has been executed in duplicate.

_____ 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.

_____ ON FEDERAL FUNDED PROJECTS, the Notice To Bidders regarding DUNS Requirements has been completed and included in the contract documents.

_____ 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.

(04/2011)

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

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907-601-1: Structural Concrete
907-603-8: Culverts & Storm Drains
907-607-4: Barrier Fence Gate
907-625-1: Painted Traffic Markings
907-625-5: Painted Traffic Markings – Blue-ADA
907-631-1: Flowable Fill
907-699-4: Construction Staking
907-701-4: Hydraulic Cement
907-702-3: Polyphosphoric Acid (PPA) Modification of Petroleum Asphalt Cement
907-703-10: Aggregates
907-708-5: Non Metal Drainage Structures, w/ Supplement
907-709-1: Metal Pipe
907-710-1: Fast Dry Solvent Traffic Paint
907-711-4: Synthetic Structural Fiber Reinforcement
907-713-2: Admixtures for Concrete, w/ Supplement
907-714-6: Miscellaneous Materials
907-804-13: Concrete Bridges and Structures, w/ Supplement

SECTION 905 - PROPOSAL, PROPOSAL BID ITEMS
COMBINATION BID PROPOSAL
STATE BOARD OF CONTRACTORS REQUIREMENTS
STATE CERTIFICATION REGARDING NON-COLLUSION, DEBARMENT AND SUSPENSION
SECTION 902- CONTRACT FORM, AND SECTION 903 - CONTRACT BOND FORMS

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

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 901 - ADVERTISEMENT

Sealed bids will be received by the Mississippi Transportation Commission in the Office of the Contract Administration Engineer, Room 1013, Mississippi Department of Transportation Administration Building, 401 North West Street, Jackson, Mississippi, until 10:00 o'clock A.M., Tuesday, September 25, 2012, and shortly thereafter publicly opened on the Sixth Floor for:

Relocation and Construction of various metal buildings at the MDOT Shop Complex, known as State Project No. BWO-9030-25(002) / 502352301 & BWO-9041-25(001) / 502400301 & BWO-9721-25(001) / 502353301 & LWO-9002-25(006) / 501560303 in Hinds 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 acquired from the MDOT Contract Administration Division. These proposal are available at a cost of Ten Dollars ($10.00) per proposal. Specimen proposals are also available at the MDOT Contract Administration Division at a cost of Ten Dollars ($10.00) per proposal, or can be viewed or downloaded at no cost at www.gomdot.com.

Plans may be acquired on a cost per sheet basis from MDOT Plans Print Shop, MDOT Shop Complex, Building C, Room 114, 2567 North West Street, Jackson, Mississippi 39216, Telephone (601) 359-7460 or e-mail at plans@mdot.state.ms.us or FAX (601) 359-7461. Plans will be shipped upon receipt of 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: 05/03/2004

SUBJECT: Governing Specifications

The current (2004) 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 herein. Copies of the specification book may be purchased from the MDOT Construction Division.

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 1990 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 2004 Edition of the Standard Specifications.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 3 **CODE: (SP)**

DATE: 05/03/2004

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. 640 **CODE: (IS)**

DATE: 09/26/2005

SUBJECT: Fiber Reinforced Concrete

Bidders are hereby advised that synthetic structural fibers meeting the requirements of Subsection 907-711.04 may be used in lieu of wire mesh in some items of construction. Substitution of fibers for wire mesh will be allowed in the construction of paved ditches, paved flumes, paved inlet apron, driveways, guard rail anchors and pile encasements. Substitution in any other items of work must be approved by the State Construction Engineer prior to use.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 883 **CODE: (IS)**

DATE: 04/28/2006

SUBJECT: Payroll Requirements

Bidders are hereby advised that the Contractor and Subcontractor(s) are required to submit payroll information to the Project Engineers on a weekly basis.

On Federal-Aid Projects, CAD-880, CAD-881 and certified payroll submissions are required each week the Contractor or a Subcontractor performs work on the project. This is addressed in Section V, page 6 of Form FHWA-1273.

On State-Funded Projects, CAD-880 is required each week the Contractor or a Subcontractor performs work on the project.

When no work is performed on either Federal-Aid and State-Funded Projects, the Contractor should only submit CAD-880 showing no work activities.

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 full week of the month for the estimate period in order for the Project Engineer to process an estimate.

Bidders are advised to review the requirements regarding payroll submissions in Section 110 of the Standard Specifications.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 1405 **CODE: (IS)**

DATE: 03/15/2007

SUBJECT: ERRATA AND MODIFICATIONS TO THE 2004 STANDARD SPECIFICATIONS

Page	Subsection	Change
101	201.01	In the second sentence of the first paragraph, change “salvable” to “salvageable”.
107	202.04	In the fourth sentence of the fourth paragraph, change “yard” to “feet”.
107	202.05	In the list of units measurements for 202-B, add “square foot”.
132	211.03.4	In the second sentence of the second paragraph, change “planted” to “plated”.
192	306.02.4	In the first line of the first paragraph, delete the word “be”.
200	307.03.7	In the fourth sentence of the second paragraph, change “lime-fly ash” to “treated”.
236	401.01	Change the header from “Section 403” to “Section 401”.
242	401.02.3.2	In the first sentence of the third full paragraph, add “1/8” in the blank before the inch mark.
250	401.02.6.3	In the second sentence of the first paragraph on page 250, change “rutting over ” ” to “rutting over 1/8" ”.
253	401.02.6.4.2	In the paragraph preceding the table, change “91.0” to “89.0”.
259	401.03.1.4	In the first paragraph, change “92.0 percent” to “the specified percentage (92.0 or 93.0)”.
269	403.03.2	In the table at the top of page 269, change the PI requirement from “ = ” to “ ≤ ”.

278	404.04	In the second sentence, change the subsection from "401.04" to "403.04".
283	409.02.2	Change "PG 64-22" to "PG 67-22".
294	413.02	In the first sentence of the second paragraph, change "707.02.1.3" to "Subsection 707.02.1.3".
340	511.04	In the second sentence of the second paragraph, change "412" to "512".
349	601.03.3	In the first sentence, change "804.03.2" to "804.03.5".
355	603.02	Change the subsection reference for Joint mortar from "707.03" to "714.11".
369	604.04	In the first sentence, change "601.04" to "Subsection 601.04".
427	619.04	Delete the second paragraph.
442	625.04	In the third paragraph, change "626.04" to "Subsection 626.04".
444	626.03.1.2	Delete the third sentence of the first paragraph.
464	631.02	Change the subsection reference for Water from "714.01.0" to "714.01.1".
570	682.03	Change the subsection number from "682-03" to "682.03".
575	683.10.4	Change the subsection number from "683.10.4" to "683.04".
575	683.10.5	Change the subsection number from "683.10.5" to "683.05".
596	701.02	In the table under the column titled "Cementations material required", change Class F, FA" to "Class F FA,".
603	702.11	In the first sentence, change "702.12" to "Subsection 702.12".
612	703.04.2	In the fifth paragraph, delete "Subsection 703.11 and".
616	703.07.2	In the Percentage By Weight Passing Square Mesh Sieves table, change the No. 10 requirement for Class 7 material from "30 - 10" to "30 - 100".

618	703.13.1	In the first sentence of the first paragraph, change "703.09" to "703.06".
618	703.13.2	In the first sentence, change "703.09" to "703.06".
671	712.06.2.2	In the first sentence, change "712.05.1" to "Subsection 712.05.1".
689	714.11.2	In the first sentence, change "412" to "512".
709	715.09.5	In the first sentence of the first paragraph, change "guage" to "gauge".
717	717.02.3.4	In the top line of the tension table, change "1 1/2" to "1 1/8" and change "1 1/8" to "1 1/2".
741	720.05.2.2	In the last sentence of this subsection, change "720.05.2.1" to "Subsection 720.05.2.1".
827	803.03.2.3.7.5.2	In the first sentence of the second paragraph, change "803.03.5.4" to "803.03.2.3.4".
833	803.03.2.6	In the first sentence, change "803.03.7" to "803.03.2.5".
854	804.02.11	In the last sentence of the first paragraph, change "automatically" to "automatic".
859	804.02.13.1.3	In the last sentence, change Subsection "804.02.12.1" to "804.02.12".
879	804.03.19.3.2	In the first sentence of the third paragraph, change "listed on of Approved" to "listed on the Approved".
879	804.03.19.3.2	In the last sentence of the last paragraph, change "804.03.19.3.1" to "Subsection 804.03.19.3.1".
962	814.02.3	In the first sentence, change "710.03" to "Subsection 710.03".
976	820.03.2.1	In the first sentence, change "803.02.6" to "803.03.1.7".
976	820.03.2.2	In the first sentence, change "803.03.9.6" to "803.03.1.9.2".
985	Index	Change the subsection reference for Petroleum Asphalt Cement from "702.5" to "702.05".

985	Index	Change the subsection reference for the Definition of Asphaltic Cement or Petroleum Asphalt from "700.2" to "700.02".
985	Index	Change the subsection reference for Automatic Batchers from "501.03.2.4" to "804.02.10.4".
986	Index	Delete "501.03.2" as a subsection reference for Batching Plant & Equipment.
988	Index	Change the subsection reference for the Central Mixed Concrete from "501.03.3.2" to "804.02.11".
988	Index	Change the subsection reference for the Concrete Batching Plant & Equipment from "501.03.2" to "804.02.11".
999	Index	Delete "501.03.3.3" as a subsection reference for Truck Mixers.
1001	Index	Change the subsection reference for Edge Drain Pipes from "605.3.5" to "605.03.5".
1002	Index	Change the subsection reference for Metal Posts from "713.05.2" to "712.05.2".
1007	Index	Change the subsection reference for Coarse Aggregate of Cement Concrete Table from "703.3" to "703.03".
1007	Index	Change the subsection reference for Composite Gradation for Mechanically Stabilized Courses Table from "703.8" to "703.08".
1009	Index	Delete "501.03.3.3" as a subsection reference for Truck Mixers and Truck Agitators.
1010	Index	Delete reference to "Working Day, Definition of".

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 1808 **CODE: (IS)**

DATE: 09/09/2008

SUBJECT: Safety Apparel

Bidders are advised that the Code of Federal Regulations CFR 23 Part 634 final rule was adopted November 24, 2006 with an effective date of November 24, 2008. This rule requires that "All workers within the right-of-way of a Federal-Aid Highway who are exposed either to traffic (vehicles using the highway for the purposes of travel) or to construction equipment within the work area shall wear high-visibility safety apparel". High-visibility safety apparel is defined in the CFR as "personnel protective safety clothing that is intended to provide conspicuity during both daytime and nighttime usage, and that meets the Performance Class 2 or 3 requirements of the ANSI/ISEA 107-2004 publication entitled American National Standard for High-Visibility Safety Apparel and Headwear". All workers on Mississippi State Highway right-of-way shall comply with this Federal Regulation. Workers are defined by the CFR as "people on foot whose duties place them within the right-of way of a Federal-Aid Highway, such as highway construction and maintenance forces, survey crews, utility crews, responders to incidents within the highway right-of-way, and law enforcement personnel when directing traffic, investigating crashes, and handling lane closures, obstructed roadways, and disasters within the right-of-way of a Federal-Aid Highway".

You can access this final rule at the following link:

http://a257.g.akamaitech.net/7/257/2422/01jan20061800/edocket.access.gpo.gov/2006/pdf/E6-19910.pdf

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 1928 **CODE: (IS)**

DATE: 04/14/2008

SUBJECT: Federal Bridge Formula

Bidders are hereby advised that Federal Highway Administration Publication No. FHWA-MC-94-007, **BRIDGE FORMULA WEIGHTS**, dated January 1994, 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://ops.fhwa.dot.gov/freight/sw/brdgcalc/calc_page.htm

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 2818 **CODE: (SP)**

DATE: 10/01/2009

SUBJECT: Non-Quality Control / Quality Assurance Concrete

Bidders are advised that the following pay items will not be accepted based on the Quality Control / Quality Assurance (QC/QA) requirements of Section 804 of the specifications. The acceptance of these pay items will be based on sampling and testing at the project site by MDOT forces. The Contractor is required to submit mix designs to accomplish this work in accordance with Section 804 and perform normal Quality Control functions at the concrete plant. Acceptance will be in accordance with the requirements of 907-601, Structural Concrete, and TMD-20-04-00-000. At the discretion of the Engineer, the Contractor may request that the concrete be accepted based on QC/QA requirements.

Pay Item	Description
221	Paved Ditches
601	Minor Structures - manholes, inlets, catch basins, junction boxes, pipe headwalls, and pipe collars.
606	Guardrail Anchors
607	Fence Post Footings
608	Sidewalks
609	Curb and Gutter
614	Driveways
616	Median and Island Pavement
630	Sign Footings, except Overhead Sign Supports

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 3039 **CODE: (SP)**

DATE: 03/23/2010

SUBJECT: Alternate Asphalt Mixture Bid Items

Bidders are advised that the asphalt mixture used on this project will be bid as an alternate pay item: Hot Mix Asphalt (HMA) or Warm Mix Asphalt (WMA). Bidders must select one of the alternates at the time of bid. **The Contractor must use the selected asphalt mixture, HMA or WMA, throughout the entire project.**

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 3067 **CODE: (SP)**

DATE: 04/14/2010

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 13, 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. 3242 **CODE: (SP)**

DATE: 09/21/2010

SUBJECT: Warm Mix Asphalt

Bidders are advised that MDOT approved products and processes for the production of Warm Mix Asphalt is available at the following MDOT website.

http://www.gomdot.com/Divisions/Highways/Resources/MPL/Home.aspx

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 3612 **CODE: (SP)**

DATE: 08/10/2011

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 GRASSED, 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 grassed 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. 3655 **CODE: (SP)**

DATE: 10/04/2011

SUBJECT: Type III Barricade Rails

Bidders are advised that the use of 2-inch nominal thickness timber for rails on Type III barricades has not been approved by NCHRP as a crashworthy device. Therefore, the use of 2-inch nominal thickness timbers will not be allowed for rails on Type III Barricades. Timber rails for Type III Barricades shall be as follows.

- For barricades up to four feet (4') wide, the maximum thickness of timber rails shall be one inch (1") and the material shall be pine timber or ¾-inch ACX plywood.

- For barricades more than four feet (4') wide, timber rails shall be constructed of ¾-inch ACX plywood.

A list of crashworthy Type III Barricades can be found at the below FHWA website.

http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/wzd/

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 3704 **CODE: (SP)**

DATE: 11/30/2011

SUBJECT: Use of Precast Drainage Units

Bidders attention is brought to the content of Subsection 601.02.3 regarding precast units. MDOT Drawing Sheet Nos. PCU-1 and PCU-2 address MDOT approved precast drainage units. The Contractor must make a request to the Project Engineer for approval to use precast units other than the ones shown on Drawing Sheet No. PCU-1 or PCU-2.

Bidders are advised that precast drainage unit tops are only allowed on units shown on Drawing Sheet No. PCU-1. Cast-In-Place drainage unit tops are required on units shown on Drawing Sheet No. PCU-2.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 3893 **CODE: (SP)**

DATE: 04/10/2012

SUBJECT: Petroleum Products Base Prices

Bidders are advised that monthly petroleum products base prices will be available at the web site listed below. Current monthly prices will be posted to this web site on or before the 15th of each month. Bidders are advised to use the petroleum base prices on this web site when preparing their bids. The current monthly petroleum products base prices will be acknowledged by the Bidder and become part of the contract during the execution process.

Monthly Petroleum Products Base Prices can be viewed at:

http://sp.gomdot.com/Contract%20Administration/BidSystems/Pages/letting%20calendar.aspx

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 3980 **CODE: (SP)**

DATE: 07/25/2012

SUBJECT: 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 Monday prior to the letting on Tuesday. Answers to questions will be posted by 6:00 p.m. on Monday prior to the letting on Tuesday. Answers can be viewed by clicking on Q&A link under the Proposal Addenda column.

It shall be the Bidders responsibility to familiarize themselves with the questions and answers that have been submitted on this project.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 4078 **CODE: (SP)**

DATE: **8/02/2012**

SUBJECT: **Contract Time**

PROJECT: **BWO-9030-25(002) / 502352301 & BWO-9041-25(001) / 502400301 & BWO-9721-25(001) / 502353301 & LWO-9002-25(006) / 501560303 – Hinds County**

The calendar date for completion of work to be performed by the Contractor for this project shall be **January 31, 2014** which date or extended date as provided in Subsection 907-108.06 shall be the end of contract time. It is anticipated that the Notice of Award will be issued no later than **October 9, 2012** and the effective date of the Notice to Proceed / Beginning of Contract Time will be **November 8, 2012**.

Should the Contractor request a Notice to Proceed earlier than **November 8, 2012**, and it is agreeable with the Department for an early Notice to Proceed, the requested date will become the new Notice to Proceed / Beginning of Contract Time date.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-101-4 **CODE: (IS)**

DATE: 11/05/2008

SUBJECT: **Definitions**

Section 101, Definitions and Terms, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-101.02--Definitions. Replace the following definitions in Subsection 101.02 on pages 3 through 13.

Contract - The written agreement between the Mississippi Transportation Commission and the Contractor setting forth the obligations of the parties thereunder, including but not limited to, the performance of the work, the furnishing of labor and materials, and the basis of payment.

The contract includes the invitation for bids, proposal, contract form and contract bonds, specifications, supplemental specifications, interim specifications, general and detailed plans, special provisions, notices to bidders, notice to proceed, and also any agreements that are required to complete the construction of the work in an acceptable manner, including authorized extensions thereof, all of which constitute one instrument.

Contract Bonds - The approved form of security, executed by the Contractor and the Contractor's Surety(ies), guaranteeing complete execution of the contract and all supplemental agreements pertaining thereto and the payment of all legal debts pertaining to the construction of the project. This term includes Performance and Payment Bond(s).

Surety - A corporate body, qualified under the laws of Mississippi, which is bound with and for the successful bidder by "contract bond(s)" to guarantee acceptable performance of the contract and payment of all legal taxes and debts pertaining to the construction of the project, including payment of State Sales Tax as prescribed by law, and any overpayment made to the Contractor.

Add the following to the list of definitions in Subsection 101.02 on pages 3 through 13.

Performance Bond - The approved form of security, executed by the Contractor and issued by the Contractor's Surety(ies), guaranteeing satisfactory completion of the contract and all supplemental agreements pertaining thereto.

Payment Bond - The approved form of security, executed by the Contractor and issued by the Contractor's Surety(ies), guaranteeing the payment of all legal debts pertaining to the construction of the project including, but not limited to, the labor and materials of subcontractors and suppliers to the prime contractor.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-102-8

DATE: 07/10/2012

SUBJECT: Bidding Requirements and Conditions

Delete Subsection 907-102.06 on page 1, and substitute the following.

907-102.06--Preparation of Proposal. Delete the first, fifth, sixth, and seventh paragraphs of Subsection 102.06 on pages 17 & 18, 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 Expedite Bid printed bid sheets along with the bid data on the MDOT-supplied USB Flash Drive. Expedite Bid System (EBS) files shall be downloaded from the Department's website www.goMDOT.com. 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 generated by the Department's Electronic Bid System (Trns•port Expedite Bid) 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 Expedite Bid generated bid sheets and delivered to the Department in accordance with the provisions of Subsection 102.09. Bids submitted using any other form, format or means will result in an irregular bid. **Handwritten bids will no longer be an accepted method for submission.**

Bidders are cautioned that using other versions of the Expedite Bid may result in improperly printed bid sheets. The correct version of Expedite Bid can be obtained at no cost from the MDOT Contract Administration Division or at the MDOT website, www.gomdot.com. The current version of Expedite Bid is also included on the MDOT-supplied USB Flash Drive.

The Expedite Bid generated bid sheets should be stapled together in order beginning with page 1, signed and included in the bid proposal package in the sealed envelope. Only the Expedite Bid generated sheets will be recognized as the official bid. The MDOT-provided USB Flash Drive containing the information printed on the Expedite Bid generated bid sheets should be placed in the padded envelope included with the bid proposal package and enclosed in the sealed envelope. Bid sheets printed from Expedite Bid should be a representation of the data returned on the flash drive. To have a true representation of the bid sheets, the Bidder must copy the EBS and EBS amendment files used to prepare the bid sheets to the flash drive. Otherwise, the unit prices bid will not be recorded to the flash drive. Bidders are cautioned that failure to follow proper flash drive handling procedures could result in the Department being unable to process the flash drive. Any modification or manipulation of the data contained on the flash drive, other than entering unit bid prices and completing all required Expedite Bid sections, will not be allowed and will cause the Contractor's bid to be considered irregular.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-102-8 **CODE: (IS)**

DATE: 01/20/2011

SUBJECT: Bidding Requirements and Conditions

907-102.06--Preparation of Proposal. Delete the fifth, sixth, and seventh paragraphs of Subsection 102.06 on page 18 and substitute the following:

Bid sheets generated by the Department's Electronic Bid System (Trns•port Expedite Bid) along with a completed proposal package will constitute the official bid and shall be signed on the last sheet of the Expedite Bid generated bid sheets and delivered to the Department in accordance with the provisions of Subsection 102.09.

Bidders are cautioned that using other versions of the Expedite Bid may result in improperly printed bid sheets. The correct version of Expedite Bid can be obtained at no cost from the MDOT Contract Administration Division or at the MDOT website, www.gomdot.com.

If bidders submit Expedite Bid generated bid sheets, then the bid sheets included in the proposal should not be completed. The Expedite Bid generated bid sheets should be stapled together, signed and included in the bid proposal package in the sealed envelope. If both the forms in the proposal and the Expedite Bid generated bid sheets are completed and submitted, only the Expedite Bid generated sheets will be recognized and used for the official bid. The USB Flash Drive containing the information printed on the Expedite Bid generated bid sheets should be placed in the padded envelope included with the bid proposal package and enclosed in the sealed envelope. Bid sheets printed from Expedite Bid should be a representation of the data returned on the flash drive. To have a true representation of the bid sheets, the Bidder must copy the EBS and EBS amendment files used to prepare the bid sheets to the flash drive. Otherwise, the unit prices bid will not be recorded to the flash drive. Bidders are cautioned that failure to follow proper flash drive handling procedures could result in the Department being unable to process the flash drive. Any modification or manipulation of the data contained on the flash drive, other than entering unit bid prices and completing all required Expedite Bid sections, will not be allowed and will cause the Contractor's bid to be considered irregular.

907-102.08--Proposal Guaranty. Delete the first and second paragraphs in Subsection 102.08 on page 20 and substitute the following:

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 907-103.05.1, 907-103.05.2, and as required by law.

If a bid bond is offered as guaranty, the bond must be on a form approved by the Executive Director, 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 907-103.05.2 as applicable.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-103-8 **CODE: (SP)**

DATE: 12/15/2009

SUBJECT: Award and Execution of Contract

Section 103, Award and Execution of Contract, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-103.04--Return of Proposal Guaranty. Delete the second paragraph of Subsection 103.04 on page 23 and substitute the following:

Certified checks or cashier's checks submitted as proposal guaranties, except those of the two lowest bidders, will be returned within 10 days of contract award. The retained proposal guaranty of the unsuccessful of the two lowest bidders will be returned within ten days following the execution of a contract with the successful low bidder. The retained proposal guaranty of the successful bidder will be returned after satisfactory performance and payment bonds have been furnished and the contract has been executed.

In the event all bids are rejected by the Commission, certified checks or cashier's checks submitted as proposal guaranty by all bidders will be returned within 10 days of rejection.

Delete Subsection 103.05 on page 23 and substitute the following:

907-103.05--Contract Bonds.

907-103.05.1--Requirement of Contract Bonds. Prior to the execution of the contract, the successful bidder shall execute and deliver to the Executive Director a performance and payment bond(s), in a sum equal to the full amount of the contract as a guaranty for complete and full performance of the contract and the protection of the claimants and the Department for materials and equipment and full payment of wages in accordance with Section 65-1-85 Miss. Code Ann. (1972 as amended). In the event of award of a joint bid, each individual, partnership, firm or corporation shall assume jointly the full obligations under the contract and the contract bond(s).

907-103.05.2--Form of Bonds. The form of bond(s) shall be that provided by or acceptable to the Department. These bonds shall be executed by a Mississippi agent or qualified nonresident agent and shall be accompanied by a certification as to authorization of the attorney-in-fact to commit the Surety company. A power of attorney exhibiting the Surety's original seal supporting the Mississippi agent or the qualified nonresident agent's signature shall be furnished with each bond. The Surety company shall be currently authorized and licensed in good standing to conduct business in the State of Mississippi with a minimum rating by A.M. Best of (A-) in the latest printing "Best's Key Rating Guide" to write individual bonds up to ten percent of the policy holders' surplus or listed on the current list of “Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies” as

published by the United States Department of the Treasury, Financial Management Service, Circular 570 (latest revision as published and supplemented on the Financial Management Service Web site and in the Federal Register) within the underwriting limits listed for that Surety. All required signatures on the bond(s) and certifications shall be original signatures, in ink, and not mechanical reproductions or facsimiles. The Mississippi agent or qualified nonresident agent shall be in good standing and currently licensed by the Insurance Commissioner of the State of Mississippi to represent the Surety company(ies) executing the bonds.

Surety bonds shall continue to be acceptable to the Commission throughout the life of the Contract and shall not be canceled by the Surety without the consent of the Department. In the event the Surety fails or becomes financially insolvent, the Contractor shall file a new Bond in the amount designated by the Executive Director within thirty (30) days of such failure, insolvency, or bankruptcy. Subsequent to award of Contract, the Commission or the Department may require additional security for any supplemental agreements executed under the contract or replacement security in the event of the surety(ies) loss of the ratings required above. Suits concerning bonds shall be filed in the State of Mississippi and adjudicated under its laws without reference to conflict of laws principles.

907-103.08--Failure to Execute Contract.. In the first sentence of Subsection 103.08 on page 24, change "bond" to "performance and payment bonds".

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-104-4 **CODE: (SP)**

DATE: 03/01/2011

SUBJECT: Disposal of Materials

Section 104, Scope of Work, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-104.05--Removal and Disposal of All Materials From the Project. Delete the second sentence of the first full paragraph of Subsection 104.05 on page 30 and substitute the following:

The Contractor shall also furnish the Engineer a certified letter stating that the area of disposal is not in a wetland or in Waters of the U.S.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-105-6

DATE: 12/12/2011

SUBJECT: Control of Work

After Subsection 907-105.05 on page 1, add the following.

907-105.14--Maintenance During Construction. Before the first sentence Subsection 105.14 on page 39, add the following:

The Contractor will be responsible for the maintenance of existing roadways within the limits of this project starting on the date of the Notice To Proceed / Beginning of Contract Time. Anytime work is performed in a travel lane, the Contractor shall install portable lane closure signs meeting the requirement of the MDOT Standard Drawing or MUTCD.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-105-6 **CODE: (IS)**

DATE: **01/20/2011**

SUBJECT: **Control of Work**

Section 105, Control of Work, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is modified as follows:

907-105.05--Cooperation by Contractor. In the third sentence of the second paragraph of Subsection 105.05 on page 35, change "Notice to Proceed" to "Notice of Award".

Delete the fourth paragraph of Subsection 105.05 on page 35, and substitute the following.

On projects that include erosion control pay items, the Contractor shall also designate a responsible person whose primary duty shall be to monitor and maintain the effectiveness of the erosion control plan, including NPDES permit requirements. This responsible person must be a Certified Erosion Control Person certified by an organization approved by the Department. Prior to or at the pre-construction conference, the Contractor shall designate in writing the Certified Erosion Control Person to the Project Engineer. The designated Certified Erosion Control Person shall be assigned to only one (1) project. When special conditions exist, such as two (2) adjoining projects or two (2) projects in close proximity, the Contractor may request in writing that the State Construction Engineer approve the use of one (1) Certified Erosion Control Person for both projects. The Contractor may request in writing that the Engineer authorize a substitute Certified Erosion Control Person to act in the absence of the Certified Erosion Control Person. The substitute Certified Erosion Control Person must also be certified by an organization approved by the Department. A copy of the Certified Erosion Control Person's certification must be included in the Contractor's Protection Plan as outlined in Subsection 907-107.22.1. This in no way modifies the requirements regarding the assignment and availability of the superintendent.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-107-9

DATE: 08/23/2011

SUBJECT: Legal Relations and Responsibility to Public

907-107.14.2.2--Railroad Protective. Delete the first sentence of subparagraph (b) of Subsection 907-107.14.2.2 on page 3 and substitute the following.

(b) **Contractor's Liability - Railroad**, including subcontractors, XCU and railroad contractual with limits of $1,000,000 each occurrence; $2,000,000 aggregate.

After Subsection 907-107.17 on page 4, add the following:

907-107.18--Contractor's Responsibility for Utility Property and Services. After the first sentence of Subsection 107.18 on page 63, add the following:

Prior to any excavation on the project, the Contractor shall contact MS 811 and advise them to mark all known utilities in the area of the excavation.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-107-9 **CODE: (IS)**

DATE: 01/20/2011

SUBJECT: **Legal Relations and Responsibility to Public**

Section 107, Legal Relations and Responsibility to Public, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-107.02--Permits, Licenses and Taxes. Delete in toto Subsection 107.02 on page 49 and substitute the following:

The Contractor or any Subcontractor shall have the duty to determine any and all permits and licenses required and to procure all permits and licenses, pay all charges, fees and taxes and issue all notices necessary and incidental to the due and lawful prosecution of the work. At any time during the life of this contract, the Department may audit the Contractor's or Subcontractor's compliance with the requirements of this section.

The Contractor or any Subcontractor is advised that the "Mississippi Special Fuel Tax Law", Section 27-55-501, et seq. and the Mississippi Use Tax Law, Section 27-67-1, et seq., and their requirements and penalties, apply to any contract or subcontract for construction, reconstruction, maintenance or repairs, for contracts or subcontracts entered into with the State of Mississippi, any political subdivision of the State of Mississippi, or any Department, Agency, Institute of the State of Mississippi or any political subdivision thereof.

The Contractor or any Subcontractor will be subject to one or more audits by the Department during the life of this contract to make certain that all applicable fuel taxes, as outlined in Section 27-55-501, et seq., and any sales and/or use taxes, as outlined in Section 27-67-1, et seq. are being paid in compliance with the law. The Department will notify the Mississippi State Tax Commission of the names and addresses of any Contractors or Subcontractors.

907-107.14--Damage Claims and Insurance.

907-107.14.2--Liability Insurance. Delete Subsection 107.14.2 beginning on page 60 and substitute:

907-107.14.2.1--General. The Contractor shall carry Contractor's liability, including subcontractors and contractual, with limits not less than: $500,000 each occurrence; $1,000,000 aggregate; automobile liability - $500,000 combined single limit - each accident; Workers' Compensation and Employers' Liability - Statutory & $100,000 each accident; $100,000 each employee; $500,000 policy limit. Each policy shall be signed or countersigned by a Mississippi Agent or Qualified Nonresident Agent of the Insurance Company.

The Contractor shall have certificates furnished to the Department from the insurance companies providing the required coverage. The certificates shall be on the form furnished by the Department and will show the types and limits of coverage.

907-107.14.2.2--Railroad Protective. The following provisions are applicable to all work performed under a contract on, over or under the rights-of-way of each railroad shown on the plans.

The Contractor shall assume all liability for any and all damages to work, employees, servants, equipment and materials caused by railroad traffic.

Prior to starting any work on railroad property, the Contractor shall furnish satisfactory evidence to the Department that insurance of the forms and amounts set out herein in paragraphs (a) and (b) has been obtained. Also, the Contractor shall furnish similar evidence to the Railroad Company that insurance has been obtained in accordance with the Standard Provisions for General Liability Policies and the Railroad Protective Liability Form as published in the Code of Federal Regulations, 23 CFR 646, Subpart A. Evidence to the Railroad Company shall be in the form of a Certificate of Insurance for coverages required in paragraph (b), and the original policy of the Railroad Protective Liability Insurance for coverage required in paragraph (a).

All insurance herein specified shall be carried until the contract is satisfactorily complete as evidenced by a release of maintenance from the Department.

The Railroad Company shall be given at least 30 days notice prior to cancellation of the Railroad Protective Liability Insurance policy.

For work within the limits set out in Subsection 107.18 and this subsection, the Contractor shall provide insurance for bodily injury liability, property damage liability and physical damage to property with coverages and limits no less than shown in paragraphs (a) and (b). Bodily injury shall mean bodily injury, sickness, or disease, including death at anytime resulting therefrom. Property damage shall mean damages because of physical injury to or destruction of property, including loss of use of any property due to such injury or destruction. Physical damage shall mean direct and accidental loss of or damage to rolling stock and their contents, mechanical construction equipment or motive power equipment.

(a) **Railroad Protective Liability Insurance** shall be purchased on behalf of the Railroad Company with limits of $2,000,000 each occurrence; $6,000,000 aggregate applying separately to each annual period for lines without passenger trains. If the line carries passenger train(s), railroad protective liability insurance shall be purchased on behalf of the Railroad Company with limits of $5,000,000 each occurrence; $10,000,000 aggregate applying separately to each annual period.

Coverage shall be limited to damage suffered by the railroad on account of occurrences arising out of the work of the Contractor on or about the railroad right-of-way, independent of the railroad's general supervision or control, except as noted in paragraph 4 below.

Coverage shall include:

(1) death of or bodily injury to passengers of the railroad and employees of the railroad not covered by State workmen's compensation laws,

(2) personal property owned by or in the care, custody or control of the railroads,

(3) the Contractor, or any of the Contractor's agents or employees who suffer bodily injury or death as a result of acts of the railroad or its agents, regardless of the negligence of the railroads, and

(4) negligence of only the following classes of railroad employees:

(i) any supervisory employee of the railroad at the job site

(ii) any employee of the railroad while operating, attached to, or engaged on, work trains or other railroad equipment at the job site which are assigned exclusively to the Contractor, or

(iii) any employee of the railroad not within (i) or (ii) above who is specifically loaned or assigned to the work of the Contractor for prevention of accidents or protection or property, the cost of whose services is borne specifically by the Contractor or Governmental authority.

(b) **Regular Contractor's Liability**, including subcontractors, XCU and railroad contractual with limits of $1,000,000 each occurrence; $2,000,000 aggregate. **Automobile** with limits of $1,000,000 combined single limit any one accident; **Workers' Compensation and Employer's Liability** - statutory and $100,000 each accident; $100,000 each employee; $500,000 policy limit. **Excess/Umbrella Liability** $5,000,000 each occurrence; $5,000,000 aggregate. All coverage to be issued in the name of the Contractor shall be so written as to furnish protection to the Contractor respecting the Contractor's operations in performing work covered by the contract. Coverage shall include protection from damages arising out of bodily injury or death and damage or destruction of property which may be suffered by persons other than the Contractor's own employees.

In addition, the Contractor shall provide for and on behalf of each subcontractor by means of a separate and individual liability and property damage policy to cover like liability imposed upon the subcontractor as a result of the subcontractor's operations in the same amounts as contained above; or, in the alternative each subcontractor shall provide same.

907-107.15--Third Party Beneficiary Clause. In the first sentence of the first paragraph of Subsection 107.15 on page 61, change "create the public" to "create in the public".

907-107.17--Contractor's Responsibility for Work. Delete the fifth sentence of the fifth paragraph of Subsection 107.17 on page 63 and substitute the following:

The eligible permanent items shall be limited to traffic signal systems, changeable message signs, roadway signs and sign supports, lighting items, guard rail items, delineators, impact attenuators, median barriers, bridge railing or pavement markings. The eligible temporary items shall be limited to changeable message signs, guard rail items, or median barriers.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-107-10 **CODE: (SP)**

DATE: 03/14/2011

SUBJECT: Contractor's Erosion Control Plan

Section 107, Legal Relations and Responsibility to Public, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

Delete in toto Subsection 107.22.1 on pages 65 and 66, and substitute the following:

907-107.22.1--Contractor's Erosion Control Plan. At the preconstruction conference or prior to starting any work on the project, the Contractor shall submit to the Project Engineer for concurrence a comprehensive erosion and siltation control plan utilizing temporary measures and permanent erosion control features to provide acceptable controls during all stages of construction.

The contract time for this project has allowed 60 calendar days for the submittal and concurrence of the Contractor's erosion control plan, MDOT's review of the plan, and any revisions that may be necessary. The original contract time shall not be adjusted unless delays are caused solely by the Department for the submission, review, and concurrence of the Contractor's erosion control plan.

As a minimum, the plan shall include the following:

1. Erosion Control Plan (ECP) sheets or the plan profile sheets, 11" x 17" or larger, of all areas within the rights-of-way from the Beginning of the Project (BOP) to the End of the Project (EOP) showing the location of all temporary erosion control devices. Erosion control devices should be identified by exact type, temporary or permanent, configuration, and placement of each item to prevent erosion and siltation. A narrative of the Contractor's temporary erosion control plan shall be submitted in a format similar to the form attached to this special provision, but must include the heading and sub-heading information. As a minimum, the narrative shall include the following:
   - A detailed description, including locations (station numbers) of the Contractor's proposed sequence of operations including, but not limited to, clearing and grubbing, excavation, drainage, and structures.
   - A detailed description, including locations, and best management practices (BMP) that will be used to prevent siltation and erosion from occurring during the Contractor's proposed sequence of operations.
2. A copy of the certification for the Contractor's Certified Erosion Control Person whose primary duty shall be monitoring and maintaining the effectiveness of the erosion control plan, BMPs, and compliance with the NPDES permit requirements.
3. A plan for the disposal of waste materials on the project right-of-way which shall include but not be limited to the following:

- containment and disposal of materials resulting from the cleaning (washing out) of concrete trucks that are delivering concrete to the project site.
- containment and disposal of fuel / petroleum materials at staging areas on the project.

The erosion and siltation control plan shall be maintained on the project site at all times, updated as work progresses to show changes due to revisions in the sequences of construction operations, replacement of inadequate BMPs, and the maintenance of BMPs. Work shall not be started until an erosion control plan has been concurred with by the MDOT. 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.

907-107.22.2--Clearing and Grubbing, Haul Roads, Waste Areas, Plant Sites or Other Areas Occupied by the Contractor. Delete the fourth paragraph of Subsection 107.22.2 on page 66 and substitute the following:

Unless otherwise determined by the Engineer from a study of overall job conditions, the exposed surface area of erodible material at any one time for each of the separate operations of this subsection shall not exceed 19 acres without prior approval by the Engineer.

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

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, temporary or permanent vegetation will be placed within 7 calendar days.**

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.

HOUSEKEEPING PRACTICES: Structural BPM's 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.

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 BMP's 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 behind BMP's when it becomes about 1/3 to 1/2 height of BMP.

_____ _____
Prime Contractor's Signature Date

_____ _____
Printed Name Title

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-108-24 **CODE: (SP)**

DATE: 03/15/2011

SUBJECT: Prosecution and Progress

Section 108, Prosecution and Progress, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-108.01--Subletting of Contract.

907-108.01.1--General. At the end of the last paragraph of Subsection 108.01.1 on page 73, add the following:

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 make prompt payment within 15 calendar days as required above, or failure to submit the required OCR-484 Form, Certification of Payments to Subcontractors, which is also designed to comply with prompt payment requirements.

907-108.02--Notice To Proceed. Delete the second paragraph of Subsection 108.02 on page 75 and substitute the following:

The anticipated date of the Notice to Proceed (NTP) / Beginning of Contract Time (BCT) will be specified in the proposal.

Delete the fourth paragraph of Subsection 108.02 on page 75 and substitute the following:

Upon written request from the Contractor and if circumstances permit, the Notice to Proceed may be issued at an earlier date subject to the conditions stated therein. The Contractor shall not be entitled to any monetary damages or extension of contract time for any delay claim or claim of inefficiency occurring between the early issuance Notice To Proceed date and the Notice to Proceed date stated in the contract.

907-108.03--Prosecution and Progress. Delete Subsection 108.03.1 on pages 75 & 76, and substitute the following:

907-108.03.1--Progress Schedule. Prior to or at the Pre-Construction Conference, the Contractor shall furnish a progress schedule and be prepared to discuss both its proposed methodologies for fulfilling the scheduling requirements and its sequence of operations. The Engineer will review the schedule and approve the schedule as it relates to compliance with the specifications and logic. The progress schedule must be approved by the Engineer prior to commencing work. The schedule shall be a bar-chart type schedule submitted on 11”x17” paper meeting the below minimum requirements. These activities shall be significantly detailed enough to communicate the Contractor's understanding of the construction sequencing and phasing of the project.

When preparing the progress schedule, the Contractor shall include the following:

- Show a time scale to graphically show the completion of the work within contract time.
- Define and relate activities to the contract pay items.
- Show all activities in the order the work is to be performed including submittals, submittal reviews, fabrication and delivery.
- Show all activities that are controlling factors in the completion of the work.
- Show the time needed to perform each activity and its relationship in time to other activities.

Should the schedule not include the above requirements or becomes unrealistic during construction, the Contractor should immediately submit a revised, more realistic schedule for approval.

907-108.03.2--Preconstruction Conference. Delete the first paragraph of Subsection 108.03.2 on page 76 and substitute the following:

Prior to commencement of the work, a preconstruction conference shall be held for the purpose of discussing with the Contractor essential matters pertaining to the prosecution and satisfactory completion of the work. The Contractor will be responsible for scheduling the preconstruction conference. The Contractor will advise the Project Engineer in writing 14 days prior to the requested date that a conference is requested. When the contract requires the Contractor to have a certified erosion control person, the Contractor's certified erosion control person shall be at the preconstruction conference. The Department will arrange for utility representatives and other affected parties to be present.

Delete the third paragraph of Subsection 108.03.2 on page 76.

907-108.06--Determination and Extension of Contract Time. Delete Subsections 108.06.1 and 108.06.2 on pages 79 thru 85 and substitute the following:

907-108.06.1--Blank.

907-108.06.2--Based on Calendar Date Completion.

907-108.06.2.1--General. Contract Time will be established on the basis of a Completion Date, as indicated in the contract. The span of time allowed for the completion of the work included in the contract will be indicated in the contract documents and will be known as "Contract Time".

The span of time allowed in the contract as awarded is based on the quantities used for comparison of bids. If satisfactory fulfillment of the contract requires performance of work in greater quantities than those set forth in the proposal, the time allowed for completion shall be increased in Calendar Days in the same ratio that the cost of such added work, exclusive of the cost of work altered by Supplemental Agreement for which a time adjustment is made for such altered work in the Supplemental Agreement, bears to the total value of the original contract unless it can be established that the extra work was of such character that it required more time

than is indicated by the money value.

The Contractor shall provide sufficient materials, equipment and labor to guarantee the completion of the work in the contract in accordance with the plans and specifications within the Contract Time.

907-108.06.2.2--Contract Time. The following TABLE OF ANTICIPATED PRODUCTIVE DAYS indicates an average/anticipated number of productive days per month.

TABLE OF ANTICIPATED PRODUCTIVE DAYS

Month	Available Productive Days
January	6
February	7
March	11
April	15
May	19
June	20
July	21
August	21
September	20
October	16
November	11
December	5
Calendar Year	172

Allocation of anticipated productive days for a fractional part of the month will be computed as a proportion of the listed anticipated productive days for the applicable month.

An available productive day will be assessed (a) any day of the week, Monday through Friday, exclusive of legal holidays recognized by the Department in Subsection 108.04.1, in which the Contractor works or could have worked for more than six (6) consecutive hours on the controlling items of work, as determined by the Engineer, or (b) any Saturday, exclusive of legal holidays recognized by the Department in Subsection 108.04.1, in which the Contractor works for more than six (6) consecutive hours on the controlling items of work, as determined by the Engineer. When the Contractor works less than four consecutive hours during the day, no time will be charged for that day. When the Contractor works more than four but less than six consecutive hours, one-half (0.5) of an available work day will be charged for that day. When he Contractor works six or more consecutive hours during the day, one (1.0) available work day will be charged for that day.

Should the weather or other conditions be such that four (4) consecutive satisfactory hours are not available prior to noon (for daytime operations) or midnight (for nighttime operations), no time will be assessed for that day regardless of the above conditions. However, if the Contractor elects to work, time will be assessed in accordance with the previous paragraph.

Weather delays will not be considered for Saturdays, Sundays or legal holidays recognized by the Department in Subsection 108.04.1.

Available productive days will be based on soil and weather conditions and other specific conditions cited in the contract. The Engineer will determine on each applicable day the extent to which work in progress could have been productive, regardless of whether the Contractor actually worked.

Each month the Engineer will complete, and furnish to the Contractor, an "Assessment Report for Available Productive Days" (CSD-765). This report shows the number of available productive days during the estimate period and the cumulative available productive days to date. The Contractor should review the Engineer's report as to the accuracy of the assessment and confer with the Resident or Project Engineer to rectify any differences. Each should make a record of the differences, if any, and conclusions reached. In the event mutual agreement cannot be reached, the Contractor will be allowed a maximum of 15 calendar days following the ending date of the monthly report in question to file a protest Notice of Claim in accordance with the provisions of Subsection 105.17. Otherwise, the Engineer's assessment shall be final unless mathematical errors of assessment are subsequently found to exist, and any claim of the Contractor as to such matter shall be waived.

At any given date, the ratio of the accumulated monetary value of that part of the work actually accomplished to the total contract bid amount adjusted to reflect approved increases or decreases shall determine the "percent complete" of the work.

The "percentage of elapsed time" shall be calculated as a direct ratio of the expired calendar days to the total calendar days between the Beginning of Contract Time and the Specified Completion Date in the contract.

When the "percent complete" lags more than 20 percent behind the "percentage of elapsed time", the Contractor shall immediately submit a written statement and revised progress schedule indicating any additional equipment, labor, materials, etc. to be assigned to the work to ensure completion within the specified contract time. When the "percent complete" lags more than 40 percent behind the "percentage of elapsed time", the contract may be terminated.

907-108.06.2.3--Extension of Time. The Contractor may, prior to the expiration of the Contract Time, make a written request to the Engineer for an extension of time with a valid justification for the request. The Contractor's plea that insufficient time was specified is not a valid reason for extension of time.

No extension of the specified completion date will be granted except as provided herein. An extension of contract time may be granted for unusually severe weather, abnormal delays caused

solely by the State or other governmental authorities, or unforeseeable disastrous phenomena of nature of the magnitude of earthquakes, hurricanes, tornadoes, or flooded essential work areas which are deemed to unavoidably prevent prosecuting the work.

Unusually severe weather is defined as when the actual available productive days for the contract time are less than the number of available productive days shown in the Table of Anticipated Productive Days.

Any extension of contract time will be based on a calendar days basis, excluding Saturdays, Sundays or legal holidays recognized by the Department in Subsection 108.04.1. No proration of contract time will be made. Any extension of contract time will be made on or after the specified completion date. No extension of contract time will be made on a monthly basis.

Any revision of the specified completion date provided in the contract will be made automatically on the specified completion date as established in the contract, and at a later date if additional conditions so warrant.

If the completion of the project is extended into a season of the year in which completion of certain items of work would be prohibited or delayed because of seasonal or temperature limitations, the Engineer may waive the limitations provided the completion of the work will not result in a reduction in quality. When determined that the completion of the out-of-season items will cause a reduction in the quality of the work, the completion of the project will be further extended so the items may be completed under favorable weather conditions. In either case, the Engineer will notify the Contractor in writing.

Liquidated damages as set forth in Subsection 108.07 under the heading "Daily Charge Per Calendar Day" in the Table titled "Schedule of Deductions for Each Day of Overrun in Contract Time", shall be applicable to each calendar day after the specified completion date, or authorized extension thereof, and until all work under the contract is completed.

907-108.06.2.4--Cessation of Contract Time. When the Engineer by written notice schedules a final inspection, time will be suspended until the final inspection is conducted and for an additional 14 calendar days thereafter. If after the end of the 14-day suspension all necessary items of work have not been completed, time charges will resume. If the specified completion date had not been reached at the time the Contractor called for a final inspection, the calendar day difference between the specified completion date and the date the Contractor called for a final inspection will be added after the 14-day period before starting liquidation damages. If a project is on liquidated damages at the time a final inspection is scheduled, liquidated damages will be suspended until the final inspection is conducted and for seven (7) calendar days thereafter. If after the end of the 7-day suspension all necessary items of work have not been completed, liquidated damages will resume. When final inspection has been made by the Engineer as prescribed in Subsection 105.16 and all items of work have been completed, the daily time charge will cease.

907-108.10--Termination of Contractor's Responsibility. In the last sentence of Subsection 108.10 on page 88, change "bond" to "performance and payment bond(s)".

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-109-5

DATE: 05/15/2012

SUBJECT: Measurement and Payment

After the last paragraph of Subsection 907-109.01 on page 1, add the following.

After the second sentence of the fourth full paragraph of Subsection 109.01 on page 90, add the following.

Where loose vehicle measurement (LVM) is used, the capacity will be computed to the nearest one-tenth cubic yard and paid to the whole cubic yard. Measurements greater than or equal to nine-tenths of a cubic yard will be rounded to the next highest number. Measurements less than nine-tenths of a cubic yard will not be rounded to the next highest number. Example: A vehicle measurement of 9.9 cubic yards will be classified as a 10-cubic yard vehicle. A vehicle measurement of 9.8 cubic yards will be classified as a 9-cubic yard vehicle.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

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

DATE: 1/20/2011

SUBJECT: Measurement and Payment

Section 109, Measurement and Payment, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-109.01--Measurement of Quantities. Delete the third full paragraph of Subsection 109.01 on page 90 and substitute the following.

When requested by the Contractor, material specified to be measured by the cubic yard or ton may be converted to the other measure as appropriate. Factors for this conversion will be determined by the District Materials Engineer and agreed to by the Contractor. The conversion of the materials along with the conversion factor will be incorporated into the contract by supplemental agreement. The supplemental agreement must be executed before such method of measurement is used.

907-109.04--Extra and Force Account Work. In the last sentence of subparagraph (b) in Subsection 109.04 on page 91, change "bond" to "bond(s)".

Delete the first sentence of the second paragraph of subparagraph (d) in Subsection 109.04 on page 92 and substitute the following:

In the event an agreement cannot be reached for a particular piece of equipment, the book entitled "Rental Rate Blue Book For Construction Equipment" as published by EquipmentWatch® and is current at the time the force account work is authorized will be used to determine equipment ownership and operating expense rates.

907-109.06--Partial Payment.

907-109.06.1--General. Delete the fourth and fifth sentences of the third paragraph of Subsection 109.06.1 on page 94, and substitute the following:

In the event mutual agreement cannot be reached, the Contractor will be allowed a maximum of 25 calendar days following the Contractor's receipt of the monthly estimate in question to file in writing, a protest Notice of Claim in accordance with the provisions Subsection 105.17. Otherwise, the Engineer's estimated quantities shall be considered acceptable pending any changes made during the checking of final quantities.

907-109.07--Changes in Material Costs. Delete the third full paragraph of Subsection 109.07 on page 96 and substitute the following:

A link to the established base prices for bituminous products and fuels will be included in the contract documents under a Notice to Bidders entitled "Petroleum Products Base Prices."

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-234-5 **CODE: (SP)**

DATE: 09/23/2010

SUBJECT: Siltation Barriers

Section 234, Silt Fence, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-234.01--Description. Delete the first paragraph of Subsection 234.01 on page 177 and substitute the following:

This work consists of furnishing, constructing and maintaining a water permeable filter type fence, inlet siltation guard or turbidity barrier for the purpose of removing suspended soil particles from the water passing through it in accordance with the requirements shown on the plans, directed by the Engineer and these specifications. Fence, inlet siltation guards and turbidity barriers measured and paid as temporary shall be removed when no longer needed or permanent devices are installed.

Delete the first sentence of the second paragraph of Subsection 234.01 on page 177 and substitute the following:

It is understood that measurement and payment for silt fence, inlet siltation guards, and turbidity barriers will be made when a pay item is included in the proposal.

907-234.02--Materials. After the first paragraph of Subsection 234.02 on page 177, add the following:

Inlet siltation guards shall be listed on the Department's "Approved Sources of Materials".

Turbidity barriers shall be one of the following, or an approved equal.

1. SiltMax Turbidity Barrier by Dawg, Inc., 1-800-935-3294, www.dawginc.com
2. Turbidity Barrier by IWT Cargo-Guard, Inc., 1-609-971-8810, www.iwtcargoguard.com
3. Turbidity Curtain by Abasco, LLC, 1-281-214-0300, www.abasco.net

Chain link fence and hardware for super silt fence shall meet the requirements of Section 607, as applicable. Geotextile for super silt fence shall meet the requirements of Subsection 714.13 for a Type II Woven fabric.

907-234.03--Construction Requirements. After the last paragraph of Subsection 234.03.1 on page 178, add the following:

Super Silt Fence. Super silt fence shall be constructed in accordance with the plans and these specifications.

All posts shall be installed/driven so that at least 34 inches of the post will protrude above the ground. The chain link wire and geotextile shall be stretched taut and securely fastened to the posts as shown on the plans. The bottom edge of the fence and geotextile shall be buried at least eight inches below ground surface to prevent undermining. When splicing of the geotextile is necessary, the fabric shall be overlapped approximately 18 inches.

907-234.03.1.1--Placement of Inlet Siltation Guards and Turbidity Barriers. The inlet siltation guards and turbidity barriers shall be constructed at the locations shown on the erosion control plans. Inlet siltation guards and turbidity barriers shall be installed in accordance with the erosion control drawings in the plans. A copy of the manufacturer's instructions for placement of inlet siltation guards and turbidity barriers shall be provided to the Engineer prior to construction.

907-234.03.2--Maintenance and Removal. At the end of the first paragraph of Subsection 234.03.2 on page 178, add the following:

The Contractor shall maintain the inlet siltation guards. The geotextile shall be removed and replaced when deteriorated to such extent that it reduces the effectiveness of the guard. Replacement geotextile shall be the same type and manufacture as the original. Excessive accumulations against the guard shall be removed and disposed of at a location approved by the Engineer.

The Contractor shall maintain the turbidity barriers. Excessive accumulations against the turbidity barrier shall be removed and disposed of at a location approved by the Engineer.

Delete the second paragraph of Subsection 234.03.2 on page 178 and substitute the following:

Unless otherwise directed, all temporary silt fences, inlet guards and turbidity barriers shall be removed. Upon removal, the Contractor shall remove and dispose of any excess silt accumulations, shape the area to the line, grade, and cross section shown on the plans and vegetate all bare areas in accordance with the contract requirements. The temporary fence, inlet guard materials and turbidity barriers will remain the property of the Contractor and may be used at other locations provided the materials are acceptable to the Engineer.

After Subsection 234.03.2 on page 178, insert the following:

907-234.03.3--Resetting Inlet Siltation Guards and Turbidity Barriers. When inlet siltation guards and turbidity barriers are no longer needed at one location, they may be removed and reset at other needed locations. The Engineer may allow the resetting of siltation guards and turbidity barriers upon an inspection and determination that the siltation guards (frame and geotextile) and turbidity barriers are adequate for their intended purpose. When they have to be stored until needed at another location, payment for resetting will not be made until they are reset at their needed location.

907-234.04--Method of Measurement. Delete the sentence in Subsection 234.04 on page 178, add the following:

Silt fence and super silt fence will be measured by the linear foot.

Inlet siltation guard and resetting siltation guards will be measured per each. Turbidity barrier will be measured per linear foot.

907-234.05--Basis of Payment. Delete the sentence in Subsection 234.05 on page 178, add the following:

Silt fence and super silt fence, measured as prescribed above, will be paid for at the contract unit price per linear foot which shall be full compensation for completing the work.

Inlet siltation guard, resetting inlet siltation guards, and turbidity barrier, measured as prescribed above, will be paid for at the contract unit price per each or linear foot, which shall be full compensation for furnishing, constructing, and maintaining the work and for the removal and disposal of all items comprising the devices.

After the last pay item listed on page 178, add the following:

907-234-C:	Super Silt Fence	- per linear foot
907-234-D:	Inlet Siltation Guard	- per each
907-234-E:	Reset Inlet Siltation Guard	- per each
907-234-F:	Turbidity Barrier	- per linear foot

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-237-4 **CODE: (SP)**

DATE: 03/13/2012

SUBJECT: Wattles

Section 907-237, Wattles, is hereby added to and made a part of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-237 - WATTLES

907-237.01--Description. This work consists of furnishing, constructing and maintaining wattles for the retention of soil around inlets, swale areas, small ditches, sediment basins and other areas as necessary. Also, the work includes removing and disposing of the wattles and silt accumulations.

Measurement and payment for wattles will be made only when a pay item is included in the bid schedule of the proposal. The quantity is estimated for bidding purposes only and will be dependent upon actual conditions which occur during construction of the project.

907-237.02--Materials. Wattles used around inlets shall have a diameter of twelve inches (12") and a length adequate to meet field conditions. Wattles used at other locations shall have a diameter of twenty inches (20") and a length adequate to meet field conditions. The minimum diameter for the above wattle sizes shall be one inch (1") less than the specified diameter.

The stakes used in securing the wattles in place shall be placed approximately three feet (3') apart throughout the length of the wattle. Stakes shall be wooden and of adequate size to stabilize the wattles to the satisfaction of the Engineer.

In addition to the requirements of this specifications, wattles shall be listed on the Department's "Approved Sources of Materials".

907-237.03--Construction Requirements.

907-237.03.1--General. The wattles shall be constructed at the locations and according to the requirements shown on the erosion control plan.

907-237.03.2--Maintenance and Removal. The Contractor shall maintain the wattles and remove and dispose of silt accumulations.

When the wattles are no longer needed, they shall be removed and the Contractor shall dispose of silt accumulations and treat the disturbed areas in accordance with the contract requirements.

907-237.04--Method of Measurement. Wattles of the size specified will be measured per linear foot.

907-237.05--Basis of Payment. Wattles, measured as prescribed above, will be paid for at the contract unit price per linear foot, which price shall be full compensation for installation, maintaining and removal of the wattles, the removal and disposal of silt accumulations and any required restoration of the disturbed areas.

Payment will be made under:

907-237-A: Wattles, Size - per linear foot

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-242-28 **CODE: (SP)**

DATE: 8/15/2012

SUBJECT: Shop Complex Buildings

PROJECT: BWO-9030-25(002) / 502352301, BWO-9041-25(001) / 502400301, BWO-9721-25(001) / 502353301 & LWO-9002-25(006) / 501560303 – Hinds County

Section 907-242, Shop Complex Buildings, is hereby added to and made part of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows:

SECTION 907-242-- SHOP COMPLEX BUILDINGS

The following specifications are to be used ONLY for the construction of the various metal buildings at the shop complex. The Mississippi Standard Specifications for Road and Bridge Construction shall be used for all other items of work.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

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PROJECT: MULTIPLE BUILDINGS AT SHOP COMPLEX – PHASE 1
JACKSON, HINDS COUNTY, MISSISSIPPI

PROJECT NUMBER: BWO-9030-25(002) 502352
BWO-9041-25(001) 502400
BWO-9721-25(001) 502353
LWO-9002-25(006) 501560

DATE: JULY 27, 2012

DESCRIPTION A: This Work shall consist of minor site work and all construction work necessary in Relocating Existing Equipment Shed and constructing a Scales Maintenance Shop at MDOT Shop Complex in Jackson, Hinds County, Mississippi, Project No. BWO-9030-25(002) 502352 in accordance with these Specifications and conforming to the Drawings.

DESCRIPTION B: This Work shall consist of minor site work and all construction work necessary in constructing a Warehouse at MDOT Shop Complex in Jackson, Hinds County, Mississippi, Project No. BWO-9041-25(001) 502400 in accordance with these Specifications and conforming to the Drawings.

DESCRIPTION C: This Work shall consist of minor site work and all construction work necessary in constructing an Equipment Shed at MDOT Shop Complex in Jackson, Hinds County, Mississippi, Project No. BWO-9721-25(001) 502353 in accordance with these Specifications and conforming to the Drawings.

Site Improvements at MDOT Shop Complex in Jackson, Hinds County, Mississippi are under Project No. LWO-9002-25(006) 501560 and shall be in accordance with the Pay Items / Special Provisions listed on Summary of Quantity sheets and conforming to the related Drawings.

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 these buildings shall not relieve the Contractor of furnishing and installing such items and conforming to the building codes having jurisdiction.

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

END OF SECTION

SECTION 00 01 15 LIST OF DRAWING SHEETS

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A002	3	DETAILED INDEX
A003	4	CODE REVIEWS
C0.1	5	GENERAL NOTES AND INDEX OF DRAWINGS
C0.2	6	SUMMARY OF QUANTITIES
C0.3	7	SUMMARY OF QUANTITIES
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DT-1	145	DETAILS OF TYPICAL DITCH TREATMENTS
CL-1	162	FENCE – CHAIN LINK – CLASS 1
CLG-1	168	FENCE – CHAIN LINK GATE
GR-1B	182	GUARDRAIL – “W” BEAM (STEEL POSTS)
GR-3A	193	GUARDRAIL – TYPE 1 CABLE ANCHORAGE (CONCRETE FOOTING)
SN-7	223	STANDARD ROADSIDE SIGNS
SN-8B	225	STANDARD ROADWAY SIGN ASSYMBLY AND INSTALLATION
SN-8C	226	STANDARD ROADWAY SIGN ASSYMBLY AND INSTALLATION
SD-1	287	DRIVEWAYS, CURB & GUTTER & SIDEWALK
PI-1	300	PIPE CULVERT INSTALLATION
JB-1	302	JUNCTION BOX FOR CONCRETE CULVERTS
JB-2	304	JUNCTION BOX TYPE 2 FOR TRAFFIC LOAD (MAX “W”=9’-3”)
FE-1	328	FLARED END SECTIONS FOR CONCRETE PIPE
FE-1A	329	FLARED END SECTION FOR CONCRETE ARCH PIPE

END OF SECTION

SECTION 00 21 13 INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.01 QUESTIONS

A. General questions should be directed to the Project Engineer. Should a Bidder find Discrepancies in or omissions from the Drawings or Project Manual, or be in doubt as to their meaning, the Bidder should immediately notify the Project Engineer. The Contract Administration Engineer will send the Project Engineer's written instruction(s) or interpretation(s) to all known holders of the Documents. Neither the Owner, nor the Project Engineer, will be responsible for any oral instruction or interpretation.

1.02 BIDDER'S QUALIFICATIONS

A. Certificate of Responsibility: The Mississippi State Board of Contractors is responsible for Issuing Certificates of Responsibility to Contractors. To be awarded a Contract for public work, Sections 31-3-15 and 31-3-21 of the Mississippi Code 1972, Annotated requires a Contractor to have a current Certificate of Responsibility at bid time and during the entire length of the job. The Certificate of Responsibility number issued becomes a significant item in all public bidding.

B. Bid Under $50,000: If a Bidder submits a bid not exceeding $50,000, no Certificate of Responsibility number is required; however, a notation stating the bid does not exceed $50,000 must appear on the face of the envelope, or a Certificate of Responsibility number.

C. Bid Over $50,000: Each Bidder submitting a bid in excess of $50,000 must show its Certificate of Responsibility number on the bid and on the face of the envelope containing the bid.

D. As a condition for awarding of a bid, the total amount of which is equal to or excess of $50,000 and financed 100% with State funds, the bidder must have a current Certificate of Responsibility to do Building Construction issued by the Mississippi State Board of Public Contractors or a similar certificate issued by another state recognizing such certificate issued by the State of Mississippi.

E. Joint Venture Bid: When multiple Contractors submit a joint venture bid in excess of $50,000, a joint venture Certificate of Responsibility number must be shown on the bid and on the face of the envelope containing the bid. If the Multiple-Contractor joint venture has no joint venture Certificate of Responsibility number, each of the Contractors participating in the bid must indicate their individual Certificate of Responsibility numbers on the bid and on the face of the envelope.

1.03 NON-RESIDENT BIDDER

A. When a non-resident Bidder (a Contractor whose principal place of Business is outside the State of Mississippi) submits a bid for a Mississippi public works project, one of the following is required and shall be submitted with the Proposal Form:

B. Copy of Law: If the non-resident Bidder's state has a resident Bidder preference law, a copy of that law shall be submitted with the Proposal Form.

C. Statement: If the state has no such law then a statement indicating the State of (Name of State) has no resident Contractor preference law shall be submitted with the Proposal Form.

1.04 DISQUALIFICATION OF BIDDER

A. A Bidder may be disqualified for having defaulted on a previous Contract.

1.05 CONDITIONS OF WORK

A. Each Bidder must fully inform himself 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.

1.06 EXAMINATION OF SITE

A. All Bidders, including the general Contractor and Subcontractors shall visit the building site, compare the Drawings and Project Manual with any work in place and informed of all conditions. Failure to visit the site will in no way relieve the successful Bidder from furnishing any materials or performing any work required to complete Work in accordance with Drawings and Project Manual (Proposal) without additional cost to the Owner.

1.07 LAWS AND REGULATIONS

A. The Bidder's attention is directed to the fact that all applicable Mississippi state laws, rules and regulations of all authorities having jurisdiction over construction of the Project apply to the Contract.

1.08 OBLIGATION OF BIDDER

A. At the bid opening, each Bidder will be presumed to have inspected the site, read and become thoroughly familiar with the Drawings and the Project Manual (Proposal) including all addenda.

1.09 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.

1.10 METHOD OF BIDDING

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

1.11 PROPOSAL FORMS

A. The Bidder shall make all proposals on forms provided and shall fill all applicable blank spaces without interlineation or alteration and must not contain recapitulation of the work to be done. No oral or telegraphic proposals will be considered.

1.12 TIME OF COMPLETION

A. The Bidder shall agree to commence work on, or before a date specified in a written *NOTICE TO PROCEED* and fully complete the Project within the calendar days indicated on the Proposal Form.

1.13 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 62 15 entitled *Product Options and Substitution Procedures* which covers procedures after the award of Contract.

1.14 ADDENDA

A. Any 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

1.15 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 the same as the name appearing in the current Mississippi State Board of Contractors Roster.

C. Legal Address: The address appearing on the Proposal Form should be the same address appearing in the current Mississippi State Board of Contractors Roster.

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.

1.16 BID SECURITY

A. The Bid Security shall be in the form of a Bid Bond, or a Certified Check:

1. Bid Bond: The Bidder may submit a Bid Bond made out to the STATE OF MISSISSIPPI by a Surety licensed in Mississippi in the amount of five percent (5%) of the base bid. The Bidder, the Surety and a Mississippi Agent or Qualified Non-Resident Agent, with Power of Attorney attached or on file with the Contract Administration Engineer, shall duly execute the Bid Bond. The Project number shall be identified on the Bid Bond. (No standard form is required for the Bid Bond.)
2. Certified Check: The Bidder may submit a certified check made out to the STATE OF MISSISSIPPI in the amount of five percent (5%) of the base bid. The Project number shall be identified on the Certified check. All checks received from Bidders will be returned upon request, unless a Bidder is one (1) of the three (3) apparent low Bidders. The three (3) apparent low Bidder's checks will be held for forty-five (45) days, unless a Contract is awarded and executed in less time.

1.17 POWER OF ATTORNEY

A. Each bid security must be accompanied by an appropriate Power of attorney.

1.18 SUBMITTAL

A. This Proposal, which includes the Bid Forms and Specifications, must have all applicable parts completely filled out and delivered in its entirety to the address indicated on the Advertisement for Bids prior to the time and date stated.

B. DO NOT remove any part of the Contract Documents (Exception – An addendum requires substitution of second sheet of Section 905 (*Proposal Forms*).

C. Failure to complete all of the applicable requirements may be cause for the Proposal to be considered irregular.

D. A STRIPPED PROPOSAL THAT IS NOT RE-ASSEMBLED IN ITS CORRECT ORDER IS CONSIDERED AS AN IRREGULAR BID AND WILL BE REJECTED.

E. The Proposal shall be submitted and sealed in the opaque envelope provided and mailed or hand-delivered.

1. If the Bid is mailed, the bid envelope shall be placed inside a second envelope to prevent inadvertent premature opening of the Proposal. The second mailing envelope shall have the notations “SEALED BID ENCLOSED” on the face thereof.

1.19 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.

1.20 WITHDRAWAL OF BID

A. Any bid may be withdrawn prior to the scheduled time for opening of bids. However, bids may not be withdrawn until sixty (60) days after bid opening.

1.21 OPENING OF BIDS

A. Bids will be publicly opened shortly after the time stated in the advertisement for Bids. Bidder representatives are invited; however, attendance is not mandatory.

1.22 IRREGULARITIES

A. The omission of any information requested on the Proposal Form may be considered as an informality, or irregularity, by the awarding public body when in their opinion the omitted information does not alter the amounts contained in the submitted bid proposal, or place other Bidders at a disadvantage.

1.23 PROTEST

A. Any protest must be delivered in writing to the Owner within twenty-four (24) hours after the bid opening.

1.24 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.

1.25 AWARD OF CONTRACT

A. The Owner reserves the right to reject any, or all bids. A Contract will be awarded on the basis of the low base bid, or low combination of base bid and those alternates selected by the Owner in any order determined to be in the best interest of the Mississippi Transportation Commission and which produces a total within available funds.

1.26 FAILURE TO ENTER INTO A CONTRACT

A. The Bidder shall forfeit the Bid Security to the Owner as liquidated damages for failure, or refusal, to execute and deliver the Contract, Bond and Certificate of Insurance within the required ten (10) days after notice of the acceptance of the bid.

1.27 SECURITY FOR FAITHFUL PERFORMANCE

A. Simultaneously, with delivery of the executed Contract, the Contractor shall furnish a Surety Bond, or Bonds, as security for faithful performance, the payment of all persons performing labor on the project and furnishing materials in connection with this Contract. The Surety on such Bond or Bonds shall be a duly authorized surety company satisfactory to the Owner and meeting all of the following requirements:

1. Licensed at the time of award by the State of Mississippi's Commissioner of Insurance for the purpose of providing surety.
2. Listed at the time of award in the Department of the Treasury's Federal Register as a company holding certificates of authority as acceptable sureties on Federal Bonds, commonly referred to as the Treasury List.
3. All Bonds shall be executed on the form provided in the Project Manual under Section 903 Contract Bond form. The form is bound in the back of the Project Manual.
4. A Mississippi Agent or Qualified Non-Resident Agent with Power of Attorney attached or on file with the Contract Administration Engineer, shall countersign all Bonds with the name and address typed, or lettered legibly.
5. All Bonds must be accompanied by an appropriate Power of Attorney.

1.28 BIDDER'S CHECKLIST

A. PROPOSAL FORM

1. Base Bid
( ) Write in the amount of the base bid in numbers.

2. Alternates
( ) Write in each alternates amount in words and 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 as it appears in the current Mississippi State Board of Contractors Roster.
( ) Legal address of the business listed above.
( ) 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 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

1.29 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	Emma Taylor – Contract Administration	(601) 359-7744
2.	Additional Prints	Clint Wells – MDOT Plans Print Shop	(601) 359-7460
3.	Bid Forms	B.B. House – Contract Admin. Engineer	(601) 359-7730
4.	Specifications	Earl Glenn – Specifications Engineer	(601) 359-7301
5.	Drawings	Earl Glenn – Specifications Engineer	(601) 359-7301

6. Bidder's List & Specimen Proposals are available online at:
http://sp.gomdot.com/Contract%20Administration/BidSystems/Pages/current-letting.aspx

PART 2 - PRODUCTS & PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 00 22 13 SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.01 WORK IN PROXIMITY OF HIGH VOLTAGE POWER LINES

A. Bidders are hereby advised of Section 45-15-1, et seq., Mississippi Code of 1972, regarding the performance of work in the proximity of high voltage overhead power lines. It is the Contractor's responsibility to comply with those statutory requirements.

1.02 AGENCY, COMMISSION AND OFFICER NAME CHANGES

A. Whenever the term "Mississippi State Highway Department", the word "Department", or variations thereof meaning the Mississippi State Highway Department appears in the plans, proposal, contract documents, and specifications for highway construction projects, in accordance with the laws of the State of Mississippi, it shall mean the "Mississippi Department of Transportation.

B. Whenever the term "Mississippi State Highway Commission", the word "Commission", or variations thereof meaning the Mississippi State Highway Commission appears in the plans, proposal, contract documents, and specifications for highway construction projects, in accordance with the laws of the State of Mississippi, it shall mean the "Mississippi Transportation Commission".

C. Whenever the term "Director", or variations thereof meaning the Chief Administrative Officer of the State Highway Department appears in the plans, proposal, contract documents, and specifications for highway construction projects, in accordance with the laws of the State of Mississippi, it shall mean the "Executive Director of the Mississippi Department of Transportation."

1.03 PLANT PEST QUARANTINES INFORMATION

A. AT the request of the U. S. Department of Agriculture, Plant Pest Control Information Concerning Domestic Quarantines is cited as follows:

B. The entire state of Mississippi has been quarantined for the Imported Fire Ants. Soil and soil-moving equipment operating in the state will be subject to plant quarantine regulations. In general, these regulations provide for cleaning soil from equipment before it is moved from the state. Complete information may be secured from the State of Mississippi Department of Agriculture and commerce, Bureau of Plant Industry, P.O. Box 5207, Mississippi State, Mississippi 39762-5207 – Telephone 325-3390.

IMPORTED FIRE AN QUARANTINES

THE FOLLOWING REGULATED ARTICLES REQUIRE A CERTIFICATE OR PERMIT FOR MOVEMENT:

1. Soil, separately or with other things, except soil samples shipped to approved laboratories*. Potting soil is exempt, if commercially prepared, packaged and shipped in original containers.
2. Plants with roots with soil attached, except houseplants maintained indoors and not for sale.
3. Grass sod.
4. Baled hay and straw that have been stored in contact with the soil.

5. Used soil-moving equipment.
6. Any other products, articles, or means of conveyance of any character whatsoever not covered by the above, when it is determined by an inspector that they present a hazard of spread of the imported fire ant and the person in possession thereof has been so notified.

* Information as to designated laboratories, facilities, gins, oil mils, and processing plants may be obtained from an inspector.

Consult your State or Federal plant protection Inspector or your county agent for assistance regarding exact areas under regulation and requirements for moving regulated articles. For detailed information see 7 CFR 301.81 for quarantine and regulations.

1.04 PROMPT PAYMENT

A. Bidders are hereby advised that the Prime Contractor must pay their subcontractor(s) for satisfactory performance of their contracts no later than a specific number of days from receipt of payment from the Department. Therefore, Prime Contractors are hereby advised of the following:

1. Within 15 calendar days after receiving payment from the Department for work satisfactorily performed, the Prime Contractor shall make prompt payment to all sub-contractors or material suppliers for all monies due.
2. Within 15 calendar days after receiving payment from the Department for work satisfactorily completed, the Prime Contractor shall promptly return all retainage monies due to all sub-contractors or material suppliers.
3. 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 make prompt payment within 15 calendar days as required above, or failure to submit the required OCR-484 Form, "Certification of Payments to Subcontractors", which is also designed to comply with prompt payment requirements.

1.05 ALTERATIONS IN BIDDING PROCESS

A. Bidders are hereby advised that they may either use the traditional method of entering their Bid information by hand on Section 905--Proposal or may insert printed information obtained from the available Electronic Bid System (EBS).

B. It is the responsibility of every bidder to check for any addendum or modification to the contract document(s) for which they intend to submit a response. It shall be the bidder's responsibility to be sure they are in receipt of all addenda, pre-bid conference information, and/or questions and answers provided at, or subsequent to, the pre-bid conference, if any are issued.

The Mississippi Transportation Commission assumes no responsibility for defects, irregularities or other problems caused by the use of electronic media. Operation of this electronic media is done at the sole risk of the user.

1.06 CONTRACT TIME

A. It is anticipated that the Notice to Award will be issued by not later than October 9, 2012 and the date for Notice to Proceed and Beginning of Contract Time will be November 8, 2012

B. The calendar date for completion of this Contract shall be January 31, 2014 which date or extended date as provided in Article 8 – TIME shall be the end of contract time.

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

1. Contractor Note: As first item of work the contractor shall schedule and attend MDOT's Erosion Control training session(s) and become certified to prepare Contractor's Erosion Control Plan (if not already certified).
2. Site work shall not proceed until Contractor's Erosion Control Plan has been approved by MDOT.
3. Contractor should allow approximately 60 days in his construction schedule for the completion of this process.

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. Specialty Items:
   a. Termite Treatment
   b. Aluminum Composite Panel System
   c. Metal Building Systems
   d. Plumbing Items
   e. Heating, Ventilating and Air Conditioning Items
   f. Electrical Items
   g. Security and Surveillance Systems

These items are not to be confused with Division 10 – Specialties of the Specifications.

END OF SECTION

SECTION 00 31 32 GEOTECHNICAL DATA

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Geotechnical Investigation, MDOT Shop Complex, Jackson, Mississippi, prepared by SoilTech Consultants on March 01, 2011, is hereby made a part of the information made available to Bidders. For brevity, **Geotechnical Data** may also be referred to in the Contract Documents as the "Geotechnical Report" or "Soils Engineering Report".

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

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

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SOILTECH CONSULTANTS
Geotechnical Engineering

March 11, 2011

Neel-Schaffer, Inc.
125 South Congress Street
Suite 1100
Jackson, Mississippi 39201

Report No.: N.S. 8185.003.01

Attention: Mr. Chuck Lott, P.E.

Re: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

Gentlemen:

Submitted herein is a report of our investigation of soil and foundation conditions at the location of the proposed Mississippi Department of Transportation (MDOT) Shop Complex in Jackson, Mississippi. This work was authorized by Mr. Chuck Lott, P.E., on December 22, 2010.

This report presents the results of an investigation made to determine suitable foundation systems for the proposed buildings at the site as well as pavement designs for the proposed parking lot and driveway. It is our understanding that the three story parking garage and the four story office building will be supported by a deep foundation system. There are three different single story structures that will be supported by a shallow foundation system. Details of our recommendations related to design and construction of the foundation elements are included in the body of this report.

We appreciate the opportunity of providing services to you. If we can answer any questions or provide additional information, please call.

Very truly yours,
SoilTech Consultants, Inc.

William Matthew Doss, E.I.

Paul A. Gilbert, Ph.D., P.E.

Copies Submitted: (4)

Page

1.0 INTRODUCTION

Neel-Schaffer, Inc. is developing plans to construct a single story building, a three story parking garage, and a four story office building at the MDOT Shop Complex in Jackson, Mississippi. The project site is located between North West Street and North Mill Street approximately 1,500 ft north of East Woodrow Wilson Ave.

1.1 Project Information

There are three structures proposed at this facility; they include a single story structure that will be used for storage, a three story parking garage, and a four story office building. These three buildings will all be constructed near the current MDOT shop complex which is located between North West Street and North Mill Street, approximately 1,500 ft north East Woodrow Wilson Ave in Jackson, Mississippi. The Mississippi Industries for the Blind headquarters building borders this facility to the south, and single family dwellings border it to the north. The Mississippi Veterans Memorial Stadium is located to the east of the site and a large railroad junction lies to the west.

The project site is relatively flat with a large MDOT building located on the north side of the property along with a self support cellular tower. Demolition had begun on the south side of the project site to accommodate the new buildings that are the subject of this investigation.

1.2 Scope/Purpose

The purposes of the investigation reported herein were as follows:

- To determine soil conditions in the proposed construction area;
- To evaluate pertinent physical properties of the soils encountered; and
- After analyses of available field and laboratory data, to develop guideline recommendations related to foundation design and construction.

2.0 FIELD INVESTIGATION

Subsurface conditions at the project site were investigated by means of 30 borings made at the locations shown on Figure1. Borings B-1 through B-6 were located in the footprint of the proposed three story parking garage, and borings B-7 through B-12 were located in the footprint of the proposed four story office building; all of these borings were drilled to a terminal depth of 40 feet. Boring B-11 was advanced to a depth of 45 feet. Borings B-13 through B-16 and B-27 through B-30 were located in the footprint of the proposed single story structures and drilled to a terminal depth of 15 feet. It should be noted that boring B-29A was moved approximately 20 feet to the east due to an unknown concrete obstruction at about 3.5 feet below grade. The second boring at this location was boring B-29 and was drilled to the proposed depth of 15 feet. The remaining borings (B-17 through B-26) were all drilled in the proposed new driveway and parking areas and drilled to depths of 6 feet each. Dynamic Cone Penetrometer (DCP) soundings were taken in all the 6 foot pavement borings. Graphical logs of the borings showing the types of soils encountered are presented in Appendix A. Symbols and soil classifications used in the graphical boring logs are also presented in Appendix A.

Petroleum Spill

It should be noted that a possible petroleum spill was detected during this investigation although no specific testing or laboratory analysis has been performed to quantitatively identify the

presence of a petrochemical. The unmistakable odor of gasoline was detected in borings B-4, B-21, B-23, and B-29 at the depths specified in Table 2.1.1. Locations of possible spillage were noted and the coordinates of these locations were documented using a handheld GPS unit.

Table 2.1.1
Locations of possible petrochemical contamination

Boring No.	Depth of Contaminants (ft)	Latitude	Longitude
B-4	5' and 9'	32°19'54.0"N	90°10'59.8"W
B-21	1'	32°19'54.1"N	90°11'02.4"W
B-23	3'	32°19'54.7"N	90°10'58.5"W
B-29	7'	32°19'56.3"N	90°11'03.6"W

Petrochemical odor was observed by SoilTech only at these four locations during the field investigation. It is possible that petrochemical contamination existed in other locations on the site but may not have been detected as the results of the wet rotary drilling technique used. However, all soil samples are on file in the laboratory of SoilTech Consultants. We recommend that quantitative petrochemical analysis be performed on the samples identified in Table 2.1.1, with the possibility of extending the analysis to neighboring locations.

Dynamic Cone Penetrometer Soundings. Subgrade strength conditions in the area of the parking and driveway areas at MDOT Shop Complex were evaluated by means of Dynamic Cone Penetrometer (DCP) soundings. The DCP consists of a 5/8 inch diameter steel rod with a steel cone attached to one end. The cone is driven into the subgrade soil by dropping one of two interchangeable hammers weighing either 10.1 pounds or 17.6 pounds from a height of 22.6 inches. The lighter hammer yields better results in weaker soils, whereas the heavy hammer is used on high strength soils that are difficult to penetrate. During testing, the number of hammer drops and accumulative penetration are recorded at selected penetration intervals, or when a change in penetration is noticed. The device penetrates foundations to a depth up to 36 inches. DCP test data are used to determine the bearing ratio that can serve as a basis for pavement design. The device has been thoroughly investigated and effectively calibrated with California Bearing Ratio (CBR) by Webster, Grau, and Williams.[1] CBR's are widely used to evaluate subgrade strength and to gage a subgrade for potential support of pavement structures. The DCP soundings performed during this investigation are presented in Appendix A.

Soil Sampling. Relatively undisturbed samples of cohesive soils encountered during this investigation were taken by pushing a 3-in. OD thin-wall Shelby tube sampler a distance of approximately 2 ft into the soils with hydraulic cylinders on the drill rig (ASTM D 1587). Depths at which these samples were taken are indicated by shaded portions in the "Samples" column of the boring logs. After the Shelby tube was recovered from a boring, the sample was carefully extruded and examined visually. One representative portion of each sample was selected and sealed with melted paraffin in a cylindrical cardboard container to prevent loss of moisture and to protect the sample during transportation to the laboratory. Another portion of each

[1] Webster, S.L., Grau, R.H., and Williams, T.P. (1992). "Description and Application of Dual Mass Dynamic Cone Penetrometer," Instruction Report GL-92-3, USACE Waterways Experiment Station, Vicksburg, Mississippi.

undisturbed sample was also selected and sealed in a plastic jar for ease in subsequent visual examination.

Disturbed samples of sands and other near-cohesionless soils encountered in the borings were obtained by driving an ASTM standard 2-in. outer diameter split-spoon sampler a distance of 18 in. into the soils with a 140-lb hammer falling a distance of 30 in. (ASTM D 1586). This sampling procedure is referred to as the Standard Penetration Test. Depths at which the split-spoon samples were taken are indicated by crossed-slashes in the "Samples" column of the boring logs. The number of blows (N-value) required to drive the sampler the final 12 in. of penetration is recorded at the corresponding depth in the "Field Tests Results" column of the boring logs. Also shown are the blow counts required to drive the sampler each 6-in. increment. Representative portions of each split-spoon sample were selected and sealed in plastic jars to prevent loss of moisture.

Representative disturbed samples were taken directly from cuttings of the short-flight earth auger used to complete the 6-ft borings. The disturbed samples were taken at intervals of depth as indicated by two horizontal lines connected by a vertical line in the "Samples" column of the boring logs. These samples were sealed in plastic jars to prevent loss of moisture. All jars were placed in protective boxes for transportation to the laboratory for possible testing.

3.0 LABORATORY INVESTIGATION

The engineering properties which were considered to be pertinent for this study are soil shear strength, compressibility and shrink-swell potential. These engineering properties were determined by means of tests completed in our laboratory. Laboratory tests completed for this study include natural moisture content, visual classification, No. 200 washes, liquid and plastic limits, unconfined compression, and unconsolidated undrained triaxial compression tests. These tests were performed in accordance with recognized ASTM standards and procedures. A summary of laboratory tests performed in this investigation including statistical analysis of the results is provided in Table 1 in Appendix A. The laboratory tests are discussed in the following paragraphs.

3.1 Strength Tests

Unconfined Compression Tests. Undrained shear strength values for the cohesive soils were evaluated by means of 42 unconfined compression tests. In an unconfined compression test, a cylindrical sample of soil is subjected to a uniformly increasing axial load until failure develops. For purely cohesive soils, the undrained shear strength is taken to be equal to one-half of the maximum normal stress which was observed to develop on the sample during the test. Undrained shear strength or simply "cohesion" values determined from the results of the unconfined compression tests are presented in the laboratory data section of the boring logs. Also shown are the natural moisture contents, plotted as shaded circles, and the unit dry weights determined as a part of each unconfined compression test.

Unconsolidated-Undrained Triaxial Compression Test. Unconsolidated-undrained (UU) shear strength values for soils were evaluated by means of four UU triaxial compression tests. In a UU triaxial compression test, a cylindrical sample of soil is placed in a triaxial chamber cell and is subjected to a predetermined uniform confining stress. An axial load is then applied to the sample and is increased at a constant rate until failure develops. For purely cohesive soils, the UU shear strength is taken to be equal to the deviator stress. The deviator stress is equal to the maximum normal stress which was observed to develop on the sample during the test minus the confining stress. The UU shear strength or simply "cohesion" values determined from

the results of the UU triaxial compression tests and the confining pressures used during the tests are presented in the laboratory data section of the boring logs. Also shown are the natural moisture contents and unit weights determined as part of each UU triaxial compression test. The undrained shear strength values and moisture contents are presented graphically on the boring logs as open triangles and shaded circles, respectively.

3.2 Index Properties

Liquid and Plastic Limits. The compressibility and shrink-swell potential of the subsurface soils were investigated indirectly by means of natural moisture content and liquid and plastic limit tests. For this study, 43 liquid and plastic limit tests were performed on selected samples. The results of the liquid and plastic limit tests can be used to classify fine-grained soils by the Unified Soil Classification System as silts or clays of high or low plasticity. The numerical difference between the liquid and plastic limit is defined as the plasticity index. The magnitude of the liquid limit and plasticity index and the proximity of the natural moisture content to the plastic limit are indicators of the potential for a soil to shrink or swell upon changes in moisture content or to consolidate under loading. The results of the liquid and plastic limit tests are plotted as small vertical lines interconnected by a horizontal-dashed line in the data section of the boring logs. Atterberg limits are presented graphically in the plasticity charts in Appendix A; these charts summarize all Atterberg limits tests performed in this investigation.

Moisture Contents. Additionally, 92 natural moisture content tests and visual classifications were performed to verify field classifications for consistency in soil type and to extend the usefulness of shear strength and plasticity data. The results of these additional moisture content tests are also plotted as small shaded circles in the data section of the boring logs. Results of the visual classifications were utilized in the development of the "Description" section in the graphical boring logs.

No. 200 Washes. In order to further classify the soil types, 11 soil sample were washed over the No. 200 sieve to determine the percent of fine soil in the total soil sample. Material passing the No. 200 sieve is considered to be fine soil (clays and silts) whose particles are less than 0.075 millimeters in size. Results of No. 200 washes are presented as percent fines in the data section of the boring log.

4.0 SUBSURFACE CONDITIONS

The outcrop of the Yazoo Formation covers the northeastern corner of Hinds County, Mississippi. The Yazoo clay is a fairly homogeneous unit consisting of blue-green to blue-gray calcareous, fossiliferous clay with some pyrite. The formation has a maximum thickness of 425 to 450 feet in thickness in Hinds County, but the thickness of Yazoo clay at the MDOT Shop Complex project site is about 50 feet. The Yazoo is extremely calcareous and glauconitic just above contact with the subjacent Moodys Branch formation. The Yazoo clay weathers to a yellowish or greenish yellow color. Montmorillonite is the predominant clay mineral in Yazoo clay; consequently when weathered, the clay has a high potential for volumetric change with changes in moisture content. Additionally, Yazoo clay tends to creep and slump badly on relatively flat slopes. A characteristic that should be mentioned in connection with this formation is the Jackson Dome which is the major structural geologic feature in Hinds County. It is located in northeastern Hinds County and adjoins Rankin and Madison Counties. The crest of the dome lies within the Belhaven Area of the City of Jackson. This crest is about 1¼ miles southeast of the MDOT Shop Complex site. This dome is the result of molten igneous material pushing upward from deep within the earth. This intrusion uplifted formations that were already

in place, leaving them high over the crest of the mass. Erosion wore away these uplifted formations which includes the Yazoo Formation. As the result of uplift and erosion, only about fifty feet of the original thickness of the Yazoo Formation remains at the MDOT Shop Complex project site.

As mentioned, Yazoo clays typically possess a high shrink-swell potential. In addition to the high shrink-swell potential, Yazoo clays possess the characteristic of soil creep movement at sites where the Yazoo clay is present and sloping ground surface conditions exist. Soil movements directly attributable to soil creep generally consist of a combination of lateral and vertical movements or a general downslope movement of the soil mass. This phenomenon is thought to be the result of gravitational forces exerted on the Yazoo clay, shrinking and swelling cycles in the clay and the geometric configuration presented by sloping or hilly ground surface conditions. In addition to shrinking, swelling and downslope creep, Yazoo clays also possess the potential for heave due to stress relief caused by a reduction in finished grades below naturally created grades.

The general soil and groundwater conditions encountered at the project site and the engineering properties of the soils are discussed in the following paragraphs.

4.1 Soil Conditions

Soils present at the site of the proposed MDOT Shop Complex are clayey silt (ML), silty clay (CL)/(CL-ML), sandy clay (CL), clay (CH), and various fill materials (FILL). Asphalt was present in most of the borings and ranged in depth from 6 inches to 9 inches. Soil locations in terms of depth range in each boring are summarized in Table 4.1.1 below.

Table 4.1.1
Soil Location Summary

Boring #	Clayey Silt (ML) Depth range (ft)	Silty clay (CL)/(CL-ML) Depth range (ft)	Sandy Clay (CL) Depth range (ft)	Clay (CH) Depth range (ft)	Fill Depth range (ft)	Asphalt Depth range (ft)	Gravel Depth range (ft)
B-1	9 – 12	1.5 – 9 12 – 17	--	17 - TD	0.67 – 1.5	Surface – 0.67	--
B-2	8 -12	2 – 8 12 – 16	--	16 - TD	Surface – 2	--	--
B-3	7 – 9	9 – 17	--	3 – 7 17 - TD	Surface – 3.5	--	--
B-4	--	4 – 17	--	17 - TD	Surface – 4	--	--
B-5	--	2 – 16	--	16 - TD	Surface – 2	--	--
B-6	4 – 7	1 – 4 7 – 12	--	12 - TD	0.5 – 1	Surface – 0.5	--
B-7	--	3 – 7	--	7 - TD	0.5 – 3	Surface – 0.5	--
B-8	--	1 – 7	--	7 - TD	0.5 – 1	Surface – 0.5	--
B-9	--	1 – 12	--	12 - TD	0.67 – 1	Surface – 0.67	--
B-10	--	1.5 – 12	--	12 - TD	0.67 – 1.5	Surface – 0.67	--
B-11	--	5 – 11	12 – 16	16 - TD	Surface – 5	--	11 – 12
B-12	4 – 8	Surface – 4 8 – 11	--	11 – TD	--	--	--
B-13	7 – 11	11 - TD	--	--	1.5 – 7	Surface – 0.67	0.67 – 1.5 (crushed limestone)
B-14	7 – 11	--	--	12 -TD	1.5 – 7	Surface – 0.67	0.67 – 1.5

							(crushed limestone)
Table 4.1.1 Cont'd							
Boring #	Clayey Silt (ML) Depth range (ft)	Silty clay (CL)/(CL-ML) Depth range (ft)	Sandy Clay (CL) Depth range (ft)	Clay (CH) Depth range (ft)	Fill Depth range (ft)	Asphalt Depth range (ft)	Gravel Depth range (ft)
B-15	--	8 – 12	--	12 - TD	1.5 – 8	Surface – 0.67	0.67 – 1.5 (crushed limestone)
B-16	--	7 – 12	--	12 - TD	1.5 – 7	Surface – 0.67	0.67 – 1.5 (crushed limestone)
B-17	--	Surface – 2.5	--	2.5 - TD	--	--	--
B-18	--	Surface – 2 5.5 - TD	--	2 – 5.5	--	--	--
B-19	--	2 – 3	--	3 – 6	Surface – 2	--	--
B-20	5 - TD	--	3 – 5	--	0.75 – 3	Surface – 0.75	--
B-21	--	--	--	--	0.75 - TD	Surface – 0.75	--
B-22	--	Surface - TD	--	--	--	--	--
B-23	--	1 - TD	--	--	0.5 – 1	Surface – 0.5	--
B-24	--	1 - TD	--	--	0.5 – 1	Surface – 0.5	--
B-25	--	2.5 - TD	--	--	0.67 – 2.5	Surface – 0.67	--
B-26	--	2.5 - TD	--	--	0.67 – 2.5	Surface – 0.67	--
B-27	--	10 - TD	--	--	1.5 - 10	Surface – 0.5	0.5 – 1 (crushed limestone)
B-28	--	7.5 - TD	--	3.5 – 7.5	1.5 – 3.5	Surface – 0.5	0.5 – 1.5 (crushed limestone)
B-29	--	6.5 - TD	--	--	0.5 – 6.5	Surface – 0.5	--
B-29A	0.5 – 3.5	*Terminated at 3.5 feet due to unknown concrete obstruction.				Surface – 0.5	
B-30	--	3 - TD	--	--	0.5 - 3	Surface – 0.5	--

* TD - Terminal Depth of boring

Clayey silt (ML) made up 4.3% of the total drilling footage. This material is grey and tan in color and loose to dense in consistency. Three strength tests were performed on this material and resulted in shear strength values ranging from 280 psf to 2,460 psf and dry density values from 97.73 pcf to 107.0 pcf. Four moisture content tests yielded moisture contents from 23.6% to 29.7%. One liquid and plastic limit test was performed on material from this deposit and resulted in a liquid limit of 27% and a plasticity index (PI) of 4%.

Silty clay (CL) / (CL-ML) comprised 30.6% of the total drilling footage. This material is tan, grey and brown in color and soft to very stiff in consistency. Traces of gravel and sand were found within this deposit. Shear strength values of this material were found to range from 120 psf to 2,840 psf and dry density values ranged from 53.7 pcf to 115.8 pcf. Moisture content tests yielded moisture content values from 14.87% to 39.23 %. Liquid and plastic limit tests were performed on material from this deposit and resulted in liquid limits ranging from 25% to 46% and plasticity index (PI) values between 4% and 30%. Additionally, two No. 200 washes were performed on this material and resulted in 87.18 and 91.28 percent passing the No. 200 sieve.

Sandy clay (CL) only accounted for 1.0% of the total drilling footage during this investigation. This material is tan, red and grey in color and medium to stiff in consistency. One No. 200 wash was performed on material from this deposit and resulted in 49.71 % material passing the No. 200 sieve.

Clay (CH) was the most abundant material at this site, accounting for 48.2% of the total drilling footage. This material is tan, grey, and blue in color and stiff to hard in consistency. Sand was present at shallow depth in this material. Shell fragments and calcareous nodules were spread throughout the entire deposit. Shear strength values ranged from 1,270 psf to 5,520 psf and dry density values ranged from 76.79 pcf to 111.76 pcf. The moisture content throughout this material ranged from 19.41% to 43.89%. Liquid and plastic limit tests resulted in liquid limits ranging from 54% to 106% and plasticity index (PI) values ranging from 30% to 82%.

4.2 Groundwater Conditions

Groundwater conditions at the project site were determined by observing water levels in the borings upon completion. Notes pertaining to groundwater level observations are presented in the lower left portion of each graphical boring log. Equilibrium water levels in the borings are summarized in Table 4.2.1. Care was taken to identify correct groundwater levels at the time of the investigation, however, note should be taken that groundwater conditions and levels will fluctuate seasonally with variations in rainfall, drainage, leaking utility lines, levels in streams and rivers in the vicinity and other environmental factors.

Table 4.2.1

Groundwater Summary

Boring #	Initial Water Level (ft below grade)	Static Water Level (ft below grade)	Time to Static Level (min)
B-1	7.0	--	--
B-2	8.0	6.0	5
B-3	Trace of water at 8 ft, boring sloughed at 7 ft		
B-4	7.0	7.0	5
B-5	No groundwater encountered from 0-10.0 ft		
B-6	No groundwater encountered from 0-20.0 ft		
B-7	No groundwater encountered		
B-8	No groundwater encountered		
B-9	No groundwater encountered 0-20.0 ft		
B-10	No groundwater encountered 0-20.0 ft		

Table 4.2.1 Continued			
B-11	8	7	5
B-12	No groundwater encountered from 0-15		
B-13	None	6	16 hours
B-14	None	6.5	6 hours
B-15	None	4	5 hours
B-16	Trace of water @ 8 ft	5.5	2 hours
B-17 through B-28	No Groundwater Encountered		
B-29	7	6	30
B-30	Boring sloughed at 9'		

5.0 GUIDELINE FOUNDATION DESIGN RECOMMENDATIONS

It is our understanding that two different foundation types will be used at the MDOT Shop Complex. A deep foundation system will be used for the proposed Three Story Parking Garage and the proposed Four Story Office Building. The pre-engineered metal buildings and single story storage buildings will utilize a shallow foundation system.

For the parking areas and driveways, we recommend at least 3 ft of non-expansive buffer soils be placed between the bottom of the pavement structure and underlying Yazoo clays. Our recommendations related to design and construction of the foundation elements are discussed in the following paragraphs.

5.1 Site Preparation

Objectionable Materials. Site preparation for this project should include, as a minimum, the removal of objectionable materials at or near the existing ground surface. Objectionable materials that should be removed from this project site include organic matter, debris, trees, stumps and roots. Any underground utility lines should also be removed and redirected away from the foundation. After removal of objectionable materials, any areas that will receive select fill, a shallow foundation or pavement section should be proof-rolled. Proof-rolling should be conducted with two passes by a fully-loaded dump truck or other suitable vehicle approved by the Engineer. After proof-rolling, any areas that are soft or that "pump" should be overexcavated and recompacted with select fill materials.

Pumping Soils. The near-surface soils at this project site are silty. Silty soils are sensitive to increases in moisture content and have a tendency to lose strength and deform excessively as moisture content increases and the soils are subjected to compaction by heavy vehicles. This reaction is called pumping, and silty soils are particularly susceptible to pumping. Pumping soils are not acceptable as compacted fills. Pumping soils should be removed and replaced or removed, reprocessed and recompacted to establish a stable surface. Soils that are stable

during proof-rolling and compaction could become unstable from exposure to inclement (wet) weather and/or construction vehicle traffic. Therefore, the Contractor should be cautioned to provide adequate drainage both during and after earthwork activities and to minimize construction traffic on compacted fills.

Should the earthwork occur during extended rainy periods, it may be difficult to establish a stable working platform so that fill materials could be placed. Should this situation occur, we suggest that the top 2 ft of extremely wet materials be removed and a layer of geotextile fabric be placed over the soft and pumping area. The geotextile fabric should conform to Mirafi 600X or equal material. An 18-in. layer of sand having a maximum of 15% passing the No. 200 sieve should be placed over the fabric by backdumping. The sand should be spread and compacted to at least 70% relative density (ASTM D 4254). Select fill materials could then be placed to bring the project site to the desired finish grade elevation.

Select Fill Materials. The select fill materials for this project should consist of a soil having a liquid limit of not more than 45% and a plasticity index between 10 and 25. Select fill used for this project should be compacted from horizontally-placed loose lifts not exceeding 9 in. in thickness to a density which is equal to at least 95% of standard Proctor density (ASTM D 698). Field density tests should be completed in each lift of the select fill materials to provide some assurance that adequate and uniform densities are being obtained before proceeding with subsequent lifts. These field density tests should be completed by a competent geotechnical engineering firm retained by the Owner. The surface of each lift should be scarified prior to placement of subsequent lifts.

Foundation Excavations. The excavations necessary for construction of the foundations should be made in compliance with OSHA regulations. The federal regulations require that excavations be performed in a manner and method that would not place employees at risk in case of an excavation cave-in. Further, these regulations require that all excavations 5 ft or greater in depth be sloped, sheeted, braced or shored to prevent the risk of a cave-in.

All foundation excavations should be inspected prior to concrete placement. Any foundation soils that have become soft or saturated should be overexcavated and replaced with compacted select fill materials. These select fill materials should be compacted to at least 95% of the maximum dry unit weight as determined by standard Proctor procedures (ASTM D 698). Finish grades around the proposed foundation should be established to promote quick run-off of rainwater away from the foundation in all directions.

5.2 Proposed Shallow Foundation

Borings B-13 – B-16 and B-27 – B-30 were located in the vicinity where single story and pre-engineered metal buildings will be constructed. It is our understanding that these buildings will be placed on shallow foundations. Various fill materials, as well as soft, unstable, and wet materials were found in the subgrade soil beneath all three of the proposed shallow foundations to a depth of about 12 feet. For this reason it is recommended that all three of the proposed shallow foundation areas be undercut to remove all wet, soft, and unstable materials. It is estimated that this excavation will be in the range of 10 to 12 feet. All material must be removed until a stable layer is reached. Once a stable material is reached, these areas must be backfilled with select fill material that satisfies all requirements set forth in the Select Fill Materials paragraph, including the material characteristics, placement and compaction specifications.

A bearing capacity of 2,000 lb/ft^2 could be used for any footing placed at a depth of at least 3 feet below grade within the select fill material. The allowable net bearing capacity presented is

factored based on a safety factor of 3.0. It should be noted that allowable net soil bearing capacity should not be exceeded for any combination of dead, live, or wind loads. Specific details relating to the design and construction of the foundation slab should be provided by a qualified structural engineer.

5.3 Deep Foundations

It is our understanding that the proposed three story parking garage and four story building will be supported by means of a deep foundation system. Due to the expansive nature of the clay soils at this location it is our recommendation that these structures be placed on drilled underreamed piers. We recommend a qualified soil technician be present during the installation of the deep foundation in order to verify and provide assurance that the deep foundation elements obtain proper dimensions, bearing depths and are free of loose soils prior to placement of concrete. Details relating to the load capacity of the underreamed piers at the MDOT Shop Complex are discussed below. All deep foundation ultimate loads are based on a factor of safety of 1. These values should be divided by a factor of safety of 2 to 3 to obtain allowable bearing capacities.

For a center-to-center spacing of 2.5 times the diameter of each pier, an efficiency factor of 0.65 could be used. Once the center-to-center spacing of each pier reaches 4.0 times the diameter of the pier used, an efficiency factor of 1.0 can be used. For any center to center spacing between 2.5 and 4.0, the efficiency value may be determined by linear interpolation between 2.5 and 4.0. The sizing and spacing of the drilled and underreamed piers should be determined by a qualified structural engineer using the allowable bearing pressure presented below.

Underreamed Cast in Place Piers

The underreamed piers should extend at least 3 ft into the underlying hard blue clay and should have a minimum depth of 40 feet. The piers should be underreamed so that the underreamed portion of the pier has a diameter between two and three times the shaft diameter. The underreamed portion should be sized for compression loads based a net allowable soil bearing pressure of 10,000 pounds per square foot for a maximum combination of dead, live and wind loads. Each pier shaft should be reinforced over its entire length with a net steel area equivalent to at least 0.50% of the gross cross sectional area of the pier assuming Common Grade 60 reinforcement is utilized. Further, temporary casing may be required to prevent sloughing of the drilled pier shafts. Formation of the bells may be difficult because of silt seams, cemented seams, limestone layers, etc. Test shafts should be constructed prior to initiation of construction to verify that the bells can be formed in these materials. The reinforcement recommendations that we provide are general; detailed reinforcement for the piers should be designed by a qualified structural engineer.

Should the drilled pier shafts be connected at ground surface by means of grade beams, the grade beams should be isolated from contact with the surface soils utilizing cardboard boxes filled with a commercial grade of vermiculite, "J"-voids or another suitable type spacer that will provide a net void of at least 18 in. beneath the grade beams. We strongly recommend positive drainage be provided for the void space beneath the grade beams. The drainage system should prevent standing water in the void space and should extend around the perimeter of the foundation.

The ground floor for the structure should be structurally supported with a minimum 18-in. crawl space between the slab and underlying soils. Any utility lines connected to the structure should be suspended beneath the slab to minimize the possibility of damage caused by swelling and shrinking movements of the underlying soils. However, provisions for differential movements between the ground-supported lines and the suspended lines should be made. The design of the

suspended lines should be such that a minimum 18-in. void space will exist beneath the lines and exposed surface soils in the crawl space. The crawl space should be sloped towards interior drains or the exterior. Drainage by means of gravity should be provided, if possible.

6.0 Pavement Design

For the pavement and parking areas within the MDOT Shop Complex, three different loading conditions were considered. These loading conditions are light, medium and heavy loading patterns. It is not clear at this writing what the traffic loading will be within the complex so the pavement structure was designed in terms of light, medium and heavy traffic patterns. If specific traffic loading becomes available in future, SoilTech should be notified and will be pleased to incorporate the specific traffic loading into a pavement design. All of the loading conditions used for design of the pavement presented are discussed in greater detail below.

6.1 Traffic Conditions

Pavement construction for vehicular traffic is associated with the MDOT Shop Complex in Jackson, Mississippi. For this design, a 20 year design life was assumed as well as a 2% annual growth rate. Based on the information provided, we assume that the traffic will consist of vehicles that are divided into load groups as shown below in table 6.1.1.

Table 6.1.1
Vehicle Load Groups

Load Group	Description	Maximum Loading (kips)	
		Axle Loads	Total
Group 1	Passenger Autos and Light Trucks	2 @ 2.5 kips	5
Group 2	Two-Axle Trucks	1 @ 6 kips, 1 @15 kips	21
Group 3	Three Axle Trucks	1@ 12 kips, 1 @ 36* kips	48
Group 4	Four and Five Axle Semi-Trailer Trucks	1@ 12 kips, 2 @ 34* kips	80

* Tandem Axles

Three different traffic loading conditions were considered for this design. These three conditions were a light, moderate, and heavy trafficing, and are all discussed in greater detail in the following sections. For each different loading condition, three different pavements were designed. These three pavements include a full depth asphalt pavement, crushed stone/asphalt surface, and granular subbase/asphalt surface.

6.2 Light Design

The traffic loading for light pavement design was assumed to be a total of 512 vehicles per day. The largest portion of the vehicular traffic will be passenger cars and light weight trucks. The remaining traffic was divided among the remaining traffic groups. Light traffic loading is summarized below in Table 6.2.1.

Table 6.2.1
Light Traffic Summary

Load Group	Percent of Total	No. Vehicles
Group 1	97.6	500
Group 2	0.9	5
Group 3	0.8	4
Group 4	0.6	3
Total	100.0	512

Using the estimated traffic loadings summarized in Table 6.2.1 and a subgrade CBR value of 5, three pavement options were determined and are shown in Table 6.2.2.

Table 6.2.2 Light Traffic Design		
Option 1	**Option 2**	**Option 3**
7" HMA	4" HMA	4.5" HMA
--	10" Crushed Stone	12" Granular Subbase

6.3 Moderate Design

Traffic loading for moderate pavement design was assumed to be a total of 595 vehicles per day. The largest portion of the vehicular traffic will be passenger cars and light weight trucks. The remaining traffic was divided among the remaining traffic groups. Medium traffic loading is summarized below in Table 6.3.1.

Table 6.3.1 Traffic Summary		
Load Group	Percent of Total	No. Vehicles
Group 1	84.1	500
Group 2	8.4	50
Group 3	5.0	30
Group 4	2.5	15
Total	100.0	595

Using the estimated traffic loadings shown above and a subgrade CBR value of 5, three pavement options were determined. These pavement options are shown below in Table 6.3.2.

Table 6.3.2 :Moderate Traffic Design		
Option 1	**Option 2**	**Option 3**
10" HMA	6" HMA	5.5" HMA
	10" Crushed Stone	18" Granular Subbase

6.4 Heavy Design

The traffic loading for the heavy pavement design was assumed to be a total of 875 vehicles per day. The largest portion of the vehicular traffic will be passenger cars and light weight trucks. The remaining traffic was divided among the remaining traffic groups. heavy traffic loading is summarized below in Table 6.4.1.

Table 6.4.1 Traffic Summary		
Load Group	Percent of Total	No. Vehicles
Group 1	57.1	500
Group 2	22.9	200
Group 3	11.4	100
Group 4	8.6	75
Total	100.0	875

Using the estimated traffic loadings shown above and a subgrade CBR value of 5, three pavement options were determined. These pavement options are shown below in Table 6.4.2.

Table 6.4.2 :Heavy Traffic Design		
Option 1	**Option 2**	**Option 3**
12" HMA	8" HMA	7" HMA
--	12" Crushed Stone	24" Granular Subbase

All granular subbase material must be equivalent or better than the MDOT requirements for a Class 9, Type C subbase material described in the Mississippi Standard Specifications for Road and Bridge Construction. All subbase material must be placed and compacted as stated above in the Select Fill Materials section of this report.

Many pavement failures and problems are due to the lack of proper drainage. Therefore we strongly recommend that proper slopes and drainage be designed for all pavement areas.

7.0 REPORT LIMITATIONS

The borings made for this report were located in the field by measurement from existing features at the site as shown on your plans. Elevations of the borings were estimated from the available topographic survey. The locations and elevations of the borings should therefore be considered accurate only to the degree implied by the methods used in their determination. The boring logs shown in this report contain information related to the types of soil encountered at specific locations and times and show lines delineating the interface between these materials, as well as results of tests performed in the laboratory on representative samples. The logs also contain our field representative's interpretation of conditions that are believed to exist in those depth intervals between the actual samples taken. Therefore, these boring logs contain both factual and interpretative information. It is not warranted that these logs are representative of subsurface conditions at other locations and times.

With regard to groundwater conditions, this report presents data on groundwater levels as they were observed during the course of the field work. In particular, water level readings have been made in the borings at the times and under conditions stated in the text of the report and on the boring logs. It should be noted that fluctuations in the level of the groundwater table can occur with passage of time due to variations in rainfall, temperature and other environmental factors.

The near-surface soils encountered at this site are of a type that will soften significantly if the soil water content should be increased for any reason. Such increases in soil water content normally cause difficulties in proper soil compaction. Sources of increased water content in the surface soils could include, but are not limited to, rainwater, improper surface drainage during earthwork or site grading, and broken or leaking utility lines. It should be realized that the water content of

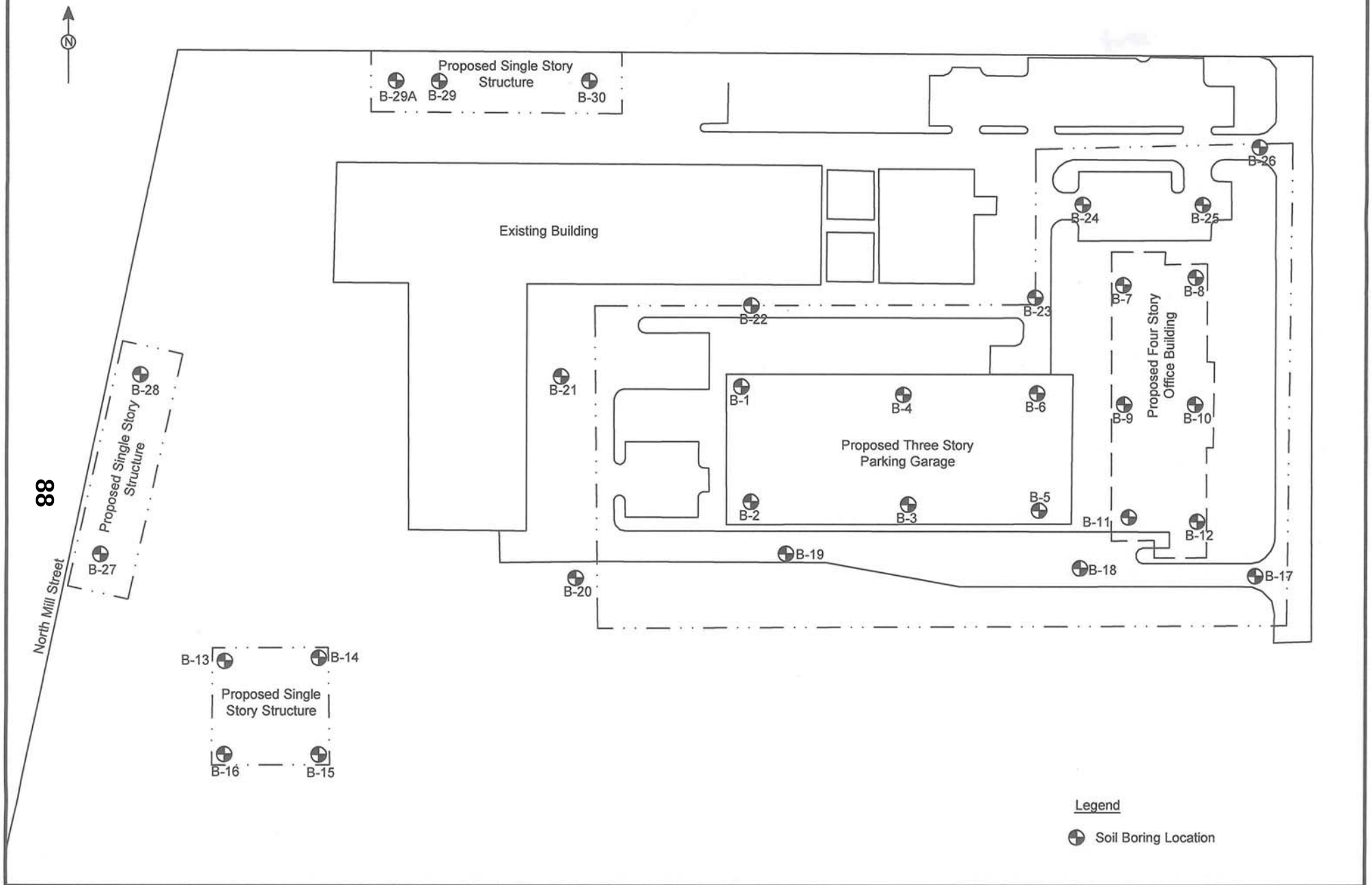
the near-surface soils at the site could change between the time our report is submitted and construction is initiated at the site.

Unanticipated soil conditions at a construction site are commonly encountered and cannot be fully predicted by mere soil samples and test borings. Such unexpected conditions frequently require that additional expenditures be made by the owner to attain a properly designed and constructed project. Therefore, provisions for some construction contingency funds are recommended to accommodate such potential extra cost.

The analyses, conclusions and recommendations contained in this report are based on site conditions as they existed at the time of our field investigation and further on the assumption that the exploratory borings are representative of the subsurface conditions throughout the site, that is, that the subsurface conditions everywhere are not significantly different from those disclosed by the borings at the time they were completed. If, during construction, different subsurface conditions from those encountered in our borings are observed, or appear to be present beneath excavations, we must be advised promptly so that we can review these conditions and reconsider our recommendations where necessary. If there is a lapse of time of more than one year between submission of this report and start of the work at the site, if conditions have changed due either to natural causes or to construction operations at or adjacent to the site, or if the structure location, loads or finish grades are changed, we urge that we be promptly informed, and retained to review our report to determine the applicability of the conclusions and recommendations, considering the changed conditions and/or time lapse.

Further, we request that our firm be retained to review those portions of the plans and specifications for this particular project that pertain to earthwork and foundations as a means to determine whether the plans and specifications are consistent with the recommendations contained in this report. In addition, we are available to observe construction, particularly the compaction of structural fill, the construction of foundations as recommended in this report, and such other field observations as might be necessary.

This report has been prepared for the exclusive use of Neel-Schaffer Inc. for specific application to design and construction of foundation elements for the proposed Mississippi Department of Transportation Shop Complex in Jackson, Mississippi. The only warranty made by us in connection with the services provided is that we have used that degree of care and skill ordinarily exercised under similar conditions by reputable members of our profession practicing in the same or similar locality. No other warranty, expressed or implied, is made or intended.



GEOTECHNICAL INVESTIGATION MDOT SHOP COMPLEX JACKSON, MISSISSIPPI	SOILTECH CONSULTANTS, INC GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING Ridgeland, Mississippi				SOIL BORING LOCATIONS
	Drawn By:	A.P.W.	Date:	Scale:	Project No.: 8185.003.01	FIGURE 1
	Checked By:	M.K.V.	3-11-11	N.T.S.	

APPENDIX A

Graphical Boring Logs
Symbols and Soil Classifications
Table 1 – Summary of Laboratory Data
Summary of Atterberg Limits Results
Dynamic Cone Penetration to CBR

SOIL BORING LOG

No. B-1
SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 1/31/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: Lat: N 32d 19m 54.0s Long: W 90d 11m 1.3s

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	LABORATORY DATA: Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI
			Surface Elevation:						
			Asphalt (8")						
			Medium red sandy clay , with gravel (FILL)						
			Medium tan and light gray to gray silty clay (CL)		0.81	17	133.4	113.6	
5					0.41	28	120.5	93.8	25
			- soft and damp from 7' to 9'						
10			Dense light gray and tan clayey silt (ML)		2.46	24	130.9	105.9	4
			Very stiff tan and light gray silty clay (CL)		2.84	22	129.1	105.9	
15									
			Stiff tan and light gray clay (CH)						
			- calcareous						
			- with calcareous nodules to 22'		1.62	31	119.7	91.4	58
20									
			- very stiff below 22'						
					2.72	28	123.1	95.9	
25									
30			Terminal Depth at 30.0 ft						
35									
40									
45									

LABORATORY DATA: ○ Cohesion / △ Triaxial (ksf) 1 2 3 4; PL MC% LL; 20 40 60 80

Groundwater Observations	Advancement Method	Notes
Groundwater encountered at 7' No rise observed	0 - 10 ft: Machine Auger 10 - 30 ft: Rotary Wash	
	Abandonment Method	
	Boring grouted upon completion	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-2

SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 1/29/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: Lat: N 32d 19m 52.9s Long: W 90d 11m 0.6s

LABORATORY DATA

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL Surface Elevation:	Field Test Results	Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	○ Cohesion / △ Triaxial (ksf) 1 2 3 4
			Medium gray silty clay with sand, gravel, and brick fragments (FILL)							PL MC% LL 20 40 60 80
			Stiff to very stiff gray and tan silty clay (CL) (Possible Fill)		2.11	22	126.4	103.8		
5			- with clay partings to 4' - soft and gray with gravel traces below 4'		0.29	29	122.9	94.9	23	
			Loose gray clayey silt (ML)		0.28	30	126.7	97.7		
10										
			Stiff tan and light gray silty clay (CL) - with sand		1.58	17	135.8	115.8	16	
15										
			Stiff tan and light gray clay (CH) - calcareous		1.68	38	113.9	82.6	69	
20										
					2.91	32	121.7	92.5		
25										
30			Terminal Depth at 30.0 ft							
35										
40										
45										

Groundwater Observations	Advancement Method	Notes
Groundwater encountered at 8' Rose to 6' after 5 minutes	0 - 10 ft: Machine Auger 10 - 30 ft: Rotary Wash	
	Abandonment Method	
	Boring grouted upon completion	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-3
SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 1/29/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: Lat: N 32d 19m 53.0s Long: W 90d 10m 59.9s

LABORATORY DATA

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI
			Surface Elevation:						
			Loose to medium dense red clayey sand, with gravel (FILL)						
			Medium to stiff tan and light gray silty clay, with sand (FILL)			21			
5			- with trace of wood at 2.5'						
			Medium tan and light gray clay (CH) - calcareous						
			Loose gray clayey silt (ML) - trace of water at 8'						
10			Stiff tan and light gray silty clay (CL)		0.43	26	134.7	107.1	
15			- gravel traces at 14.5'						23
			Very stiff tan and light gray clay (CH) - slightly silty to 23'						
20									
25			- calcareous below 23'		2.56	33	121.3	91.3	
30			Terminal Depth at 30.0 ft						
35									
40									
45									

○ Cohesion / △ Triaxial (ksf)
1 2 3 4
PL MC% LL
20 40 60 80

Groundwater Observations	Advancement Method	Notes
Trace of water at 8' Boring sloughed at 7'	0 - 10 ft: Machine Auger 10 - 30 ft: Rotary Wash	
	Abandonment Method	
	Boring grouted upon completion	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-4
SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 1/31/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: Lat: N 32d 19m 54.5s Long: W 90d 11m 0.1s

Surface Elevation:

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	○ Cohesion / △ Triaxial (ksf) 1 2 3 4	PL MC% LL 20 40 60 80	% Passing No. 200
			Loose red sand with clay and gravel (FILL)	6 b/f 3-3-3		8						9.6
5			Stiff to very stiff tan and gray silty clay (CL)		2.03	21	127.4	105.0	24			
			- soft, gray, and damp with petroleum smell from 6.5' to 9'									
10			- stiff to very stiff, tan, and light gray below 9'		1.10	30	124.0	95.5	10			
15					2.33	25	125.6	100.4	30			
			Stiff tan and light gray clay (CH) - calcareous		1.76	39	116.8	84.3				
20												
25					1.45	31	121.1	92.4				
30			Terminal Depth at 30.0 ft									
35												
40												
45												

Groundwater Observations	Advancement Method	Notes
Groundwater encountered at 7' No rise observed after 5 minutes	0 - 10 ft: Machine Auger 10 - 30 ft: Rotary Wash	
	Abandonment Method	
	Boring grouted upon completion	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-5
SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 1/29/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: Lat: N 32d 19m 52.8s Long: W 90d 10m 58.5s

LABORATORY DATA

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	○ Cohesion / △ Triaxial (ksf) 1 2 3 4
			Surface Elevation:							PL MC% LL 20 40 60 80
			Medium tan clay, slightly silty with gravel traces (FILL)							
			Medium to stiff tan and light gray silty clay (CL)							
5			- soft to medium and dark gray from 7' to 9.5'							
			- wet below 8'		0.28	29	128.3	99.6		○ ●
10			- stiff, tan, and light gray below 9.5'							
			- with gravel traces from 14' to 14.5'			18				●
15			Stiff tan and light gray clay (CH) - calcareous							
					1.63	35	119.2	88.2	71	○ ●
20										
25										
30			Terminal Depth at 30.0 ft							
35										
40										
45										

Groundwater Observations	Advancement Method	Notes
No groundwater encountered from 0 to 10'	0 - 10 ft: Machine Auger 10 - 30 ft: Rotary Wash	
	Abandonment Method	
	Boring grouted upon completion	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-6
SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 1/27/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: Lat: N 32d 19m 53.8s Long: W 90d 10m 58.5s

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	LABORATORY DATA: Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI
			Surface Elevation:						
			Asphalt (6")						
			Medium tan sandy clay (FILL)						
			Stiff tan and light gray silty clay (CL)			20			
5			Loose gray and tan clayey silt (ML)			24			
			Stiff tan and light gray silty clay (CL)		1.52	26	124.8	99.3	
10									
			Stiff to very stiff tan clay (CH) - with sand pockets and gravel traces to 17'						
15									
			- tan, light gray, and calcareous below 17'		1.68	38	114.5	83.2	
20									
25									
30			Terminal Depth at 30.0 ft						
35									
40									
45									

○ Cohesion / △ Triaxial (ksf)
1 2 3 4
PL MC% LL
20 40 60 80

Groundwater Observations	Advancement Method	Notes
No groundwater encountered from 0 to 20'	0 - 20 ft: Machine Auger 20 - 30 ft: Rotary Wash	
	Abandonment Method	
	Boring grouted upon completion	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-7

SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

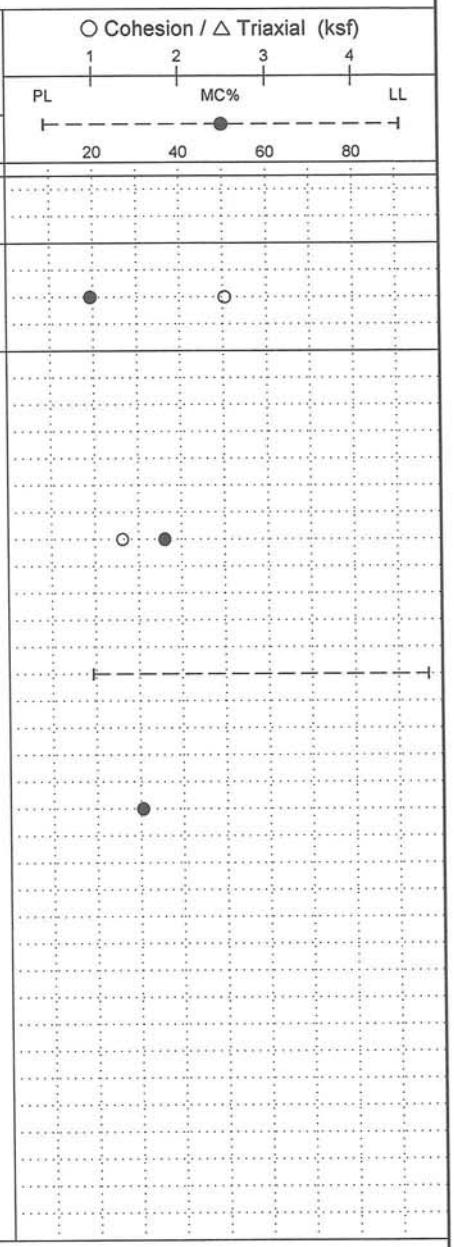
CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 1/28/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: Lat: N 32d 19m 54.9s Long: W 90d 10m 57.4s

LABORATORY DATA

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI
			Surface Elevation:						
			Asphalt (6")						
			Loose to medium dense red sand with clay (FILL)						
			Medium tan and light gray silty clay (CL)						
5			- stiff below 4.5'		2.52	19	131.4	110.1	
			Stiff to very stiff tan and light gray clay (CH)						
			- with sand to 11'						
10			- calcareous below 11'						
			- with calcareous nodules at 12'						
					1.31	36	117.4	86.2	
15									
									78
20									
						30			
25									
30									
			- with shell fragments below 33'						
35			- hard and blue-gray below 36'						
40			Terminal Depth at 40.0 ft						
45									



Groundwater Observations	Advancement Method	Notes
No groundwater encountered	0 - 40 ft: Machine Auger	
	Abandonment Method	
	Boring grouted upon completion	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-8
SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 1/28/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: Lat: N 32d 19m 54.9s Long: W 90d 10m 56.7s

LABORATORY DATA

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	○ Cohesion / △ Triaxial (ksf) 1 2 3 4
			Surface Elevation:							PL MC% LL; 20 40 60 80
			Asphalt (6")							
			Loose to medium dense red clayey sand (FILL)							
			Medium brown and gray silty clay (CL) - stiff, tan, and light gray below 2.5'		2.08	20	133.3	111.3	15	
5										
			Stiff to very stiff tan and light gray clay (CH) - with sand and gravel to 12'							
10			- calcareous below 12'			29				
15										
20										
25										
30										
			- with shell fragments below 33'							
35			- hard and blue-gray below 35.5'							
					5.52	38	115.9	83.8		>>
40			Terminal Depth at 40.0 ft							
45										

Groundwater Observations	Advancement Method	Notes
No groundwater encountered	0 - 40 ft: Machine Auger	
	Abandonment Method	
	Boring grouted upon completion	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-9
SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 1/27/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: Lat: N 32d 19m 53.7s Long: W 90d 10m 57.7s

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	LABORATORY DATA: Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI
			Surface Elevation:						
			Asphalt (8")						
			Medium tan sandy clay (FILL)						
			Stiff tan and light gray silty clay (CL)						
5			Soft gray very silty clay (CL-ML)		0.46	26	120.9	96.2	6
			Stiff tan and light gray silty clay (CL)						
10					1.98	23	130.7	106.5	
			Very stiff tan clay (CH) - with sand to 17'						
15					2.77	20	134.1	111.8	
			- tan and light gray from 17' to 36.5' - calcareous below 17'						
20									82
25									
30									
35			- hard and blue-gray with shell fragments below 36.5'						
					5.42	38	115.3	83.6	76
40			Terminal Depth at 40.0 ft						
45									

LABORATORY DATA: ○ Cohesion / △ Triaxial (ksf) 1 2 3 4; PL MC% LL; 20 40 60 80

Groundwater Observations	Advancement Method	Notes
No groundwater encountered from 0 to 20'	0 - 20 ft: Machine Auger 20 - 40 ft: Rotary Wash	
	Abandonment Method	
	Boring grouted upon completion	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-10
SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

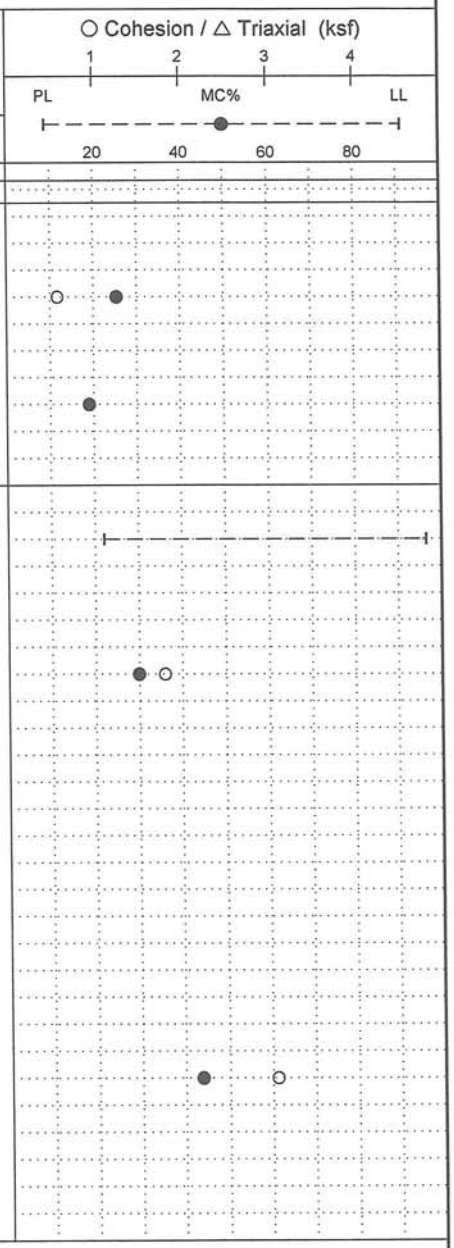
CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 1/27/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: Lat: N 32d 19m 54.1s Long: W 90d 10m 56.6s

LABORATORY DATA

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI
			Surface Elevation:						
			Asphalt (8")						
			Medium tan sandy clay with gravel (FILL)						
			Stiff tan and light gray silty clay (CL)						
			- clayey silt seam at 3.5'		0.58	25	67.3	53.7	
			- tan with sand below 8'			19			
			Stiff to very stiff tan and light gray clay (CH)						74
			- calcareous		1.80	30	120.5	92.8	
			- with shell fragments below 23'						
			- blue-gray below 35'		3.06	44	110.5	76.8	
			- very stiff to hard below 38'						
			Terminal Depth at 40.0 ft						



Groundwater Observations	Advancement Method	Notes
No groundwater encountered from 0 to 20'	0 - 20 ft: Machine Auger 20 - 40 ft: Rotary Wash	
	Abandonment Method	
	Boring grouted upon completion	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-11
SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 1/28/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: Lat: N 32d 19m 53.6s Long: W 90d 10m 57.5s

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	LABORATORY DATA: Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	○ Cohesion / △ Triaxial (ksf) 1 2 3 4	% Passing No. 200
			Surface Elevation:							PL MC% LL; 20 40 60 80	
			Soft tan clay, slightly silty with sand and gravel traces (FILL)								
			- stiff below 2.5'								
5			Stiff to very stiff gray silty clay (CL)								
			- soft and slightly sandy below 6.5'			22					
10			Gravel (GP)								
			Stiff tan and light gray sandy clay (CL)								
15			- with sand pockets								49.7
			Stiff to very stiff light gray and tan clay (CH)								
			- calcareous		1.27	39	115.3	83.0		○ ●	
20											
25											
30											
35											
			- with shell fragments below 38'								
40			- hard and blue-gray below 40'								
									69		
45			Terminal Depth at 45.0 ft								

Groundwater Observations	Advancement Method	Notes
Groundwater encountered at 8' Rose to 7' after 5 minutes	0 - 10 ft: Machine Auger 10 - 45 ft: Rotary Wash	
	Abandonment Method	
	Boring grouted upon completion	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-12
SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 1/29/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: Lat: N 32d 19m 52.9s Long: W 90d 10m 56.4s

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL Surface Elevation:	Field Test Results	LABORATORY DATA Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	○ Cohesion / △ Triaxial (ksf) 1 2 3 4 PL MC% LL 20 40 60 80
			Stiff tan and light gray silty clay (CL) - with sand							
5			Loose to medium dense gray clayey silt (ML)							
10			Stiff tan and light gray to gray silty clay (CL)		0.82	22	126.8	103.7	14	
15			Stiff tan and light gray clay (CH) - slightly calcareous with sand to 14.5' - calcareous below 14.5'							
20										
25										
30						34				
35			- hard and blue-gray with shell fragments below 36'							
40					5.40	39	119.0	85.8		>>
			Terminal Depth at 40.0 ft							
45										

Groundwater Observations	Advancement Method	Notes
No groundwater encountered from 0 to 15'	0 - 15 ft: Machine Auger 15 - 40 ft: Rotary Wash	
	Abandonment Method	
	Boring grouted upon completion	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-13
SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 1/26/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: Lat: N 32d 19m 52.0s Long: W 90d 11m 6.3s

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	LABORATORY DATA: Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	○ Cohesion / △ Triaxial (ksf) 1 2 3 4
			Surface Elevation:							PL MC% LL 20 40 60 80
			Asphalt (8")							
			Crushed limestone (10")							
			Medium brown, tan, and light gray silty clay, with sand (FILL)							
5			Stiff tan and red sandy clay (FILL)	9 b/f 5-3-6		15				
			Loose to medium dense gray and tan clayey silt (ML)							
10										
			Medium gray silty clay (CL)						16	
15			Terminal Depth at 15.0 ft							
20										
25										
30										
35										
40										
45										

Groundwater Observations	Advancement Method	Notes
No groundwater encountered during drilling Rose to 6' after 16 hours	0 - 15 ft: Machine Auger	
	Abandonment Method	
	Boring backfilled with soil cuttings and bentonite pellets	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-14
SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 1/26/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: Lat: N 32d 19m 51.9 Long: W 90d 11m 5.5s

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL Surface Elevation:	Field Test Results	LABORATORY DATA: Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	○ Cohesion / △ Triaxial (ksf) 1 2 3 4
			Asphalt (8")							PL MC% LL
			Crushed limestone (10")							20 40 60 80
5			Medium tan and red sandy clay (FILL) - with sand pockets and clay partings - very soft below 4'	2 b/f WOH-1-1		20				
10			Loose gray clayey silt (ML) - medium dense below 11'	3 b/f WOH-1-2						
15			Stiff to very stiff tan and light gray clay (CH)							
			Terminal Depth at 15.0 ft							
20										
25										
30										
35										
40										
45										

Groundwater Observations	Advancement Method	Notes
No groundwater encountered during drilling Rose to 6.5' after 6 hours	0 - 15 ft: Machine Auger	WOH = Weight of Hammer
	Abandonment Method	
	Boring backfilled with soil cuttings and bentonite pellets	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-15

SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 1/26/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: Lat: N 32d 19m 51.2s Long: W 90d 11m 5.6s

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	○ Cohesion / △ Triaxial (ksf) 1 2 3 4
			Surface Elevation:							PL MC% LL 20 40 60 80
			Asphalt (8")							
			Crushed limestone (10") - wet	11 b/f 2-5-6		14				
			Stiff tan and light gray silty clay, with clay and sandy clay partings (FILL)							
5			Soft tan and red sandy clay (FILL)			24				
			Medium tan and light gray silty clay (CL)			27				
10										
			Stiff to very stiff tan clay (CH) - slightly silty						41	
15			Terminal Depth at 15.0 ft							
20										
25										
30										
35										
40										
45										

Groundwater Observations	Advancement Method	Notes
No groundwater encountered during drilling Rose to 4' after 5 hours	0 - 15 ft: Machine Auger	
	Abandonment Method	
	Boring backfilled with soil cuttings and bentonite pellets	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-16
SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 1/26/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: Lat: N 32d 19m 51.5s Long: W 90d 11m 6.3s

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	LABORATORY DATA: Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI
			Surface Elevation:						
			Asphalt (8")						
			Crushed limestone (10")						
			Medium tan and red sandy clay, with clay partings (FILL)		0.92	20	131.1	109.1	
5			- soft and damp below 5'			17			
			Soft gray very silty clay (CL-ML) - trace of water at 8'	8 b/f 3-4-4					4
10			Very stiff tan and light gray clay (CH) - slightly silty	18 b/f 5-8-10					
15			Terminal Depth at 15.0 ft						
20									
25									
30									
35									
40									
45									

○ Cohesion / △ Triaxial (ksf)
1 2 3 4

PL MC% LL
20 40 60 80

Groundwater Observations	Advancement Method	Notes
Trace of water at 8' Rose to 5.5' after 2 hours	0 - 15 ft: Machine Auger	
	Abandonment Method	
	Boring backfilled with soil cuttings and bentonite pellets	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-17

SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 1/31/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: See Figure 1

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	LABORATORY DATA: Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	○ Cohesion / △ Triaxial (ksf) 1 2 3 4
			Surface Elevation:							PL MC% LL
			Medium tan and light gray silty clay (CL)			23				20 40 60 80
5			Stiff tan clay (CH) - slightly silty			19			34	
			Terminal Depth at 6.0 ft							

Groundwater Observations	Advancement Method	Notes
No groundwater encountered	0 - 6 ft: Machine Auger	
	Abandonment Method	
	Boring backfilled with soil cuttings	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-18

SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 1/31/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: See Figure 1

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	LABORATORY DATA: Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	○ Cohesion / △ Triaxial (ksf) 1 2 3 4
			Surface Elevation:							PL MC% LL 20 40 60 80
			Soft tan silty clay (CL)			30			18	
			Medium tan and light gray clay (CH) - calcareous with gravel traces			34			66	
5			Medium gray and tan silty clay (CL)			27			23	
			Terminal Depth at 6.0 ft							

Groundwater Observations	Advancement Method	Notes
No groundwater encountered	0 - 6 ft: Machine Auger	
	Abandonment Method	
	Boring backfilled with soil cuttings	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-19
SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 1/31/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: See Figure 1

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	LABORATORY DATA: Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	○ Cohesion / △ Triaxial (ksf) 1 2 3 4	PL MC% LL 20 40 60 80	% Passing No. 200
			Surface Elevation:									
			Loose to medium dense red clayey sand, with gravel (FILL)			11						13.1
			Medium light gray silty clay (CL) - with gravel and wood traces			25			19			
5			Medium light gray and tan clay (CH) - calcareous			29			50			
			Terminal Depth at 6.0 ft									

Groundwater Observations	Advancement Method	Notes
No groundwater encountered	0 - 6 ft: Machine Auger	
	Abandonment Method	
	Boring backfilled with soil cuttings	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-20

SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 1/26/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: See Figure 1

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	LABORATORY DATA: Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	○ Cohesion / △ Triaxial (ksf) 1 2 3 4	PL MC% LL 20 40 60 80	% Passing No. 200
			Surface Elevation:									
			Asphalt (9")									
			Loose to medium dense tan clayey sand, with gravel (FILL)			16						12.6
			Medium gray silty clay, with sand and gravel (FILL)									
5			Medium tan and red sandy clay (CL)									
			Loose to medium dense gray clayey silt (ML)									
			Terminal Depth at 6.0 ft									
10												
15												
20												
25												
30												
35												
40												
45												

Groundwater Observations	Advancement Method	Notes
No groundwater encountered	0 - 6 ft: Machine Auger	
	Abandonment Method	
	Boring backfilled with soil cuttings	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-21
SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 1/26/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: See Figure 1

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	LABORATORY DATA: Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	○ Cohesion / △ Triaxial (ksf) 1 2 3 4
			Surface Elevation:							PL MC% LL; 20 40 60 80
			Asphalt (9")							
			Medium gray and tan silty clay, with gravel traces and clay partings (FILL)			24				
5			- petroleum odor from 1' to 3'							
			- light gray below 3'							
			- soft and damp below 5'			32				
			Terminal Depth at 6.0 ft							

Groundwater Observations	Advancement Method	Notes
No groundwater encountered	0 - 6 ft: Machine Auger	
	Abandonment Method	
	Boring backfilled with soil cuttings	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-22
SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 2/1/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: See Figure 1

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	LABORATORY DATA: Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	○ Cohesion / △ Triaxial (ksf) 1 2 3 4
			Surface Elevation:							PL MC% LL; 20 40 60 80
			Stiff tan and light gray silty clay (CL) - with gravel traces			15			21	
5						21			22	
			Terminal Depth at 6.0 ft							

Groundwater Observations	Advancement Method	Notes
No groundwater encountered	0 - 6 ft: Machine Auger	
	Abandonment Method	
	Boring backfilled with soil cuttings	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-23

SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 2/1/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: See Figure 1

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	LABORATORY DATA: Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	○ Cohesion / △ Triaxial (ksf) 1 2 3 4	PL MC% LL 20 40 60 80	% Passing No. 200
			Surface Elevation:									
			Asphalt (6")									
			Loose to medium dense red clayey with sand (FILL)			20						91.3
			Stiff tan and light gray silty clay (CL)			20			21			
5						24						
			Terminal Depth at 6.0 ft									
10												
15												
20												
25												
30												
35												
40												
45												

Groundwater Observations	Advancement Method	Notes
No groundwater encountered	0 - 6 ft: Machine Auger	
	Abandonment Method	
	Boring backfilled with soil cuttings	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-24

SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 2/1/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: See Figure 1

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	LABORATORY DATA: Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	% Passing No. 200
			Surface Elevation:							
			Asphalt (7")							
			Loose to medium dense red sand with clay (FILL)			20				87.2
			Stiff tan and light gray silty clay (CL) - with sand and gravel to 2'			21			24	
5			Terminal Depth at 6.0 ft							

LABORATORY DATA: ○ Cohesion / △ Triaxial (ksf) 1 2 3 4; PL MC% LL; 20 40 60 80

10 15 20 25 30 35 40 45

Groundwater Observations	Advancement Method	Notes
No groundwater encountered	0 - 6 ft: Machine Auger	
	Abandonment Method	
	Boring backfilled with soil cuttings	

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SoilTech Consultants, Inc.

SOIL BORING LOG

No. B-25

SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 2/1/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: See Figure 1

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	LABORATORY DATA: Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	○ Cohesion / △ Triaxial (ksf) 1 2 3 4	PL MC% LL 20 40 60 80	% Passing No. 200
			Surface Elevation:									
			Asphalt (8")									
			Loose to medium dense red clayey sand (FILL)			13						20.9
			Stiff tan and light gray silty clay (CL)			21			14			
5			- medium below 5'									
			Terminal Depth at 6.0 ft									

Groundwater Observations	Advancement Method	Notes
No groundwater encountered	0 - 6 ft: Machine Auger	
	Abandonment Method	
	Boring backfilled with soil cuttings	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-26
SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 2/1/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: See Figure 1

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	LABORATORY DATA: Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	○ Cohesion / △ Triaxial (ksf) 1 2 3 4	PL MC% LL 20 40 60 80	% Passing No. 200
			Surface Elevation:									
			Asphalt (8")									
			Loose to medium dense red clayey sand (FILL)			16						24.5
			Medium tan and light gray silty clay (CL)			23			16			
5			- stiff below 5'			24			28			
			Terminal Depth at 6.0 ft									

Groundwater Observations	Advancement Method	Notes
No groundwater encountered	0 - 6 ft: Machine Auger	
	Abandonment Method	
	Boring backfilled with soil cuttings	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-27
SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 3/2/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: Lat: N 32d 19m 52.0s Long: W 90d 11m 7.4s

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	LABORATORY DATA: Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	○ Cohesion / △ Triaxial (ksf) 1 2 3 4	% Passing No. 200
			Surface Elevation:							PL MC% LL 20 40 60 80	
			Asphalt (6")								
			Crushed limestone (12")								
			Medium dense red clayey sand (FILL)	17 b/f 7-11-6							
5			- trace of water at 5'	5 b/f 1-2-3							
			FIrm gray clayey silt (FILL)			24			11		
			Medium gray silty clay with concrete rubble (FILL)								78.4
10			Medium gray silty clay (CL) - with gravel traces to 11' - with ferrous nodules below 11'			24			16		
					0.75	23	131.2	106.8	17		
15			Terminal Depth at 15.0 ft								
20											
25											
30											
35											
40											
45											

Groundwater Observations	Advancement Method	Notes
No groundwater encountered	0 - 15 ft: Machine Auger	
	Abandonment Method	
	Boring backfilled with soil cuttings and bentonite pellets	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-28

SHEET 1 OF 1

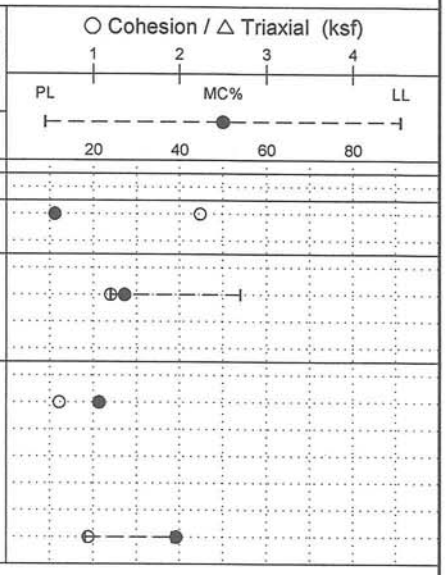
PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 3/2/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: Lat: N 32d 19m 52.9s Long: W 90d 11m 7.3s

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	LABORATORY DATA: Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI
			Surface Elevation:						
			Asphalt (6")						
			Crushed limestone (12")						
			Loose to medium dense tan and red clayey sand (FILL)		2.24	11	140.3	126.3	
5			Medium to stiff tan clay (CH) - with silt		1.20	27	124.4	97.8	30
			Medium tan and light gray silty clay (CL) - with ferrous nodules - gray and damp from 9' to 12'		0.61	21	127.9	105.4	
10			- trace of water at 13.5'		0.94	39	130.1	93.4	20
15			Terminal Depth at 15.0 ft						



Groundwater Observations	Advancement Method	Notes
No groundwater encountered	0 - 15 ft: Machine Auger	
	Abandonment Method	
	Boring backfilled with soil cuttings and bentonite pellets	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-29
SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 3/2/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: Lat: N 32d 19m 56.3s Long: W 90d 11m 3.6s

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	LABORATORY DATA: Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	○ Cohesion / △ Triaxial (ksf) 1 2 3 4 / PL MC% LL 20 40 60 80	% Passing No. 200
			Surface Elevation:								
			Asphalt (6")								
			Loose to medium dense tan silty sand, with gravel (FILL)	15 b/f 11-8-7		12				●	16.7
5			Medium dense tan and red clayey sand (FILL) - loose below 4'	4 b/f 2-2-2		13				●	36.5
			Very soft tan and light gray silty clay (CL) - petroleum smell at 7'		0.12	24	119.9	96.7	9	△ ⊢●	
10			- stiff with ferrous nodules below 12'								
				9 b/f 2-4-5		22				●	
15			Terminal Depth at 15.0 ft								
20											
25											
30											
35											
40											
45											

Groundwater Observations	Advancement Method	Notes
Groundwater encountered at 7' Rose to 6' after 30 minutes	0 - 15 ft: Machine Auger	
	Abandonment Method	
	Boring backfilled with soil cuttings and bentonite pellets	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-29A

SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 3/2/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: Lat: N 32d 19m 56.5s Long: W 90d 11m 3.7s

LABORATORY DATA

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	○ Cohesion / △ Triaxial (ksf) 1 2 3 4
			Surface Elevation:							PL MC% LL
										20 40 60 80
			Asphalt (6")							
			Stiff tan and light gray silty clay (CL) - Possible fill							
			Terminal Depth at 3.5 ft							
5										
10										
15										
20										
25										
30										
35										
40										
45										

Groundwater Observations	Advancement Method	Notes
No groundwater encountered	0 - 4 ft: Machine Auger	Boring abandoned and relocated because of unknown object in borehole
	Abandonment Method	
	Boring backfilled with soil cuttings and bentonite pellets	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

SOIL BORING LOG

No. B-30
SHEET 1 OF 1

PROJECT: Geotechnical Investigation
MDOT Shop Complex
Jackson, Mississippi

CLIENT: Neel-Schaffer, Inc.
Jackson, Mississippi

PROJECT NO.: NS.08185.000.001
DATE: 3/2/11
DRILLER: J. Ray
TECHNICIAN: P. Ray
ENGINEER: M. Volk

Location: Lat: N 32d 19m 56.2s Long: W 90d 11m 2.8s

LABORATORY DATA

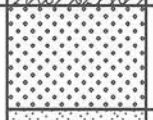
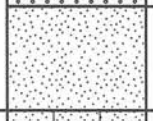
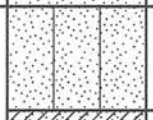
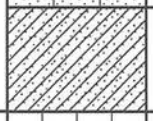
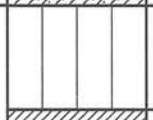
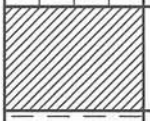
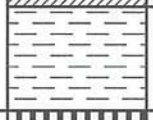
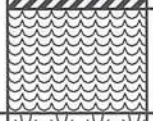
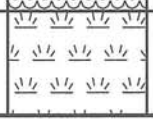
Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf) Moist	Unit Weight (pcf) Dry	Plasticity Index PI	○ Cohesion / △ Triaxial (ksf) 1 2 3 4
			Surface Elevation:							PL MC% LL 20 40 60 80
			Asphalt (6")							
			Medium dense red and tan clayey sand (FILL)	11 b/f 4-5-6		19				
5			Medium tan and light gray to gray silty clay (CL) - with clay partings to 7'		0.64	26	134.1	106.5	28	
			- soft from 7' to 12'	3 b/f 1-1-2		26				
10			- clayey sand seam at 10'							
			- medium to stiff below 12'		1.46	25	128.7	103.0	9	
15			Terminal Depth at 15.0 ft							
20										
25										
30										
35										
40										
45										

Groundwater Observations	Advancement Method	Notes
No groundwater encountered Boring sloughed at 9'	0 - 15 ft: Machine Auger	
	Abandonment Method	
	Boring backfilled with soil cuttings and bentonite pellets	

SoilTech Consultants, Inc.

SOIL BORING LOG 8185.001.GPJ GEOTECHNICAL TEMPLATE.GDT 3/10/11

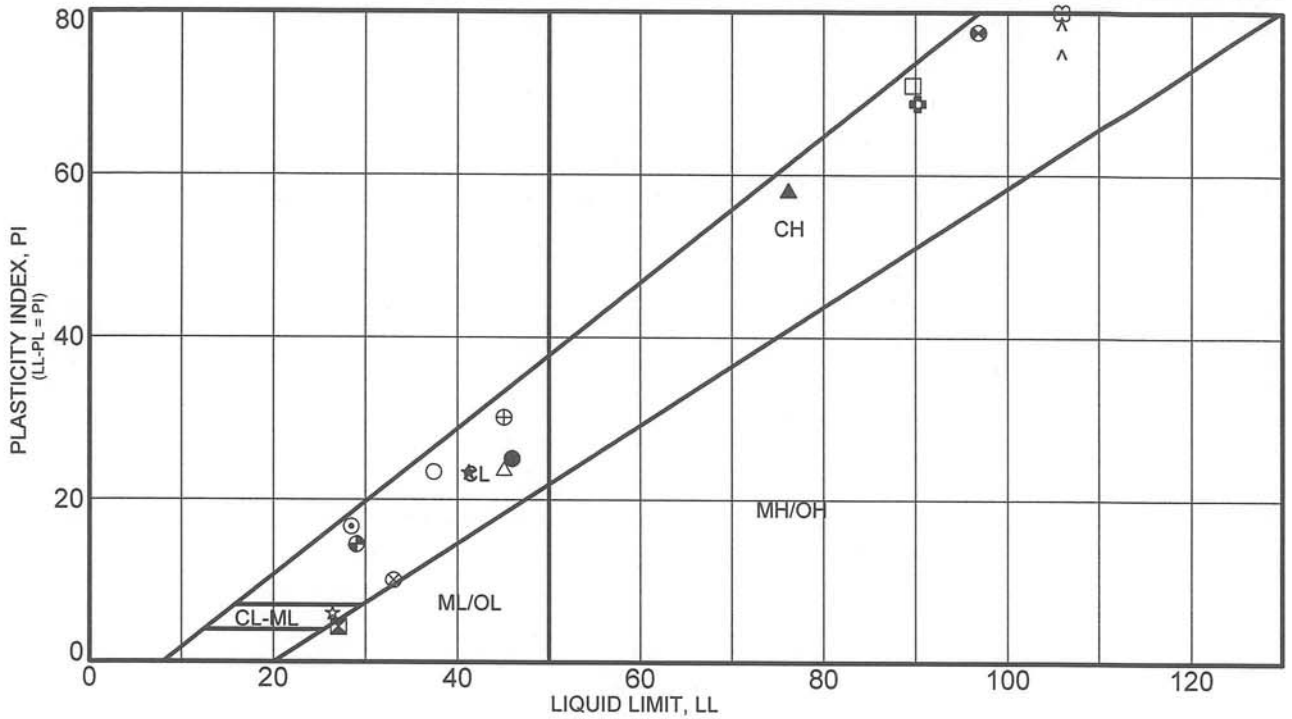
SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS — MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS — MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

Table 1
Summary of Laboratory Data

Stratum Number	I	II	III	IV	V
Classification	FILL	Clayey Silt (ML)	Silty Clay (CL) /(CL-ML)	Sandy Clay (CL)	Clay (CH)
Shear Strength (ksf)					
Number of Tests	2	3	23	0	18
Maximum	2.24	2.46	2.84	NA	5.52
Minimum	0.92	0.28	0.12	NA	1.20
Average	1.58	1.05	1.23	NA	2.54
Standard Deviation	0.93	1.22	0.81	NA	1.46
Moisture Content (%)					
Number of Tests	19	4	45	0	24
Maximum	31.61	29.65	39.23	NA	43.89
Minimum	7.79	23.61	14.87	NA	19.41
Average	17.34	25.82	23.42	NA	32.98
Standard Deviation	5.88	2.72	4.30	NA	5.86
Dry Density (pcf)					
Number of Tests	2	3	23	0	18
Maximum	126.27	107.09	115.78	NA	111.76
Minimum	109.09	97.73	53.72	NA	76.79
Average	117.68	103.58	100.91	NA	89.08
Standard Deviation	12.15	5.10	12.05	NA	7.86
Liquid Limit, LL					
Number of Tests	1	1	28	0	13
Maximum	38.00	27.00	46.00	NA	106.00
Minimum	38.00	27.00	25.00	NA	54.00
Average	38.00	27.00	35.79	NA	82.00
Standard Deviation	NA	NA	6.48	NA	18.11
Plastic Limit, PL					
Number of Tests	1	1	28	0	13
Maximum	27.00	23.00	23.00	NA	25.00
Minimum	27.00	23.00	12.00	NA	16.00
Average	27.00	23.00	17.54	NA	20.62
Standard Deviation	NA	NA	2.87	NA	3.28
Plasticity Index, PI					
Number of Tests	1	1	28	0	13
Maximum	11.00	4.00	30.00	NA	82.00
Minimum	11.00	4.00	4.00	NA	30.00
Average	11.00	4.00	18.25	NA	61.38
Standard Deviation	NA	NA	6.67	NA	17.31
% Passing No. 200					
Number of Tests	8	0	2	1	0
Maximum	78.42	NA	91.28	49.71	NA
Minimum	9.58	NA	87.18	49.71	NA
Average	26.54	NA	89.23	49.71	NA
Standard Deviation	22.63	NA	2.90	NA	NA



	BORING NUMBER	SAMPLE DEPTH	LL	PL	PI	Classification
●	1	4.0	46	21	25	**Tan and light gray to gray silty clay**
⊠	1	8.0	27	23	4	**Tan and light gray to gray silty clay**
▲	1	18.0	76	18	58	**Tan and light gray clay**
★	2	4.0	41	18	23	**Gray and tan silty clay**
⊙	2	13.0	28	12	16	**Tan and light gray silty clay**
✿	2	18.0	90	21	69	**Tan and light gray clay**
○	3	13.0	37	14	23	**Tan and light gray silty clay**
△	4	4.0	45	21	24	**Tan and gray silty clay**
⊗	4	8.0	33	23	10	**Gray silty clay**
⊕	4	13.0	45	15	30	**Tan and light gray silty clay**
□	5	18.0	90	19	71	**Tan and light gray clay**
⊛	7	18.0	97	19	78	**Tan and light gray clay**
◔	8	4.0	29	14	15	**Tan and light gray silty clay**
☆	9	4.0	26	20	6	**Gray very silty clay**
⊠	9	18.0	106	24	82	**Tan and light gray clay**

See Soil Boring Logs for detailed material descriptions.

SoilTech Consultants, Inc.
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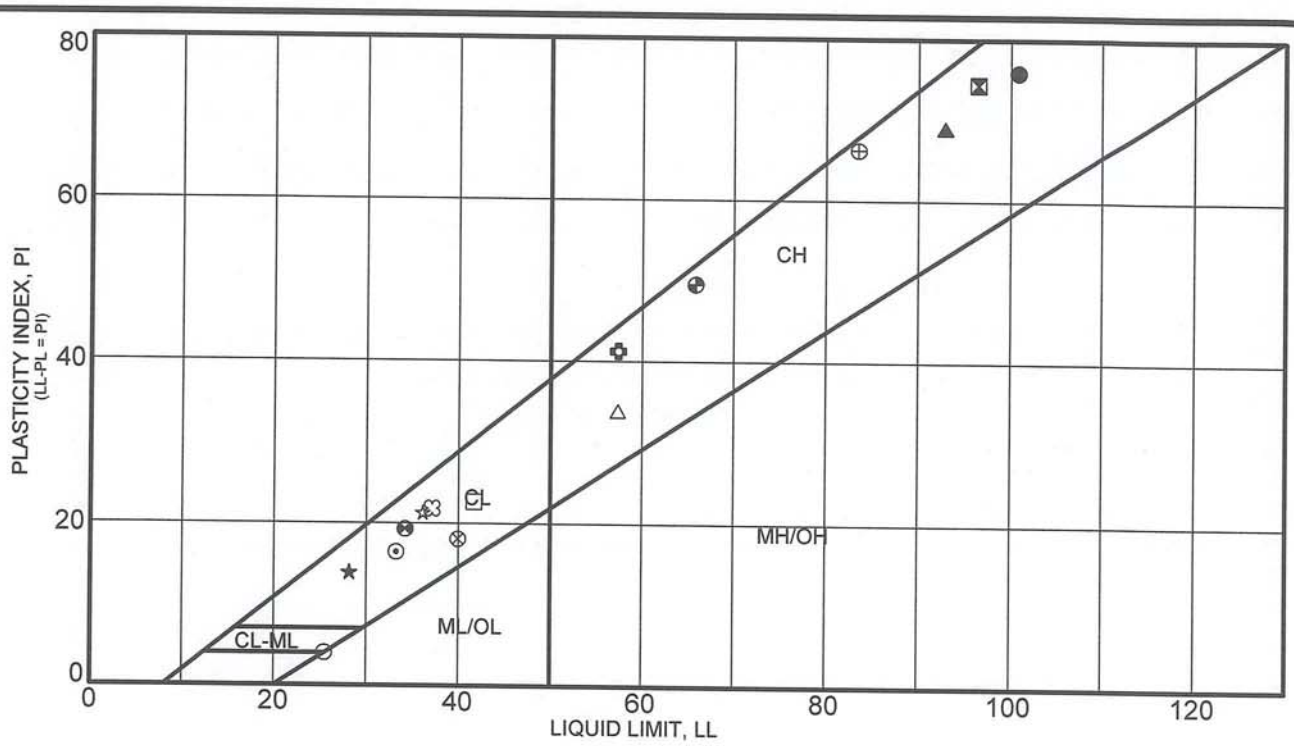
ATTERBERG LIMITS RESULTS

Project Name: MDOT Shop Complex
Location: Jackson, Mississippi
Number: NS.08185.000.001

ATTERBERG LIMIT CHART (HIGH PLASTICITY) 8185.001.GPJ NEEL SCHAFFER.GDT 3/10/11



	BORING NUMBER	SAMPLE DEPTH	LL	PL	PI	Classification
●	9	38.0	101	25	76	Tan and light gray clay
⊠	10	13.0	96	22	74	Tan and light gray clay
▲	11	43.0	93	24	69	Blue-gray clay
★	12	8.0	28	14	14	Tan and light gray silty clay
⊙	13	13.0	33	17	16	Gray silty clay
✿	15	13.0	57	16	41	Tan clay, slightly silty
○	16	8.5	25	21	4	Gray very silty clay
△	17	2.5	57	23	34	Tan clay
⊗	18	0.5	40	22	18	Tan silty clay
⊕	18	2.5	83	17	66	Tan and light gray clay
□	18	5.5	42	19	23	Gray and tan silty clay
⊛	19	2.5	34	15	19	Light gray silty clay
◕	19	5.5	66	16	50	Light gray and tan clay
☆	22	0.5	36	15	21	Tan and light gray silty clay
⊠	22	5.5	37	15	22	Tan and light gray silty clay

See Soil Boring Logs for detailed material descriptions.

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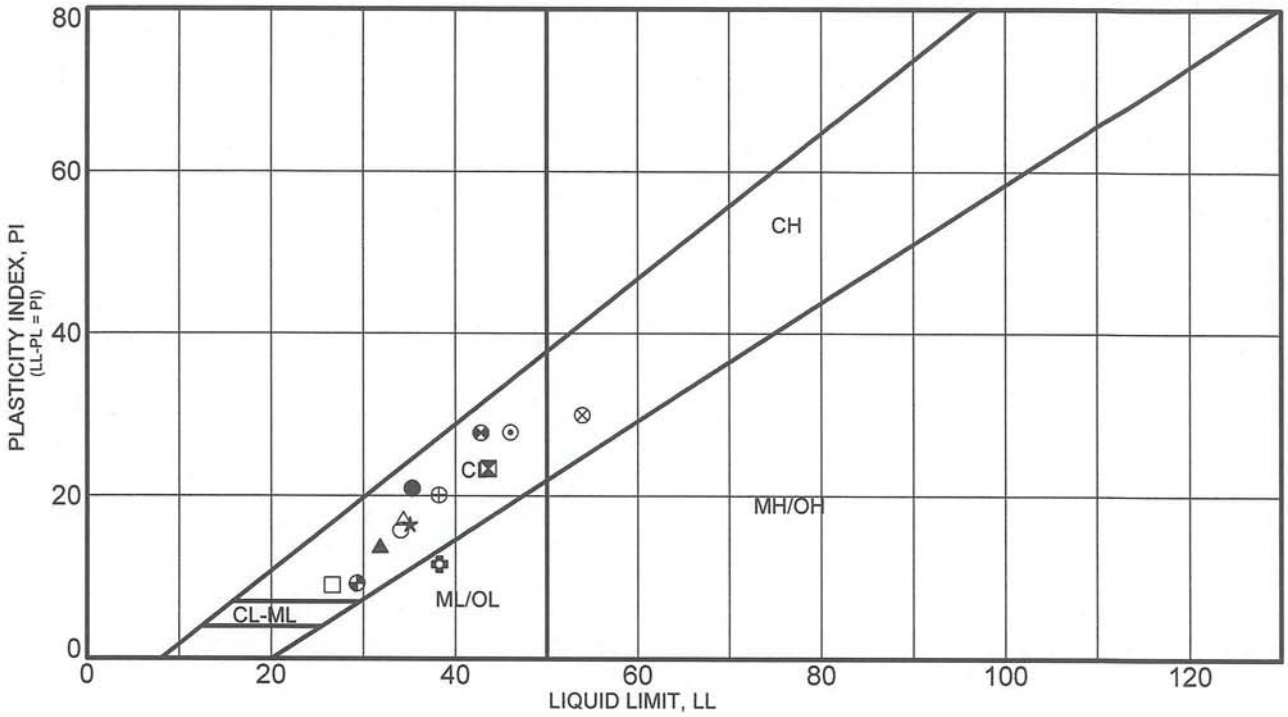
ATTERBERG LIMITS RESULTS

Project Name: MDOT Shop Complex
Location: Jackson, Mississippi
Number: NS.08185.000.001

ATTERBERG LIMIT CHART (HIGH PLASTICITY) 8185.001.GPJ NEEL.SCHAFFER.GDT 3/10/11



	BORING NUMBER	SAMPLE DEPTH	LL	PL	PI	Classification
●	23	2.5	35	14	21	Tan and light gray silty clay
⊠	24	2.5	44	20	24	Tan and light gray silty clay
▲	25	2.5	32	18	14	Tan and light gray silty clay
★	26	2.5	35	19	16	Tan and light gray silty clay
⊙	26	5.5	46	18	28	Tan and light gray silty clay
✿	27	6.0	38	27	11	Gray clayey silt
○	27	10.5	34	18	16	Gray silty clay
△	27	13.0	34	17	17	Gray silty clay
⊗	28	4.0	54	24	30	Tan clay with silt
⊕	28	13.0	38	18	20	Tan and light gray silty clay
□	29	8.0	27	18	9	Tan and light gray silty clay
⊗	30	4.0	43	15	28	Tan and light gray to gray silty clay
◒	30	13.0	29	20	9	Tan and light gray to gray silty clay

See Soil Boring Logs for detailed material descriptions.

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ATTERBERG LIMITS RESULTS

Project Name: MDOT Shop Complex
Location: Jackson, Mississippi
Number: NS.08185.000.001

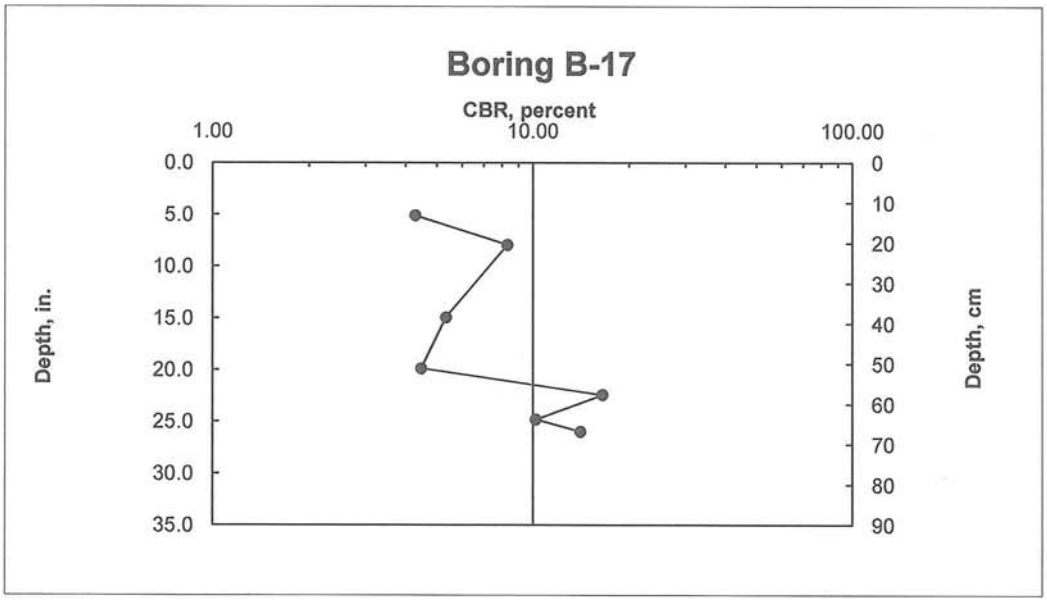
ATTERBERG LIMIT CHART (HIGH PLASTICITY) 8185.001.GPJ NEEL SCHAFFER.GDT 3/10/11

DCP CONVERSION TO CBR

NOTE: Heavy Hammer - Blow Factor = 1
Small Hammer - Blow Factor = 2

Location: Boring B-17
Project No.: 8185.001
Date: 2/24/2011

No. of Blows	Accumulative Penetration mm	Penetration per Blow Set mm	Penetration per Blow mm	Hammer Blow Factor	DCP Index	Depth In	Depth cm	CBR %	Bearing Capacity* psf
0	300					0			
3	430	130	43.33	1	43.33	5.1	13.0	4.29	1494
3	502	72	24.00	1	24.00	8.0	20.2	8.31	2475
5	680	178	35.60	1	35.60	15.0	38.0	5.34	1780
3	805	125	41.67	1	41.67	19.9	50.5	4.48	1548
5	870	65	13.00	1	13.00	22.4	57.0	16.51	3892
3	930	60	20.00	1	20.00	24.8	63.0	10.19	2853
2	960	30	15.00	1	15.00	26.0	66.0	14.07	3524
							AVG =	9.03	2509

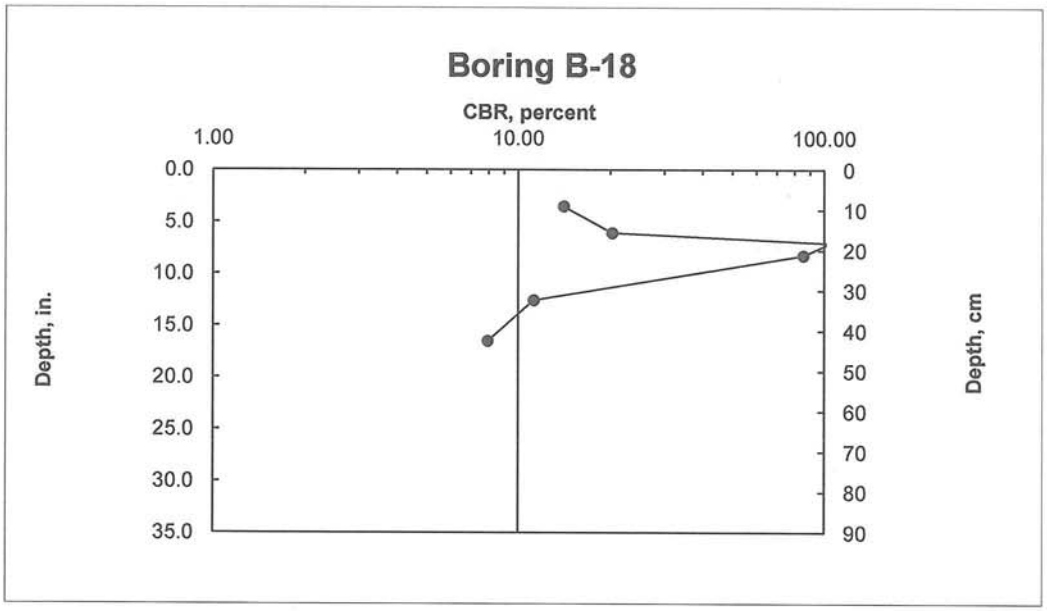


DCP CONVERSION TO CBR

NOTE: Heavy Hammer - Blow Factor = 1
Small Hammer - Blow Factor = 2

Location: Boring B-18
Project No.: 8185.001
Date: 2/24/2011

No. of Blows	Accumulative Penetration mm	Penetration per Blow Set mm	Penetration per Blow mm	Hammer Blow Factor	DCP Index	Depth In	Depth cm	CBR %	Bearing Capacity* psf
0	540					0			
6	630	90	15.00	1	15.00	3.5	9.0	14.07	3524
6	695	65	10.83	1	10.83	6.1	15.5	20.25	4393
10	720	25	2.50	1	2.50	7.1	18.0	104.64	11172
10	750	30	3.00	1	3.00	8.3	21.0	85.31	9718
6	860	110	18.33	1	18.33	12.6	32.0	11.23	3047
4	960	100	25.00	1	25.00	16.5	42.0	7.94	2395
							AVG =	40.57	5708

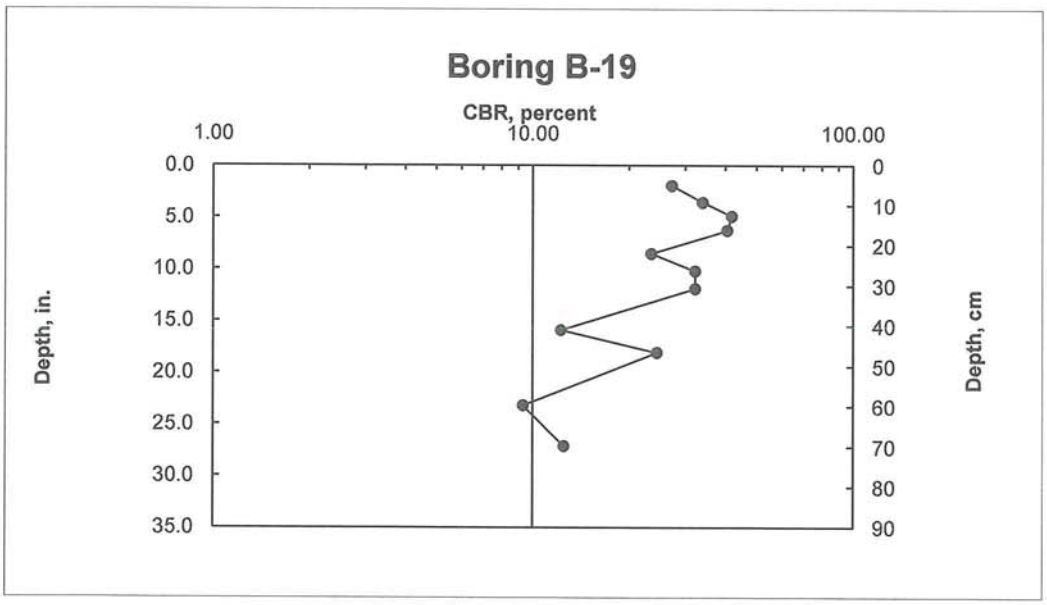


DCP CONVERSION TO CBR

NOTE: Heavy Hammer - Blow Factor = 1
Small Hammer - Blow Factor = 2

Location: Boring B-19
Project No.: 8185.001
Date: 2/24/2011

No. of Blows	Accumulative Penetration mm	Penetration per Blow Set mm	Penetration per Blow mm	Hammer Blow Factor	DCP Index	Depth In	Depth cm	CBR %	Bearing Capacity* psf
0	270					0			
6	320	50	8.33	1	8.33	2.0	5.0	27.17	5185
6	361	41	6.83	1	6.83	3.6	9.1	33.93	5845
6	395	34	5.67	1	5.67	4.9	12.5	41.85	6528
6	430	35	5.83	1	5.83	6.3	16.0	40.51	6418
6	487	57	9.50	1	9.50	8.5	21.7	23.46	4779
6	530	43	7.17	1	7.17	10.2	26.0	32.17	5681
6	573	43	7.17	1	7.17	11.9	30.3	32.17	5681
6	675	102	17.00	1	17.00	15.9	40.5	12.23	3221
6	730	55	9.17	1	9.17	18.1	46.0	24.42	4887
6	860	130	21.67	1	21.67	23.2	59.0	9.32	2683
6	960	100	16.67	1	16.67	27.2	69.0	12.50	3268
						AVG =	30.43	5417	342

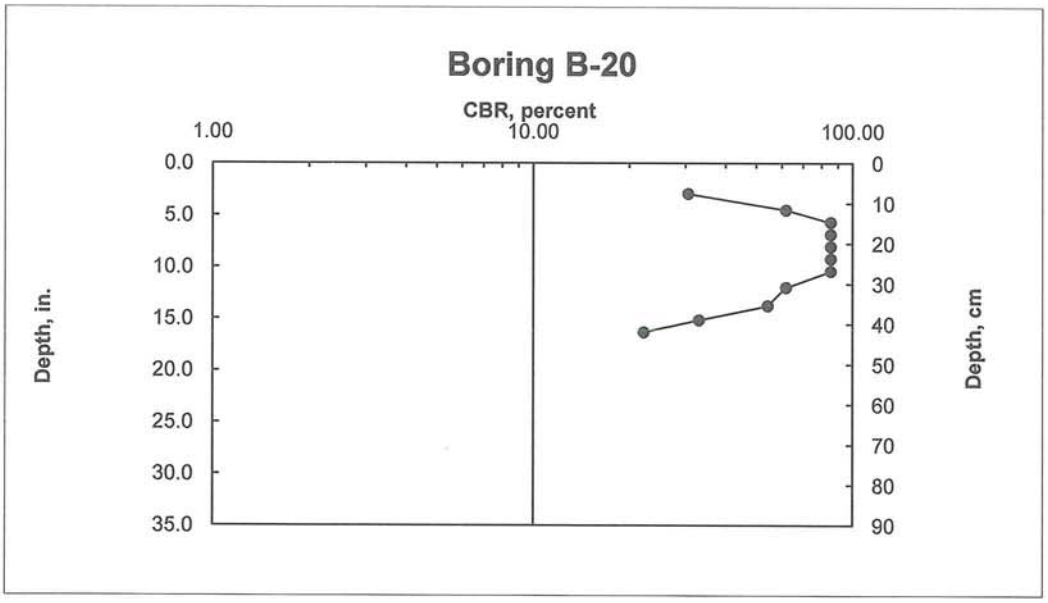


DCP CONVERSION TO CBR

NOTE: Heavy Hammer - Blow Factor = 1
Small Hammer - Blow Factor = 2

Location: Boring B-20
Project No.: 8185.001
Date: 2/24/2011

No. of Blows	Accumulative Penetration mm	Penetration per Blow Set mm	Penetration per Blow mm	Hammer Blow Factor	DCP Index	Depth In	Depth cm	CBR %	Bearing Capacity* psf
0	545					0			
10	620	75	7.50	1	7.50	3.0	7.5	30.57	5528
10	660	40	4.00	1	4.00	4.5	11.5	61.81	8036
10	690	30	3.00	1	3.00	5.7	14.5	85.31	9718
10	720	30	3.00	1	3.00	6.9	17.5	85.31	9718
10	750	30	3.00	1	3.00	8.1	20.5	85.31	9718
10	780	30	3.00	1	3.00	9.3	23.5	85.31	9718
10	810	30	3.00	1	3.00	10.4	26.5	85.31	9718
10	850	40	4.00	1	4.00	12.0	30.5	61.81	8036
10	895	45	4.50	1	4.50	13.8	35.00	54.17	7482
5	930	35	7.00	1	7.00	15.2	38.5	33.03	5761
3	960	30	10.00	1	10.00	16.3	41.5	22.15	4626
							AVG=	62.74	8005

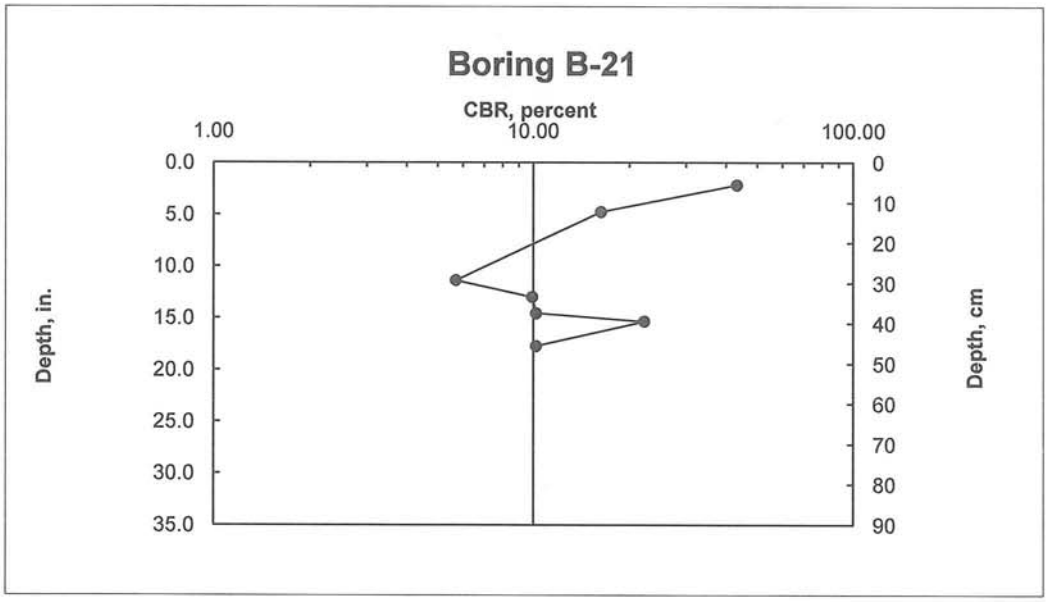


DCP CONVERSION TO CBR

NOTE: Heavy Hammer - Blow Factor = 1
Small Hammer - Blow Factor = 2

Location: Boring B-21
Project No.: 8185.001
Date: 2/24/2011

No. of Blows	Accumulative Penetration mm	Penetration per Blow Set mm	Penetration per Blow mm	Hammer Blow Factor	DCP Index	Depth In	Depth cm	CBR %	Bearing Capacity* psf
0	510					0			
10	565	55	5.50	1	5.50	2.2	5.5	43.27	6644
5	631	66	13.20	1	13.20	4.8	12.1	16.23	3852
5	799	168	33.60	1	33.60	11.4	28.9	5.70	1871
2	840	41	20.50	1	20.50	13.0	33.0	9.91	2800
2	880	40	20.00	1	20.00	14.6	37.0	10.19	2853
2	900	20	10.00	1	10.00	15.4	39.0	22.15	4626
3	960	60	20.00	1	20.00	17.7	45.0	10.19	2853
							AVG =	16.81	3643

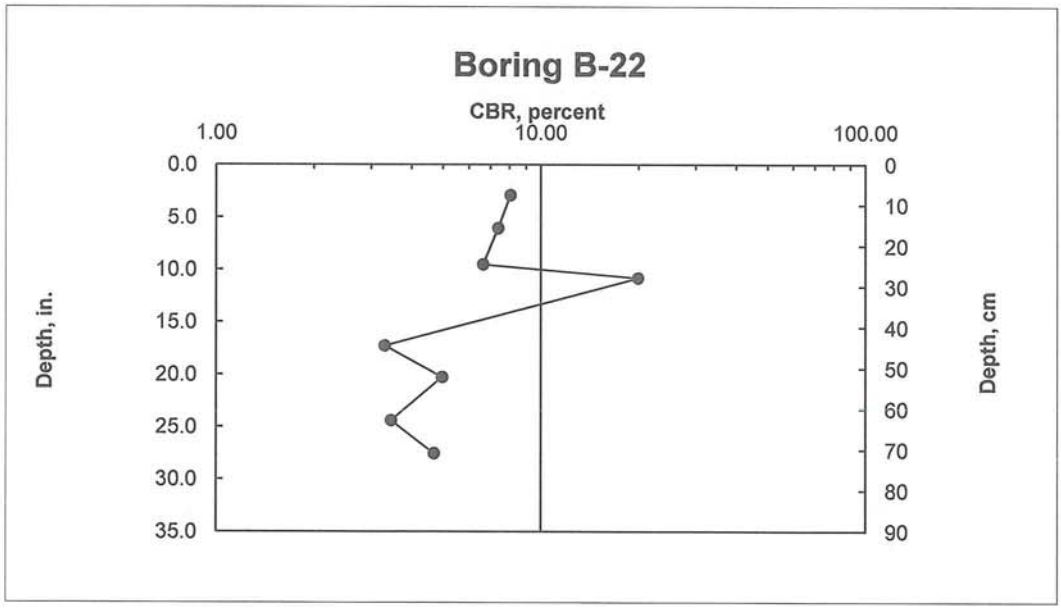


DCP CONVERSION TO CBR

NOTE: Heavy Hammer - Blow Factor = 1
Small Hammer - Blow Factor = 2

Location: Boring B-22
Project No.: 8185.001
Date: 2/24/2011

No. of Blows	Accumulative Penetration mm	Penetration per Blow Set mm	Penetration per Blow mm	Hammer Blow Factor	DCP Index	Depth In	Depth cm	CBR %	Bearing Capacity* psf
0	260					0			
3	334	74	24.67	1	24.67	2.9	7.4	8.06	2421
3	414	80	26.67	1	26.67	6.1	15.4	7.38	2273
3	502	88	29.33	1	29.33	9.5	24.2	6.64	2101
3	535	33	11.00	1	11.00	10.8	27.5	19.91	4350
3	699	164	54.67	1	54.67	17.3	43.9	3.30	1204
2	775	76	38.00	1	38.00	20.3	51.5	4.97	1681
2	880	105	52.50	1	52.50	24.4	62.0	3.46	1251
2	960	80	40.00	1	40.00	27.6	70.0	4.69	1606
							AVG =	7.30	2111

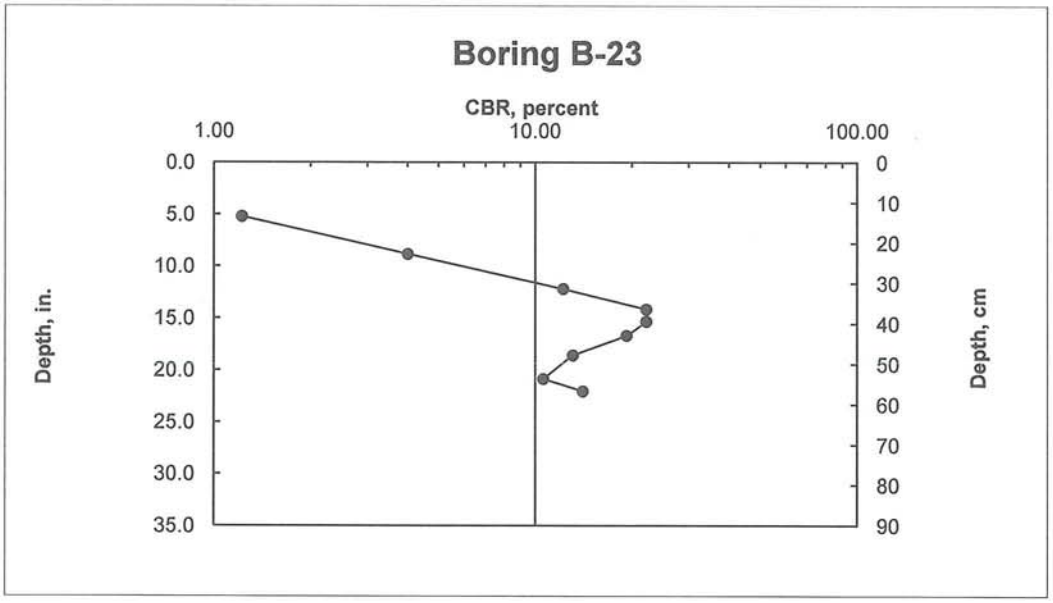


DCP CONVERSION TO CBR

NOTE: Heavy Hammer - Blow Factor = 1
Small Hammer - Blow Factor = 2

Location: Boring B-23
Project No.: 8185.001
Date: 2/24/2011

No. of Blows	Accumulative Penetration mm	Penetration per Blow Set mm	Penetration per Blow mm	Hammer Blow Factor	DCP Index	Depth In	Depth cm	CBR %	Bearing Capacity* psf
0	400					0			
1	533	133	133.00	1	133.00	5.2	13.3	1.22	494
2	625	92	46.00	1	46.00	8.9	22.5	4.01	1414
5	710	85	17.00	1	17.00	12.2	31.0	12.23	3221
5	760	50	10.00	1	10.00	14.2	36.0	22.15	4626
3	790	30	10.00	1	10.00	15.4	39.0	22.15	4626
3	824	34	11.33	1	11.33	16.7	42.4	19.25	4266
3	872	48	16.00	1	16.00	18.6	47.2	13.08	3366
3	930	58	19.33	1	19.33	20.9	53.0	10.59	2928
2	960	30	15.00	1	15.00	22.0	56.0	14.07	3524
							AVG =	13.19	3163

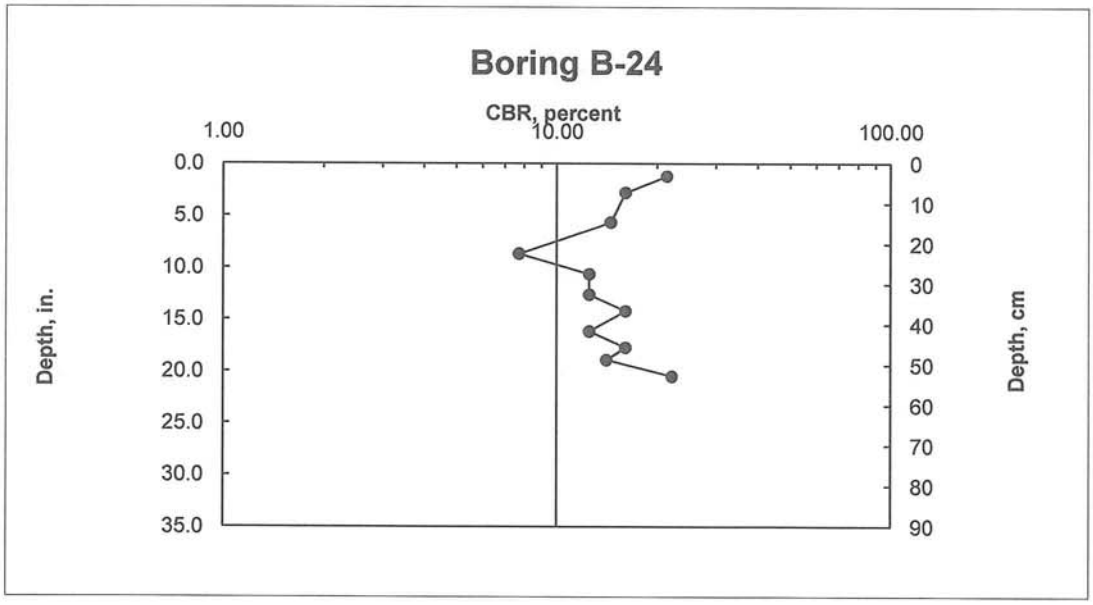


DCP CONVERSION TO CBR

NOTE: Heavy Hammer - Blow Factor = 1
Small Hammer - Blow Factor = 2

Location: Boring B-24
Project No.: 8185.001
Date: 2/24/2011

No. of Blows	Accumulative Penetration mm	Penetration per Blow Set mm	Penetration per Blow mm	Hammer Blow Factor	DCP Index	Depth In	Depth cm	CBR %	Bearing Capacity* psf
0	439					0			
3	470	31	10.33	1	10.33	1.2	3.1	21.35	4530
3	510	40	13.33	1	13.33	2.8	7.1	16.05	3825
5	583	73	14.60	1	14.60	5.7	14.4	14.50	3592
3	660	77	25.67	1	25.67	8.7	22.1	7.71	2345
3	710	50	16.67	1	16.67	10.7	27.1	12.50	3268
3	760	50	16.67	1	16.67	12.6	32.1	12.50	3268
3	800	40	13.33	1	13.33	14.2	36.1	16.05	3825
3	850	50	16.67	1	16.67	16.2	41.1	12.50	3268
3	890	40	13.33	1	13.33	17.8	45.1	16.05	3825
2	920	30	15.00	1	15.00	18.9	48.1	14.07	3524
4	960	40	10.00	1	10.00	20.5	52.1	22.15	4626
							AVG =	15.04	3627

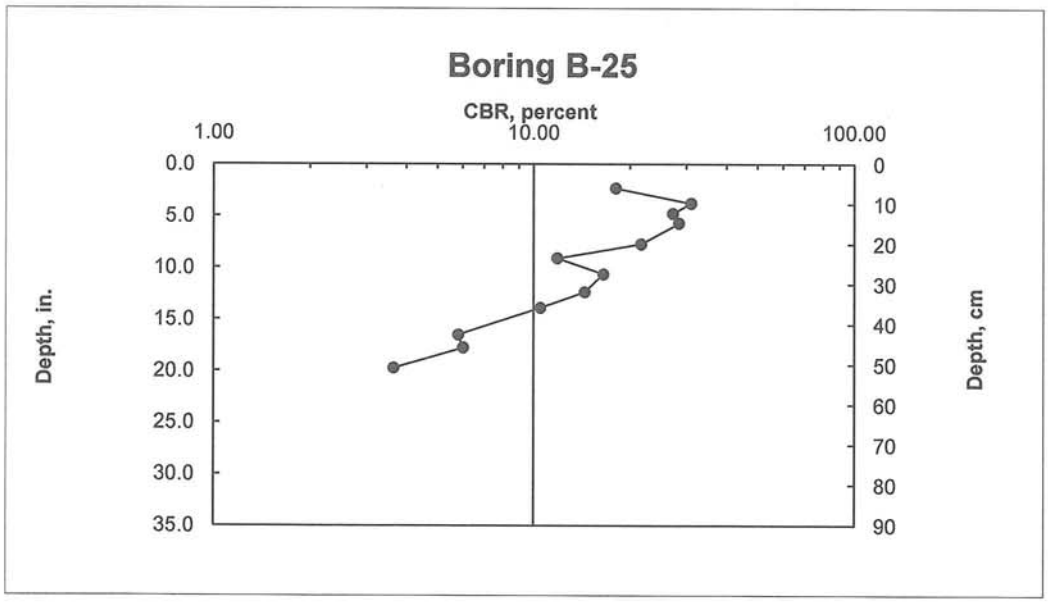


DCP CONVERSION TO CBR

NOTE: Heavy Hammer - Blow Factor = 1
Small Hammer - Blow Factor = 2

Location: Boring B-25
Project No.: 8185.001
Date: 2/24/2011

No. of Blows	Accumulative Penetration mm	Penetration per Blow Set mm	Penetration per Blow mm	Hammer Blow Factor	DCP Index	Depth In	Depth cm	CBR %	Bearing Capacity* psf
0	458					0			
5	518	60	12.00	1	12.00	2.4	6.0	18.06	4107
5	555	37	7.40	1	7.40	3.8	9.7	31.03	5573
3	580	25	8.33	1	8.33	4.8	12.2	27.17	5185
3	604	24	8.00	1	8.00	5.7	14.6	28.44	5316
5	655	51	10.20	1	10.20	7.8	19.7	21.66	4568
2	690	35	17.50	1	17.50	9.1	23.2	11.84	3154
3	729	39	13.00	1	13.00	10.7	27.1	16.51	3892
3	773	44	14.67	1	14.67	12.4	31.5	14.42	3581
2	812	39	19.50	1	19.50	13.9	35.4	10.48	2909
2	878	66	33.00	1	33.00	16.5	42.0	5.82	1901
1	910	32	32.00	1	32.00	17.8	45.2	6.02	1952
1	960	50	50.00	1	50.00	19.8	50.2	3.65	1309
							AVG=	16.26	3620

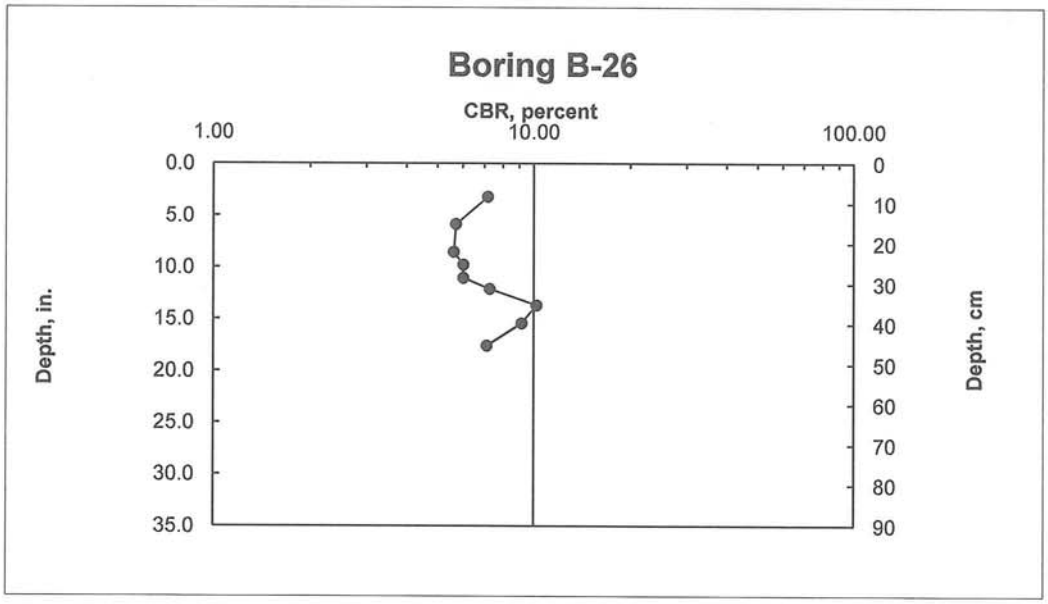


DCP CONVERSION TO CBR

NOTE: Heavy Hammer - Blow Factor = 1
Small Hammer - Blow Factor = 2

Location: Boring B-26
Project No.: 8185.001
Date: 2/24/2011

No. of Blows	Accumulative Penetration mm	Penetration per Blow Set mm	Penetration per Blow mm	Hammer Blow Factor	DCP Index	Depth In	Depth cm	CBR %	Bearing Capacity* psf
0	513					0			
3	595	82	27.33	1	27.33	3.2	8.2	7.18	2227
2	662	67	33.50	1	33.50	5.9	14.9	5.72	1876
2	730	68	34.00	1	34.00	8.5	21.7	5.63	1852
1	762	32	32.00	1	32.00	9.8	24.9	6.02	1952
1	794	32	32.00	1	32.00	11.1	28.1	6.02	1952
1	821	27	27.00	1	27.00	12.1	30.8	7.28	2250
2	861	40	20.00	1	20.00	13.7	34.8	10.19	2853
2	905	44	22.00	1	22.00	15.4	39.2	9.16	2651
2	960	55	27.50	1	27.50	17.6	44.7	7.13	2216
							AVG=	7.15	2203



SECTION 00 72 00 GENERAL CONDITIONS

PART 1- GENERAL

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.

C. See Document 00800-*Supplementary Conditions.* In the event of a conflict between the **AIA DOCUMENT A201-2007,** "General Conditions of the Contract for Construction", 2007, Sixteenth Edition and Document 00800-*Supplementary Conditions,* Document 00800 shall control even if the conflicting provision in the **AIA DOCUMENT A201-2007** "General Conditions of the Contract for Construction" is not expressly deleted or revised by reference in Document 00800.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)
Plan of Proposed Relocation & Construction of Various Metal Buildings At the Shop Complex Jackson, Hinds County, Mississippi
State Project No.
LWO-9002-25(006) / 501560
BWO-9030-25(002) / 502352
BWO-9721-25(001) / 502353
BWO-9041-25(001) / 502400

THE OWNER:
(Name, legal status and address)
Mississippi Department of Transportation
PO Box 1850
Jackson, Mississippi 39215-1850

THE ARCHITECT:
(Name, legal status and address)
JBHM Architects, PA
308 East Pearl Street, Ste. 300
Jackson, Mississippi 39201

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

TABLE OF ARTICLES

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14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES

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(Topics and numbers in bold are section headings.)

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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. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 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.

§ 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.

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§ 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.

§ 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.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner 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 Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. 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

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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 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

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§ 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, 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 shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other

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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.

§ 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.

§ 3.5 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

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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 Change Order. The amount of the 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.

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§ 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

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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.

§ 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.

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§ 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.

§ 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.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner 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 Owner, 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 Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (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.

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§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 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 will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority 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 authority 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 Architect will prepare Change Orders and 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 Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's 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 Owner 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 decide 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.

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§ 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

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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 in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor 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.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 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

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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 Change Order, 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 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 Architect alone.

§ 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 Change Order, Construction Change Directive or order for a minor change in the Work.

§ 7.2 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.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by 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 in the absence of total agreement on the terms of a 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

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.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 Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

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ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial 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 Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 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.

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 or Guaranteed Maximum Price, 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, 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.

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§ 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.

§ 9.3.2 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.

§ 9.3.3 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 issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, 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 Substantial 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 issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate 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 withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify 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 issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, 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;

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.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 withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 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 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.

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect,

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stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 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

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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 Substantial 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 certification 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 certification 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.

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.

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§ 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 Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, 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.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

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§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, 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 in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, 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), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

§ 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

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of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 Unless otherwise provided, the Owner 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.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner 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

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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.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

§ 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

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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 days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

§ 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 SUBSTANTIAL 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 SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial 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.

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§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial 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 law of the place where the Project is located 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.

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§ 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;

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.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.

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§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. 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 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

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§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

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

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

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

§ 15.2 INITIAL DECISION

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

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

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

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

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

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

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

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

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

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 ARBITRATION

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 CONSOLIDATION OR JOINDER

§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an

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additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.

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PAGE 1

Plan of Proposed Relocation & Construction of Various Metal Buildings At the Shop Complex Jackson, Hinds County, Mississippi
State Project No.
LWO-9002-25(006)/501560
BWO-9030-25(002)/502352
BWO-9721-25(001)/502353
BWO-9041-25(001)/502400

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(Name, legal status and address)
Mississippi Department of Transportation
PO Box 1850
Jackson, Mississippi 39215-1850

...

JBHM Architects, PA
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Jackson, Mississippi 39201

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James W Vinson

(Signed)

MDOT Architect - ASU

(Title)

July 27, 2012

(Dated)

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SECTION 00 73 00 SUPPLEMENTARY CONDITIONS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Owner: These supplements are necessary because the Owner is an agency, or political subdivision, of the State of Mississippi and occupies a different position from that of the usual Owner.

B. Document: The following supplements modify, change, delete from, or add to the **AIA DOCUMENT A201-2007**, "General Conditions of the Contract for Construction". When any Article of the General Conditions is modified, or deleted, by these Supplementary Conditions, the unaltered provisions of that Article, Paragraph, Subparagraph, or Clause will remain in effect. The "General Conditions of the Contract for Construction" may also be supplemented or amplified elsewhere in the Contract Documents by provisions located in, but not necessarily limited to, Division 01 of the Specifications.

1.02 VERIFICATION OF DIMENSIONS

A. Before ordering any materials or doing any work, the Contractor shall verify the dimensions and shall be responsible for the accuracy of such dimensions as they affect the Work. No extra compensation will be allowed on account of differences between the dimensions shown on the Drawings and actual dimensions.

1.03 PLANS AND SPECIFICATIONS

A. The Plans (Drawings) and Specifications are intended to be in agreement with each other, and to be mutually explanatory. They are also intended to be complementary and any Work or material called for by either shall be provided as if called for by both.

1.04 EXECUTION OF THE WORK

A. Sections of Division 01 General Requirements govern the execution of the Work of all Sections in Divisions 02-49 of the Specifications.

1.05 WORKMANSHIP

A. 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.

1.06 USE OF SITE AND FACILITIES

A. 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.

1.07 UTILITIES

A. The Owner will furnish utilities for construction (electricity and water). Contractor must use "as- is" or pay for any necessary modifications.

1.08 INSPECTION OF WORK

A. 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 preformed on Legal Holidays, Sundays or after 5:00 P.M. on week days without prior written approval from the Project Engineer.

ARTICLE 1 GENERAL PROVISIONS (A201-2007)

1.1 BASIC DEFINITIONS

1.1.1 **The Contract Documents**: Delete the last sentence of this Subparagraph and substitute following sentence:

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.

1.1.7 **Instruments of Service:** Add a new sentence at the end of this Subparagraph:

The Project Manual is a volume assembled for the Work which may include the bidding requirements, sample forms, Conditions of the Contract and Specifications.

1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

1.2.1 Add a new sentence at the end of this Subparagraph:

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.

1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATION AND OTHER INSTRUMENTS OF SERVICE

1.5.1 Add a new sentence at the end of this Subparagraph:

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.

ARTICLE 2 OWNER

2.1 GENERAL

2.1.1 Change this Subparagraph to read as follows:

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.

2.2.5 Change this Subparagraph to read as follows:

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).

ARTICLE 3 CONTRACTOR

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

3.3.1 Change the last sentence to read as follows:

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.

3.18 INDEMNIFICATION

3.18.3 Add a new Subparagraph as follows:

The Contractor agrees to defend, hold harmless and indemnify the Owner against all claims or demands caused by the Contractor's acts or omissions.

ARTICLE 4 ARCHITECT

4.1 GENERAL

4.1.4 Add a new Subparagraph as follows:

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 and inspect construction of this Project.

4.1.5 Add a new Subparagraph as follows:

The term “Project Engineer” as used in these Documents refers to the Mississippi Department of Transportation Executive Director’s authorized representative. The term “MDOT Architect” is the representative for the MDOT Architectural Services Unit and is an advisor to the Project Engineer.

ARTICLE 5 SUBCONTRACTORS

No supplementary conditions.

Article 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

6.1 OWNER’S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

Delete Subparagraphs 6.1.1 through 6.1.4 entirely and substitute the following:

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.

ARTICLE 7 CHANGES IN THE WORK

7.1 GENERAL

7.1.1 Replace the words “Change Order” with the words “Supplemental Agreement”.

7.2 CHANGE ORDERS

7.2.2 Add a new Subparagraph as follows:

The maximum cost included in a Change Order (Supplemental Agreement) 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 acquiesce to the same requirements when participating in a Change Order (Supplemental Agreement).

ARTICLE 8 TIME

8.1 DEFINITIONS

8.1.1 Change this Subparagraph to read as follows:

Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Completion of the Work.

8.1.3 Change this Subparagraph to read as follows:

The Date of Completion is the date certified by the Project Engineer and approved by the Owner in accordance with Paragraph 9.8 entitled “Substantial Completion.”

8.3 DELAYS AND EXTENSIONS OF TIME

Delete Articles 8.3.1, 8.3.2 and 8.3.3 in their entirety and insert in lieu thereof the following:

8.3.1 If the Contractor is delayed, hindered or impeded at any time in the progress of the Work or by any alleged act or neglect of the Owner, the Architect, or by any employee of any of them or by a separate Contractor employed by the Owner, or by changes ordered in the scope of the Work or other causes beyond the Contractor’s control, then the Contract Time may be extended by Change Order for such reasonable time as is agreed to by the Owner. However, to the fullest extent permitted by law, and notwithstanding any other provisions in the Contract Documents, the Owner, the Construction Manager, and the Architect and their agents and employees shall not be liable for any damage for delay whether for direct or indirect costs, extended home office overhead, idle or inefficient labor or equipment, cost escalations or monetary claims of any nature arising from our attributable to delay by any cause whatsoever. 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.

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 Any claims by the Contractor for an increase in Contract Time must follow the procedures and limits a set forth in Article 15 “Claims and Disputes” including, but not limited to the requirement that the Contractor give notice of any claim for extension in Contract Time with twenty-one (21) days after occurrence of the event giving rise to such claim.

Add the following Subparagraphs 8.3.4, 8.3.5, 8.3.6, and 8.3.7:

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

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

9.3 APPLICATIONS FOR PAYMENT

9.3.1 Add a new sentence to the end of this Subparagraph:

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.

9.3.1.3 Add a new Clause to Subparagraph 9.3.1 as follows:

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 Add a new Clause to Subparagraph 9.3.1 as follows:

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.

9.3.2.1 Add a new Clause to Subparagraph 9.3.2 as follows:

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 Add a new Clause to Subparagraph 9.3.2 as follows:

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.

9.6 PROGRESS PAYMENTS

9.6.8 Add a new Subparagraph as follows:

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

Change this Paragraph to read as follows:

The Contractor and the Owner shall be subject to the remedies as prescribed in Section 31-5-25 of the **Mississippi Code 1972, Annotated.**

9.8 SUBSTANTIAL COMPLETION

9.8.4 Add a new sentence at the end of this Subparagraph:

Substantial Completion shall not be recognized under this Contract. 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. All Warranties and Extended Warranties shall use this date as the starting date of Warranty Period.

9.11 LIQUIDATED DAMAGES

9.11.1 Add a new Paragraph as follows:

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

For More Than	To and Including	Per Calendar Day
$ 0	$ 100,000	$ 140
100,000	500,000	200
500,000	1,000,000	300
1,000,000	2,000,000	400
2,000,000	5,000,000	650
5,000,000	10,000,000	750
10,000,000	--------	1,400

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

10.2 SAFETY OF PERSONS AND PROPERTY

10.2.5 Change this Subparagraph to read as follows:

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 Clause 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 for Clauses 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or 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 Paragraph 3.18.

10.3 HAZARDOUS MATERIALS

10.3.2 Delete this Subparagraph in its entirety.

10.3.3 Delete this Subparagraph in its entirety.

10.3.4 Delete this Subparagraph in its entirety.

10.3.5 Delete this Subparagraph in its entirety.

10.3.6 Delete this Subparagraph in its entirety.

ARTICLE 11 INSURANCE AND BONDS

11.1 CONTRACTOR'S LIABILITY INSURANCE

11.1.5 Add a new Subparagraph as follows:

The Contractor's limits of liability shall be written for not less than the following:

.1 GENERAL LIABILITY:

Commercial General Liability
(Including XCU)

General Aggregate……	$ 1,000,000.00	Aggregate
Products & Completed Operations……..	$ 1,000,000.00	Aggregate
Personal & Advertising Injury……..	$ 500,000.00	Per Occurrence
Bodily Injury & Property Damage…….	$ 500,000.00	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 Add a new Subparagraph as follows:

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 Add a new Subparagraph as follows:

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

Change this Paragraph to read as follows:

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 11.1.4.

11.3 PROPERTY INSURANCE

11.3.1 Change the first line in this Subparagraph to read as follows:

The Contractor shall purchase…

11.3.1.2 Delete this Clause under Subparagraph 11.3.1 in its entirety.

11.3.1.3 Change the following Clause in Subparagraph 11.3.1.3 to read as follows:

If the property insurance requires deductibles, the Contractor shall pay costs not covered because of such deductibles.

11.3.2 Delete this Subparagraph in its entirety.

11.3.3 Delete this Subparagraph in its entirety.

11.3.4 Delete this Subparagraph in its entirety.

11.3.5 Delete this Subparagraph in its entirety.

11.3.6 Delete this Subparagraph in its entirety.

11.3.10 Change this Subparagraph to read as follows:

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.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

No supplementary conditions.

ARTICLE 13 MISCELLANEOUS PROVISIONS

No supplementary conditions.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

14.3.2 Change this Subparagraph to read as follows:

The Contract Time shall be adjusted for increase 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.

ARTICLE 15 CLAIMS AND DISPUTES

15.1.5 CLAIMS FOR ADDITIONAL TIME

Change Clause 15.1.5.2 to read:

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.

Add the following Clauses 15.1.5.3 and 15.1.5.4 to Subparagraph 15.1.5:

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.

15.3 MEDIATION

15.3.1 Delete this Subparagraph in its entirety.

15.3.2 Delete this Subparagraph in its entirety.

15.3.3 Delete this Subparagraph in its entirety.

15.4 ARBITRATION

15.4.1 Delete this Subparagraph in its entirety.

15.4.1.1 Delete this Clause in its entirety.

15.4.2 Delete this Subparagraph in its entirety.

15.4.3 Delete this Subparagraph in its entirety.

15.4.4 Delete this Subparagraph in its entirety.

15.4.4.1 Delete this Clause in its entirety.

15.4.4.2 Delete this Clause in its entirety.

15.4.4.3 Delete this Clause in its entirety.

15.5 Add a new Paragraph as follows:

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 Add a new Subparagraph as follows:

CONDITIONS PRECEDENT TO ARBITRATION

.1 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.

.2 If the dispute cannot be satisfactorily resolved, within thirty (30) days of the complaint being rejected in writing by either party, notice by certified mail shall be given to the Project Engineer. A copy of the notice shall be sent by certified mail to the opposing party. Such notice shall be in writing setting forth in detail the matter(s) in dispute, the amount involved, the remedy sought and state that informal resolution between the parties cannot be reached. Such writing shall include copies of any documents, writings, plans, or other matter pertinent to the resolution of the dispute. Opposing party shall have the opportunity to set forth in writing a rebuttal with pertinent documents attached. At the sole discretion of the Project Engineer, oral testimony may be had on the matter.

15.5.2 Add a new Subparagraph as follows:

REQUESTS FOR ARBITRATION: Within thirty (30) days of a claim being rejected in writing by the Project Engineer, either party may request arbitration. Notices for requests for arbitration shall be made in writing to the Chief Engineer of the Mississippi Department of Transportation, P. O. Box 1850, Jackson, Mississippi 39215-1850. Such notice shall set forth in detail the matter(s) in dispute, the amount involved, and the remedy sought. A copy of the request shall be mailed to the opposite party. The party requesting arbitration must deposit the sum of two hundred dollars ($200.00) with its request as a deposit against costs incurred by the arbitrators. Each party will be notified in writing in any manner provided by law of certified mail not less than twenty (20) days before the hearing of the date, time and place for the hearing. Appearance at the hearing waives a party's right to notice.

15.5.3 Add a new Subparagraph as follows:

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 Add a new Subparagraph as follows:

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 Add a new Subparagraph as follows:

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 Add a new Subparagraph as follows:

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 Add a new Subparagraph as follows:

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 Add a new Subparagraph as follows:

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.

END OF SECTION

SECTION 00 91 13 ADDENDA

PART 1 - GENERAL

1.01 DESCRIPTION

A. Addenda issued on this Project will be included in Section 00 91 13 and 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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 multiple buildings at Shop Complex in Jackson, Hinds County, Mississippi. Separate Lump Sums as described in these Specifications and Drawings are to be given for each of the following separate descriptions and combined to total one (1) lump sum for the Contract Sum.

1.	Pay Item 907-242-A004	Removal and Relocation of Metal Building with an Addition of a Scales Maintenance Shop.
2.	Pay Item 907-242-A006	Constructing a Warehouse
3.	Pay Item 907-242-A006	Constructing an Equipment Shed
4.	Pay Items Listed in Drawings	Site Improvements

B. Phasing of Pay Item 907-242-A004: Scale Maintenance Shop shall be constructed. A Partial Final Inspection shall be done on this portion of the Work. When the Project Engineer has determined the building can be used for its intended purpose, MDOT Scale Maintenance Personnel will be given two weeks to move out of the existing building. The General Contractor can then proceed with demolition of the existing building and relocation of the existing Equipment Shed. Refer to Drawings for more information.

C. Time of Completion: The completion of this Work is to be on or before the time indicated on the Owner and Contractor Agreement.

D. 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-Contractors List: Submit 8 copies of a list, acceptable to the MDOT, of all subcontractors to be used on the Project within seven (7) days after written notice of Contract award by the MDOT. The list shall include the Firm's name, contact person, street address, e-mail address, telephone and fax numbers. Submit original to Contract Administration Division and one copy to the Project Engineer and to the MDOT Architect CAD-720 form - REQUEST FOR PERMISSION TO SUBCONTRACT for each subcontractor before they are allowed to perform any Work.
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
5. 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 any stored products which interfere with operations of MDOT or other Contractors.

F. Obtain and pay for use of additional storage of work areas needed for operations.

G. Limit use of site for work and storage to the area indicated on the Drawings.

1.03 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Groups, Subgroups, Divisions and Sections using CSI/CSC's "MasterFormat" 2004 Edition numbering system.

1. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in Divisions 02 through 49 in the Specifications.

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. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
   a. 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 26 00 CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.01 SCOPE

A. This Section describes the procedures for processing Change Orders (Supplemental Agreements) by the Project Engineer and the Contractor.

1.02 CHANGE ORDER PROCEDURES

A. Change Proposed by the Project Engineer: The Project Engineer may issue a Proposal Request to the Contractor which includes a detailed description of a proposed change with supplementary or revised Drawings and Specifications and a change in Contract Time for executing the change. The Contractor shall prepare and submit an estimate within 10 days.

B. Change Proposed by the Contractor: The Contractor may propose a change by submitting a request for change to the Project Engineer, describing the proposed change and it's full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on Work by separate or other Contractors. Document any requested substitutions in accordance with Section 01 62 14 - Product Options and Substitution Procedures.

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 any 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 METHOD OF MEASUREMENT

A. The method of measurement and payment shall conform to the applicable provisions of Article 9 of the AIA Document A201-2007 General Conditions of the Contract for Construction.

1.02 APPLICATION 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 5 copies of each Application for Payment to the Project Engineer and one copy to the MDOT Architect.
2. Submit an updated construction schedule with each Application for Payment as described in Section 01 32 00-Construction Progress Documentation.
3. Submit request for payment at intervals agreed upon by the Project Engineer, Owner, and Contractor.
4. Submit requests to the Project Engineer at agreed upon times, or as may be directed otherwise.

D. Substantiating Data:
1. Submit data justifying dollar amounts in question when such information is needed.
2. Provide one copy of the data with a cover letter for each submittal.
3. Indicate the Application number, date and line item number and description.

1.03 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.

1.04 BASIS OF PAYMENT

A. This Work will be paid for by Contract Sum for the construction in District Five. The Work includes constructing multiple buildings at Shop Complex in Jackson, Hinds 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 for Special Provision 907-242-28 will be made under:

1.	907-242-A004: BWO-9030-25(002) 502352 Relocating Existing Equipment Shed with an Addition of Scales Maintenance Shop in Jackson, Hinds County	lump sum
2.	907-242-A006: BWO-9041-25(001) 502400 Constructing a Warehouse in Jackson, Hinds County	lump sum
3.	907-242-A006: BWO-9721-25(001) 502353 Constructing an Equipment Shed in Jackson, Hinds County	lump sum
	TOTAL PROJECT CONTRACT SUM	**LUMP SUM**

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 29 73 SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope: Submit 10 copies of the Schedule of Values to the MDOT Architect, with a copy of the Transmittal Letter 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. The 10 copies 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, Structural Engineer, Civil Consultant, Mechanical / Electrical Consultants, one sent to Contract Administration for use in reviewing requests for Permission to Sub-Contract (CAD-720 Form), one sent to the Project Engineer, and two returned to the Contractor. If any extra copies are needed for the Contractor, adjust number submitted.

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. For each line item, which has installed value of more than $20,000, break down costs to list major products for operations under each item; rounding figures to nearest dollar. Make sum of total costs of all items listed in schedule equal to total Contract Sum.
4. Group line items to show subtotal of Description A and then Description B, Description C, and Description D with the same amounts indicated on the Bid Forms and a total equal to the Contract amount indicated on the Bid Form.

E. Preparing Schedule of Unit Material Values:

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

F. Review and Re-submittal: After Project Engineer / MDOT Architect's review, if requested, revise and resubmit schedule in same manner

PART 2 - PRODUCTS and PART 3 - EXECTION (Not Used)

END OF SECTION

SECTION 01 31 00 PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Scope: To set forth procedures, conditions and responsibility for coordination of the total project.

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.

1.02 DEFINITIONS

A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.03 SUBMITTALS

A. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1.04 DUTIES OF PROJECT COORDINATOR (SUPERINTENDENT)

A. General:

1. Coordination: Coordinate the work of all subcontractors and material suppliers.
2. Supervision: Supervise the activities of every phase of Work taking place on the project.
3. Contractor's Daily Job Diary: Submit copy of daily job dairy to Project 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 any questions.
3. Transmission: 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 One: Coordinate and assist in the preparation of all requirements of Division One and specifically as follows:

1. Enforce all safety requirements.
2. Schedule of Values: 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 and Product Options: 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 INTERPRETATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.

1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned 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 interpretation and the following:

1. Project name.
2. Date.
3. Name of Contractor.
4. Name of Architect.
5. RFI number, numbered sequentially.
6. Specification Section number and title and related paragraphs, as appropriate.
7. Drawing number and detail references, as appropriate.
8. Field dimensions and conditions, as appropriate.
9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
10. Contractor's signature.
11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
    a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.

C. Hard-Copy RFIs: CSI Form 13.2A

1. Identify each page of attachments with the RFI number and sequential page number.

D. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow seven working days for Architect's response for each RFI. RFIs received 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 RFIs with numerous errors.
2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
3. 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 Division 1 Section "Contract Modification Procedures."
   a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 7 days of receipt of the RFI response.

E. On receipt of 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.

F. 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 Architect's response was received
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 31 19 PROJECT MEETINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Provisions for and procedures related to the required Project Meetings which include, but not limited to, the following for each Project Phase:

1. Pre-Construction Meeting.
2. Periodic Progress Meetings.

1.02 MEETINGS

A. Purpose of Meetings: Project Meetings shall be held for the following reasons:

1. To establish an understanding of what is expected from everyone involved.
2. To enable an orderly Project review during the progress of the Work.
3. To provide for systematic discussion of problems and effect remedies and clarifications.
4. To coordinate the Work.
5. To review installation procedures and schedules.

1.03 SCHEDULING AND ADMINISTRATION

A. 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.

B. 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 effected parties of result and include report of activities in next scheduled meeting.

C. 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.

D. Consultants may attend meetings to ascertain work is expedited consistent with Contract Documents and construction schedules.

1.04 PRE-CONSTRUCTION MEETING

A. Schedule: Schedule Pre-Construction Meeting within 10 days after Notice to Proceed.

B. Location: A central site, convenient for all parties, designated by the Contractor and approved by the Project Engineer and the MDOT Architect.

C. Attendance: Attending shall be the Project Engineer and MDOT representatives associated with the Project, the MDOT Architect (if requested by the District), his Consultants, the General Contractor, all major Subcontractors, and any representatives of governmental or other regulatory agencies as required.

D. Minimum Agenda:

1. Distribute and discuss construction schedule prepared by Contractor.
2. Review critical Work sequencing.
3. Designate responsibilities.
4. State procedures for submittals.
5. State procedures for maintaining record documents.
6. State procedures for change orders.
7. State procedures for application of payment.
8. Coordinate use of premises, including office and storage areas.
9. List Owner's requirements.
10. Show clear understanding of Security.
11. Show clear understanding of Housekeeping procedures.

1.05 PROGRESS MEETINGS

A. 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.

B. Place of Project Meetings: Contractor’s Field Office except as otherwise agreed.

C. 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.

D. Minimum Agenda:

1. Review, modify / approve minutes of the previous meeting.
2. Review work progress since last meeting.
3. Note field observations, problems and decisions.
4. Identify problems that impede planned progress.
5. Review off-site fabrication problems.
6. Revise construction schedule as indicated.
7. Plan progress during the next work period.
8. Review submittal schedules; expedite and modify as required.
9. Review proposed changes,
10. Review Request for Payment.
11. Complete other current business.

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 DESCRIPTION

A. Scope: Provide projected Construction Schedules for entire Work and revise monthly to show progress through the pay period. The following is a minimum requirement and other type schedules are acceptable with Owner's approval.

B. Form of Schedules: Prepare in form of horizontal bar chart.

1. Provide separate horizontal bar column for each trade or operation.
2. Order: Table of Contents of Specifications.
3. Identify each column by major Specification section number.
4. Horizontal Time Scale: Identify first work day of each week.
5. Scale and Spacing: To allow space for updating.

C. 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.

D. Updating:

1. Show all changes occurring since previous submission of updated schedule.
2. Indicate progress of each activity and completion dates.

E. Submittals:

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.

F. 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 33 00 SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Scope: Submit to the MDOT Architectural Services Unit shop drawings, product data, and samples required by Specification Sections. Faxed submittals WILL NOT be accepted. DO NOT submit Material Safety Data Sheets for approval. Refer to Section 01 62 14 – Product Options and Substitution Procedures, for requirements concerning products that will be acceptable on this Project.

B. Shop Drawings: Original (LEGIBLE) drawings (NO FAXED COPIES) prepared by Contractor, subcontractor, supplier or distributor which illustrates actual portions of the Work; showing fabrication, layout, setting or erection details. REPRODUCTIONS of the Contract Drawings WILL NOT be acceptable. Minimum requirements for shop drawings shall include the following:

1. Prepared by a qualified detailer.
2. IDENTIFY DETAILS BY REFERENCE TO SHEET AND DETAIL NUMBERS SHOWN ON CONTRACT DRAWINGS.
3. Minimum sheet size: 8-1/2 inches by 11 inches.
4. Maximum sheet size: 24 inches by 36 inches.
5. Shop drawings shall be stamped and signed by the Contractor certifying accuracy, completeness and COMPLIANCE with Contract requirements PRIOR TO SUBMITTING to the MDOT Architectural Services Unit.

C. Product Data: Minimum information (NO FAXED COPIES) submitted shall include the following:

1. Manufacturer's standard schematic drawings: Modify drawings to delete information that is not applicable to the Project. Supplement standard information to provide additional information applicable to Project.
2. Manufacturer’s catalog sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data: CLEARLY MARK each copy to identify pertinent materials, products or models. Show dimensions and clearances required. Show performance characteristics and capacities, wiring diagrams and controls.
3. Product Data shall be stamped and signed by the Contractor certifying accuracy, completeness and COMPLIANCE with contract requirements PRIOR TO SUBMITTING to the MDOT Architectural Services Unit.

D. Samples: Provide physical examples to illustrate materials, equipment or workmanship and to establish standards by which completed Work is judged.

1. Provide two copies each of sufficient size and quantity to clearly illustrate functional characteristics of products or material with integrally related parts and attachment devices and full range of color samples.
2. Samples remain the property of the Architectural Services Unit until completion of construction of the Project.

3. Samples (except for color charts/samples) will not be required when specified product is submitted.
4. If a specified product color is discontinued, Contractor shall notify Project Engineer promptly to determine if it affects other color selections.

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. Contractor Responsibilities:

1. Review shop drawings, product data, and samples prior to submission.
2. Verify field measurements, construction criteria, catalog numbers and other data.
3. Coordinate each submittal with requirements of Work and Contract Documents.
4. Contractor's responsibility for errors and omissions in submittals is not relieved by MDOT Architect’s / Consultant’s review of submittals.
5. 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.
6. Notify the Project Engineer in writing at the time of submission, of deviations in submittals from requirements of Contract Documents.
7. Do not order materials or begin Work requiring submittals until the return of submittals bearing MDOT Architect / Consultant’s stamp and initials indicating review.
8. After MDOT Architect / Consultant’s review, distribute copies.

G. Submission Requirements:

1. Schedule submission with ample time given to review submittals prior to being needed.
2. Submit nine (9) COPIES of shop drawings and product data with additional number of copies, if required, by Contractor for distribution.
3. Partial submittals are NOT ACCEPTABLE, will be considered non-responsive, and will be returned without review.
4. Submit number of samples specified in each Specification Section.
5. 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.
6. Each copy of submittal shall include a cover page with the following requirements:
   a. Date and revision dates.

b. Project title and number.
c. The names of Project Engineer, Contractor, Supplier, Manufacturer, and separate detailer, when pertinent.

d. Identification of product or material.
e. Relation to adjacent structure or materials and COMPLETE dimensions.
f. Field dimensions, clearly identified as such.
g. SPECIFICATION SECTION NUMBER.
h. Applicable standards such as ASTM Number or Federal Specification.
i. A blank space, 2 inches by 3 inches for the Reviewer's stamp.
j. Identification to deviations from Contract Documents.
k. Contractor's stamp, initialed or signed, certifying the review of submittal, verification of field measurements, and compliance with Contract Documents.

H. Resubmission Requirements:

1. Shop Drawings: Revise initial Drawings as required and resubmit as specified for initial submittal. Indicate on Drawings, all changes that have been made other than those required by the Reviewer.
2. Product Data and Samples: Submit new data and samples as required for initial submittal.

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 as directed. The Project Engineer, MDOT Architect and Consultant (as required) shall retain one of each.

J. MDOT Architect / Consultants' Duties:

1. Review submittals with reasonable promptness.
2. Review for design concept of Project and information given in Contract Documents.
3. Review of separate item does not constitute review of an assembly in which item functions.
4. Affix stamp and initial, or signature, certifying the review of submittal.
5. 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 the remainder to the Contractor.
6. Retain one copy of reviewed submittals.

K. Delays attributable to untimely submittals, submittals not approved, or time taken to resubmit WILL NOT serve as a basis for a Contract Time extension.

L. Acceptance of submittal items will not preclude rejection of these items upon discovery of defects in them prior to final acceptance of completed Work.

M. 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;
4. Other conditions became apparent which indicates acceptance of such substitute item to be in the best interest of the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 42 19 REFERENCES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Basic Contract Definitions.

B. Identification and purpose of Reference Standards.

C. Administrative procedures and responsibility for the use of Reference Standards.

1.02 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. “Reviewed”: The term “Reviewed”, when used in conjunction with MDOT Architect's action on Contractor's submittals, applications, and requests, is limited to MDOT Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by Architect, requested by Architect, and similar phrases.

D. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on Drawings; or to other paragraphs or schedules in Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference.

E. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": The term "furnish" means to supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": The term "install" describes operations at Project site including unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": The terms “provide" means to 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. 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" is the space available for performing construction activities, either exclusively or in conjunction with others performing other work as part of Project. The extent of Project site is shown on the Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.03 IDENTIFICATION AND PURPOSE

A. 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.

B. 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.

1.04 PROCEDURES AND RESPONSIBILITIES

A. 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. Should specified reference standards conflict with regulatory requirements or the Contract Documents, request Architect’s clarification before proceeding.

B. 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.

C. When date of Reference Document is not specified, conform to latest edition of said Document except when earlier editions are specifically required by Codes.

D. 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 43 00 QUALITY ASSURANCE

PART 1 - GENERAL

1.01 WORK QUALITY

A. Shop and field work shall be performed by mechanics, craftspersons, artisans, and workers skilled and experienced in the fabrication and installation/application of the work involved. The Work of this Project shall be performed in accordance with the Drawings, reviewed and approved shop drawings, and these Specifications. Quality of work shall conform to the highest established standards and practices of the various trades involved.

B. All work shall be erected and installed plumb, level, square, and true, or true to indicated angle, and in proper alignment and relationship to the work of other trades. Finished work shall be free from defects and damage.

C. Nothing specified in these Specifications shall be construed as relieving the Contractor of any responsibility for the quality of the finished work. Surfaces on which specified finishes are to be applied shall be in proper condition in every respect for superior finished work and long life without defects.

D. The Contractor's performance of the work hereunder shall be to the satisfaction of the Architect. The Architect reserves the right to reject materials and work quality which are not considered to be up to the accepted high standards of the various trades involved. Such inferior material or work quality shall be repaired or replaced, as directed by the Architect, at no additional cost to the Owner.

1.02 MANUFACTURERS' SPECIFICATIONS AND INSTRUCTIONS

A. Unless otherwise indicated or specified, manufactured materials, products, processes, equipment, systems, assemblies, and the like shall be erected, installed, or applied in accordance with the manufacturers' instructions, directions, or specifications. Said erection, installation, or application shall be in accordance with printed instructions furnished by the manufacturer of the material or equipment concerned for use under conditions similar to those at the jobsite. Two copies of such instructions shall be furnished to the Architect, and the Architect's acceptance therefore shall be obtained before work is begun.

B. Any deviation from the manufacturers' printed recommendations shall be explained and acknowledged as correct and appropriate for the circumstances, in writing, by the particular manufacturer. Any deviations must be reviewed by the Architect prior to any action by the Contractor. The Contractor will be held responsible for installations contrary to the respective manufacturers' recommendations.

1.03 SPECIALIST APPLICATOR/INSTALLER

A. Materials, equipment, systems, and assemblies requiring special knowledge and skill for the application or installation of such materials, equipment, systems, or assemblies shall be applied or installed by the specified product manufacturer or its authorized representative or by a skilled and experienced subcontractor qualified and specializing in the application or installation of the specified product with at least five years of successful experience in the type of work indicated and specified.

B. The installation subcontractor shall be approved by the product manufacturer, as applicable, and a copy of the installer's approval letter from the manufacturer shall be submitted to the Architect.

1.04 MANUFACTURER'S FIELD SERVICES

A. The manufacturer of a product, system, or assembly which requires special knowledge and skill for the proper application or installation of such product, system, or assembly shall provide appropriate field or job service at no additional cost to the Contractor or Owner. The manufacturer shall inspect and approve the application or installation work.

B. 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.

C. The manufacturer's authorized representative shall be present at the time any phase of this work is started.

D. 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.

E. 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.

1.05 TOLERANCES

A. 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.

B. 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.

C. Concrete Floors: Tolerances for concrete floors and pavement are specified in Division 03.

D. Wood and Plywood Subfloors: Subfloor surfaces shall be level and shall have a maximum variation of plus or minus 1/8 inch in 10 feet. An additional tolerance of plus 1/4 inch per 2 feet of unsupported span will be allowed for camber.

E. Finished Floors: Level to within plus or minus 1/8 inch in 10 feet for hardwood and resilient floor coverings.

1.06 PROTECTION OF WOOD

A. 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.

B. The Contractor shall 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.

C. Likewise, 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.

D. Wood materials or products which become wet from rain, dew, fog, or other source will be considered to have moisture damage and will 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.

1.07 GROUT FILL

A. 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.

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 Sections:

1. Individual specifications sections contain specific tests and inspections to be performed.
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 [C1077] [D3666] [D3740] [E329] [and] [E543].
2. Authorized to operate in State in which project is located.

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 any 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 LABORATORY 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 18, Earthwork for structures.

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 of 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, fabricator, or laboratory.
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 reports 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.
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 GENERAL

A. Establish and initiate use of each temporary facility at time first reasonably required for proper performance of the Work. Terminate use and remove facilities at earliest reasonable time, when no longer needed or when permanent facilities have, with authorized use, replaced the need.

1.02 FIELD OFFICE AND STORAGE FACILITIES

A. The Contractor shall not be responsible for construction of a field office. The Contractor shall provide, maintain, and remove when directed, suitable substantial and watertight temporary field office and storage shed(s), in locations on the site as directed by the Project Engineer, or his authorized representative and best suited for their respective uses, as follows:

1. Field Office: 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.
2. Storage Facilities: 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.

1.03 FURNISHING AND MAINTENANCE OF EQUIPMENT

A. Furnish and maintain all equipment such as temporary stairs, ladders, ramps, scaffolds, hoists, runways, derricks, chutes, elevators, etc. as required for proper execution of the Work of all trades. All such apparatus, equipment and construction shall meet all the requirements of the Labor Law and other applicable State or local laws

1.04 ELECTRIC LIGHTS AND POWER

A. Supply lights and power when necessary for the progress of the Work. The operating costs shall be borne by the Owner. Temporary wiring, where required, shall be run in conduits.

1.05 WATER

A. Supply water service. The operating costs shall be borne by the Owner.

1.06 ROADS AND ACCESS

A. The drive is to remain open at all times. A flagman will be required to control traffic when construction vehicles are present.

1.07 TOILETS FOR WORKMEN

A. Provide and maintain all necessary toilets for workmen. Toilets are to be maintained in strict accordance with the regulations of the State Board of Health. The toilets are to be located on the site as directed by the Project Engineer or his authorized representative.

1.08 SECURITY / PROTECTION PROVISIONS

A. The types of temporary security and protection provisions required include, but are not limited to, fire protection, barricades, warning signs / lights, personnel security program (theft prevention), environmental protection, and similar provisions intended to minimize property losses, personal injuries and claims for damages at Project Site(s).

B. Barricades and Construction Fence: Provide and erect all necessary barricades and any other protection required. Provide all necessary warning and danger lights from twilight to sunrise.

C. Fire Extinguishers: Provide types, sizes, numbers and locations as would be reasonably effective in extinguishing fires during early stages, by personnel at project site. Provide Type A extinguishers at locations of low potential for either electrical or grease/oil flammable liquid fires: provide Type ABC dry chemical extinguishers at other locations; comply with recommendations of NFPA No. 10. Post warning and quick-instructions at each extinguisher location, and instruct personnel at Project Site, at time of their first arrival, on proper use of extinguishers and other available facilities at Project Site. Post local fire department call number on each telephone instrument at Project Site.

D. Environmental Protection Procedures: Designate one person, the Construction Superintendent or other, to enforce strict discipline on activities related to generation of wastes, pollution of air/water/soil, generation of noise, and similar harmful or deleterious effects which might violate regulations or reasonably irritate persons at or in vicinity of Project Site.

E. Water Control: 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.

1.09 BURNING OF TRASH

A. 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.

1.10 POWDER ACTUATED TOOLS

A. The use of powder actuated tools shall be prohibited from use during all phases of the construction, unless explicitly approved in writing, prior to construction, by the Project Engineer.

1.11 FIRE HAZARDS

A. Special precautions shall be taken to reduce fire hazards where electrical or gas welding or cutting Work is done and suitable fire extinguishing equipment shall be maintained near such operations.

1.12 CONDUCT OF WORKERS

A. 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 61 15 BASIC PRODUCT REQUIREMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. The products of The Work and the requirements for their quality, delivery, handling, storage, protection and installation.

1.02 DEFINITIONS

A. “Products”. Defined as: The materials, machinery, equipment, components, and systems, in whole or in part, incorporated into The Work. “Products” does not include materials, tools, devices, machinery, equipment and systems used for the preparation, manufacture, fabrication, conveying and installation of The Work.

B. “Level of Excellence”. Defined as: The degree of quality for the Products and Workmanship of this Project. The required “degree of quality” shall be established on the basis of one or more of the following criteria which shall become the minimum acceptable “level of excellence” for the Work of this Project:

1. Products selected by Architect / Engineer.
2. Architect’s / Engineer’s Specifications.
3. Reference Standards.
4. Manufacturer’s Instructions.
5. Industry Standards.
   a. In the absence of all the criteria from the Specifications Section, the normal local Industry Standard shall prevail. The Party or Parties responsible for the required work shall be experienced in the work to be provided; shall have knowledge as to what, in the local area, constitutes “good and acceptable practice” in producing the completed Work of this Section, and will be expected to provide nothing less.
      1) Example: Masonry and Drywall Contractors are expected to know that Industry Standards, “good practice”, and “common sense” dictate, to prevent cracks in the completed work, control joints must be installed at minimum distances or should be placed in certain locations where movement or other stress conditions are likely to occur. When such items are not specified or shown on the Drawings, the Contractor will be expected to request the MDOT Architect’s clarification for location (primarily for esthetic considerations) and then provide not less than the minimum Industry Standard, at no additional cost to the Owner.

C. “Standard of Quality”. Defined as: A specific and particular manufacturer whose product(s) has / have been selected by the Architect as amply suitable to meet the Project requirements in one or more of the following criterions: appearance, physical attributes, performance characteristics, appropriateness for intended use, and cost.

1. The work of the individual Specification Section will be based on product(s) of the “Standard of Quality Manufacturer” and the product(s) of that manufacturer, designated within the Specifications Section by catalog number(s) (or other identification), shall become “Standard of Quality Product(s) and the basis by which the product(s) of “Other Acceptable Manufacturers”, and any substitutions, are judged.
2. In the absence of the designation “Standard of Quality”, such as for generic product, material or system, then the specified item (product, material or system) shall be the reference standard and shall become the “Standard of Quality”.

D. "Equivalent Products". Defined as: Products having a level of excellence which, in the MDOT Architect's judgment, is equal to the level of excellence established by the product(s) selected as Architect's / Engineer's "Standard of Quality".

E. "Manufacturer". Defined as: An entity whose principal business is the manufacturing, fabricating, assembling, and / or supplying of products / systems from off site for incorporation (in whole, or in part, such as components of a system) into the construction at the Project Site.

1. The Architect's / Engineer's selection of a particular manufacturer usually is on the basis of the manufacturer's reputation within the Construction Industry, and / or "track record" with the Architect / Engineer, for producing quality products on time, and providing responsive follow-up and reliable warranties.
2. The terms "Fabricator" and "Supplier" used in these Specifications shall be synonymous with "manufacturer".

F. "Other Acceptable Manufacturers". Defined as: Manufacturers who have qualifications and products similar to those of the "Standard of Quality" Manufacturer (see above) selected by Architect / Engineer and are therefore "acceptable" to offer any of their products considered to be "equivalent" to the specified product(s).

1. To the best of the Architect's / Engineer's knowledge, information and belief, the manufacturers, listed as "Other Acceptable Manufacturers", now have products available that are considered to be "equivalent" to the specified product (or selection) of the "Standard of Quality" Manufacturer. Where no "Standard of Quality" is indicated then any of the "Acceptable Manufacturers" listed may offer products complying with the specified requirements.
2. The inclusion of particular manufacturers as "Other Acceptable Manufacturers" does not signify that other (that is, unlisted) manufacturers are not acceptable or that they do not have equivalent products nor does the omission of any manufacturer's name indicate unacceptability for any reason.
3. Manufacturers, who are not listed in the Contract Documents, and who desire consideration, must submit their product under provisions of Section 01 62 14 - Product Options and Substitutions Procedures.

1.03 QUALITY ASSURANCE – GENERAL

A. The quality of all products and workmanship shall be in accordance with the provisions of this Section and the requirements of the individual Specifications Section.

B. Whenever a "level of excellence" higher than the minimum industry standard is expected for products and workmanship, the more rigid standards and precise requirements will be indicated within individual Specifications Sections.

1. Example: For whatever reason, the Architect may specify a "dry film thickness (DFT)" for a coating that is more than the manufacturer's recommendation or than normally available in a three coat system. It shall be the Contractor's responsibility to achieve the required DFT with one or more additional coats, none of which shall be more than the manufacturer's recommendation for wet film thickness, for a single coat, when applied.

C. Establishing and maintaining Project Quality Control shall be the responsibility of the Contractor.

1.04 QUALITY ASSURANCE – PRODUCTS

A. All products incorporated into The Work shall be new except where otherwise provided by the Contract Documents and shall comply with the requirements of the individual Specifications Sections and as supplemented herein. All products incorporated into the Work shall be asbestos free. Products containing asbestos are not acceptable and will be considered as defective material. Whenever these products containing asbestos are discovered, they shall be removed from the Work at no cost to the Owner. Contractor

shall certify that all materials incorporated into the Work are asbestos free, refer to Section 01 77 00 - Closeout Procedures.

B. Matching / Mating of Products:

1. Products required in quantity within a Specifications Section shall be the same, and shall be interchangeable.
2. All manufactured products exposed to view, especially those considered as “Finishes” (including, but not limited to, items as floor material, wall coverings, glass, paint ceiling tile, that are installed or applied directly from manufacturer’s containers), shall be of the same factory “run”.
3. The Contractor is expected to secure a sufficient quantity with initial purchase to avoid running short. Materials within an area that do not match, as a result of such failure, will be cause to reject all materials and will not be grounds for additional compensation.

C. Extra Materials: When required by individual Specifications Sections, provide products, spare parts and maintenance material in condition and quantities required. All “extra materials” shall be of the same factory “run” as installed materials. Deliver to Project Site, properly store in appropriate locations, and obtain receipt from authorized person prior to Final Payment.

1.05 QUALITY ASSURANCE – WORKMANSHIP

A. Comply with the “level of excellence” required by individual Specifications Sections. In the absence of specific requirements, comply with product(s) manufacturer’s instructions and Industry Standards.

B. Use only suitably qualified craftsmen to produce work of the specified quality.

1. Craftsmen shall be of excellent ability, thoroughly trained and experienced in types of work required, completely familiar with the quality standards, procedures and materials required.
2. In the acceptance or rejection of manufactured and / or installed work, the MDOT Architect will make no allowance for the lack of skill on the part of workmen.

C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

D. Provide finishes to match approved samples.

E. Adjusting of Operating Products: As follows:

1. Adjust moving parts of product / equipment (including, but not limited to, doors, drawers, hardware, appliances, mechanical and electrical equipment) to ensure smooth and unhindered operation and movement at time when Owner assumes control of item’s use.
2. All items shall be properly set, calibrated, balanced, lubricated, charged, and otherwise prepared and ready for intended use.
3. Starting of Systems: When specified in individual Sections, require manufacturer’s representative to be present at the Site to inspect, check, and approve equipment installation prior to start-up; to supervise placing equipment in operation; and to certify by written report that equipment has been properly installed, adjusted, lubricated, and satisfactorily operated under full load conditions.

4. Equipment/systems Demonstrations and Personnel Instruction: When specified in individual Sections, require manufacturer to provide authorized representative to demonstrate operation of equipment and systems and to instruct Owner's personnel on proper operation and maintenance manuals as basis of instruction and demonstration. Include start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at schedule times, at equipment location.

1.06 TRANSPORTATION AND HANDLING

A. Transport products by means and methods to avoid product damage; deliver in undamaged condition in manufacturers' unopened containers or packaging, keep dry.

B. Provide equipment and personnel to handle products by means to prevent soiling or damage.

C. Promptly inspect shipments for compliance with requirements, quantities, and damage.

1.07 STORAGE AND PROTECTION

A. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weathertight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions. Protect prefinished surfaces from damage or deterioration by acceptable means; do not use adhesive papers, sprayed or strippable coatings that bond when exposed to sunlight or weather.

B. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering (do not use "Visqueen" or other polyethylene sheeting when subject to direct sunlight); provide ventilation to avoid condensation.

C. Store loose granular materials on solid surface in a well-drained area; prevent mixing with foreign matter.

D. Arrange storage to provide access for inspection. Periodically inspect to assure products are undamaged, and are maintained under specified conditions and are fit for use.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 62 14 PRODUCT OPTIONS AND SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Scope: To give the product options available to the Contractor and to set forth the procedure and conditions for substitutions.

1.02 CONTRACTOR'S OPTIONS

A. For products specified only by reference standards, select any product meeting standards by any manufacturer.

B. For 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.

C. For product 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.

D. For 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

E. For 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.

1.03 PRODUCT SUBSTITUTION LIST

A. The MDOT Architect WILL NOT consider requests for substitutions during bidding.

B. Within 45 days after Notice to Proceed, submit to the MDOT Architect 4 copies of complete list of all proposed product substitutions. Substitutions WILL NOT be considered if received after this time.

C. Tabulate list by each Specification Section.

D. For named products specified with reference standards, include with listing of each product:

1. Name and address of manufacturer.
2. Trade name.
3. Model or catalog designation.
4. Manufacturer's data.
5. Performance and test data.
6. Reference standards.

E. Proposed product will be reviewed for incorporation into the Project. Contractor will be notified for substitution rejection if not allowed, or will be instructed to submit in standard substitution submittal process for approval. See attached Substitution Request Form.

1.04 SUBSTITUTIONS

A. The MDOT Architect will consider formal written requests from Contractor for substitution of products in place of those specified. ONLY ONE REQUEST per product will be allowed. Refer to Section 01 33 00 - Submittal Procedures. Include in request:

1. Complete data substantiating compliance of proposed substitutions with Contract Documents.
2. For products:
   a. Product identification including manufacturer's name and address.
   b. Manufacturer's literature: Submit literature of actual product specified and literature of proposed substitution with all comparable features or components highlighted. Highlighted information is to include, but shall not be limited to, product description, performance, test data and reference standards.
   c. Samples of the proposed substitution.
   d. Name and address of 3 similar projects on which product was used and date of installation.
3. For construction methods:
   a. Detailed description of proposed method.
   b. Drawings illustrating methods.
4. Itemized comparison of proposed substitution with product or method specified.
5. Data relating to changes in construction schedule.
6. Accurate cost data on proposed substitution in comparison with product or method specified.

B. In making request for substitution, Contractor represents:

1. He 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.
2. He will provide the same guarantee for substitution as for product or method specified.
3. He will coordinate installation of accepted substitution into Work, making such changes required of Work to be complete in all respects.
4. He waives all claims for additional costs related to substitution that consequently becomes apparent.
5. Cost data is complete and includes all related costs under his Contract.

C. Substitutions WILL NOT be considered if:

1. They are indicated or implied on Shop Drawings or product data submittals without formal request submitted in accordance with this Section.
2. Acceptance will require substantial revision of Contract Documents.
3. In the MDOT Architect’s judgment, the product or material is not equal.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PRODUCT SUBSTITUTION REQUEST FORM (AS FOLLOWS)

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: _____

Other Contracts, if any:_____

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

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 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 73 29 CUTTING AND PATCHING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Scope: To set forth broad general conditions covering cutting and patching that applies to everyone and everything on the job.

B. Execute cutting including excavating, fitting or patching or work required to:

1. Make several parts fit properly.

2. Uncover work to provide for installation of ill-timed work.

3. Remove and replace defective work.

4. Remove and replace work not conforming to Contract requirements.

5. Install specified work in existing construction.

C. In addition to Contract requirements, upon MDOT Architect's written instructions:

1. Uncover work for observation of covered work.

2. Remove samples of installed materials for testing.

3. Remove work to provide alteration of existing work.

D. Do not cut or modify work of another Contractor without his consent.

E. Payment for Costs: Costs caused by ill-timed, defective or work not conforming to the Contract will be borne by party responsible for ill-timed, defective or non-conforming work.

PART 2 - PRODUCTS

2.01 GENERAL

A. Materials for replacement of work removed shall comply with individual Specifications Sections for type of work to be done.

PART 3 - EXECUTION

3.01 GENERAL

A. Inspection: Inspect existing conditions of work, including elements subject to movement or damage during cutting and patching.

B. Preparation prior to cutting: Provide shoring, bracing and supports required to maintain structural integrity. Provide protection for other portions of project and protection from the elements.

C. Performance:

1. Execute cutting and demolition of methods that prevent damage to other work and will provide surfaces to receive installation of repairs and new work.

2. Execute excavating and backfilling by methods that prevent damage to other work and prevent settlement

3. Restore work that has been cut or removed install new products to provide completed work in accordance with requirements of the Contract Documents.

4. Refinish entire surfaces as necessary to provide an even finish. Refinish continuous surfaces to the nearest intersection and assemblies.

END OF SECTION

SECTION 01 74 00 CLEANING AND WASTE MANAGEMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Scope: Maintain premises and public properties from accumulations of waste, debris, and rubbish, caused by operations. At completion of Work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials and clean all sight-exposed surfaces; leave project clean and ready for occupancy.

B. Dispose of all waste, debris and rubbish in accordance with the 0wner's requirements.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Use only cleaning materials recommended by the manufacturer of surface to be cleaned, but cross reference cleaning materials used on surfaces to insure they are recommended by the cleaning material manufacturer.

PART 3 - EXECUTION

3.01 DURING CONSTRUCTION

A. Execute cleaning to insure that structure, grounds, and surrounding properties are maintained free from accumulations of waste materials and rubbish. Wet down dry materials and rubbish to lay dust and prevent blowing dust. Clean site and surrounding properties at reasonable intervals during progress of Work, and remove waste materials, debris and rubbish from site and legally dispose of at public or private dumping areas off MDOT owned property. Handle materials in a controlled manner with as few handling as possible; do not drop or throw materials from heights. Schedule cleaning operations so that dust or other contaminants resulting from cleaning process will not fall on wet or newly painted surfaces.

B. No materials may be disposed of by dumping them in the sanitary or storm sewer systems without specific approval by the Owner.

C. Washdown of cement trucks will be done at locations determined by the Project Engineer.

3.02 FINAL CLEANING

A. Employ experienced workmen, or professional cleaners, for final cleaning. In preparation for Inspection of structure, conduct final inspection of sight-exposed surfaces and concealed spaces. Remove grease, dust, dirt, stains, labels, fingerprints and other foreign materials from sight-exposed finished surfaces. Repair, patch and touch up marred surfaces to specified finish to match adjacent surfaces.

B. Remove temporary fencing and leave in same condition as surrounding landscaped areas.

C. Broom clean paved surfaces; rake clean other surfaces of grounds. Keep Project clean until occupied by Owner.

END OF SECTION

SECTION 01 77 00 CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Scope of Work required under this Section consists of the Final Inspections, submitting of all closeout Documents and related items to complete the Work indicated on the Drawings and described in the Project Manual.

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. All Warranties and Extended Warranties shall use this Date of Completion as the starting date of Warranty Period.

C. 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 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 (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 78 23 OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Emergency manuals.
2. Operation manuals for systems, subsystems, and equipment.
3. Maintenance manuals for the care and maintenance of products, materials, a finishes systems and equipment.

B. Related Sections include the following:

1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Division 01 Section "Closeout Procedures" for submitting operation and maintenance manuals.
3. Division 01 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
4. Divisions 02 through 49 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.02 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.03 SUBMITTALS

A. Initial Submittal: Submit 2 draft copies of each manual with request for Final Inspection. Include a complete operation and maintenance directory. MDOT Architect will return one copy of draft and mark whether general scope and content of manual are acceptable.

B. Final Submittal: Submit 2 copies of each manual in final form at least 5 days before Owner’s Final Inspection. MDOT Architect will return one copy with comments (if required) within 15 days after Owner’s Final Inspection.

1. Correct or modify each manual to comply with MDOT Architect's comments. Submit 2 copies of each corrected manual within 15 days of receipt of MDOT Architect's comments.

1.04 COORDINATION

A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.01 MANUALS, GENERAL

A. 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.

B. 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, address, and telephone number of Contractor.
6. Name and address of Architect.
7. Cross-reference to related systems in other operation and maintenance manuals.

C. 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.

D. 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.

1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2 inches by11 inches paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
   a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
   b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL", Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. 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 diskettes for computerized electronic equipment.

4. Supplementary Text: Prepared on 8-1/2 inches by11 inches white bond paper.
5. 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. Chemical release or spill.
8. System, subsystem, or equipment failure.

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.
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.
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 MANUAL

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 MANUAL

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 printed 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 videotape, if available from manufacturers / suppliers.

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. Scheduled 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. Include procedures to follow and required notifications for warranty claims.

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.

1. 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.
2. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

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 "Project Record Documents."

F. Comply with Division 01 Section "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 DESCRIPTION

A. Scope: To set forth the minimum procedure and requirements for keeping the Project Record Documents. One of these Documents is to be kept on site throughout the Project.

1.02 MAINTENANCE OF DOCUMENTS

A. Maintain 2 copies of all: Half-size Contract Drawings, Project Manual (Proposal), Addenda, Change Orders(Supplemental Agreements), Warranties, Certificates, Guarantees, Bonds, reviewed Shop Drawings, reviewed submittals (materials, fixtures, appliances, etc.), hardware schedules, field and laboratory test records, equipment brochures, spare parts lists, maintenance and operation manuals and other modifications to the Contract.

B. Store Record Documents apart from Documents used for construction.

C. Maintain Record Documents in clean, dry, and legible condition. Do not use Record Documents for construction purposes.

D. Make Record Documents available at all times for inspection by the Project Engineer, MDOT Architect and Owner.

1.03 RECORDING

A. General: Mark all modifications in red pencils. Keep Record Documents current. Review log at Progress Meetings. Do not permanently conceal any Work until required information has been accurately recorded.

B. Contract Drawings: Legibly mark to record actual construction:

1. Horizontal and vertical location of underground and overhead utilities with their connections referenced to permanent surface improvements.
2. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
3. Field changes that involve dimension and detail.
4. Changes made by Supplemental Agreement (Change Order) or Field Order.

C. Project Manual (Proposal) and Addenda: Legibly mark up each Section to record manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.

D. Shop Drawings: Maintain as Record Documents; legibly mark Drawings to record changes made after review.

1.04 SUBMITTALS

A. Furnish two (2) copies of all Record Documents.

B. 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.

C. The name and address of each subcontractor and material supplier shall be listed in front of each binder along with the Project Manual (Proposal).

D. 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.

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 RELATED SECTIONS

A. Division 01 Sections

B. Section 03 20 00 - Concrete Reinforcing.

C. Section 03 30 00 - Cast-in-Place Concrete.

D. Section 07 26 00 - Vapor Retarders

1.02 REFERENCES

A. ACI

1. ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials.
2. ACI 301 – Standard Specifications for Structural Concrete.
3. ACI 318 – Building Code Requirements for Structural Concrete.
4. ACI 347 – Guide to Formwork for Concrete.

B. ASTM

1. ASTM D1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
2. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.
3. ASTM E154 – Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
4. ASTM E1643 – Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
5. ASTM E1745 – Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
6. ASTM E1993 – Standard Specification for Bituminous Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
7. ASTM F1249 – Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.

1.03 SUBMITTALS

A. Submit manufacturer’s data for:

1. Expansion/Isolation Joint Filler.
2. Waterstops.

1.04 DESIGN OF FORMWORK

A. Design of formwork, shoring, and reshoring and its removal is the Contractor's responsibility.

B. Design of formwork, shoring, and reshoring shall conform to ACI 117, ACI 301, ACI 318, and ACI 347.

C. Design formwork in a manner such that existing or new construction is not overloaded.

PART 2 - PRODUCTS

2.01 FORM MATERIALS

A. Form Material: Wood, plywood, metal, fiberglass or a combination of these, with sufficient strength to prevent distortion.

B. Form Definitions

1. Standard Forms: No form-facing material required. Standard forms are acceptable everywhere except for Architectural Concrete elements.

2.02 FORMWORK ACCESSORIES

A. Formwork Accessories: Commercially manufactured products, including ties and hangers. Do not use nonfabricated wire form ties.

2.03 FORM RELEASE AGENT

A. Form release agent: Non-staining type, “Noxcrete" or approved equal. Release agent must not affect bonding of finishes on exposed concrete.

2.04 EXPANSION / ISOLATION JOINT FILLER

A. Expansion / Isolation Joint Filler: ASTM D1751, asphalt impregnated premolded fiberboard, 1/4-inch thick by full thickness of slab or joint, unless indicated otherwise in the Structural Drawings.

2.05 CONSTRUCTION JOINTS

A. Slabs On Grade: Steel plate dowel (3/8” thick) such as manufactured by PNA Construction Technologies, Inc., Greenstreak Group, Inc., or approved equal.

PART 3 - EXECUTION

3.01 GENERAL

A. Erect formwork in accordance with ACI 301 and ACI 347.

B. Finished work shall comply with tolerances of ACI 117.

C. Provide 3/4-inch chamfer at all formed corners.

3.02 FOUNDATION ELEMENTS

A. Form foundation elements if soil or other conditions are such that earth trench forms are unsuitable.

B. Sides of perimeter grade beams, foundation walls, and turned-down slabs shall be formed.

C. Maintain minimum coverage of reinforcing steel as indicated in Structural Drawings.

3.03 FORM PREPARATION

A. Seal form joints to prevent leakage.

B. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed.

C. Before reinforcement is placed, coat contact surfaces of form with form release agent in accordance with manufacturer's recommendations. Do not allow excess form release agent to accumulate in forms or come in contact with concrete surfaces against which fresh concrete will be placed.

3.04 INSERTS AND EMBEDMENT ITEMS

A. Install and secure in position required inserts, embeds, hangers, sleeves, anchors, and nailers.

B. Locate anchor bolts/rods in position in accordance with approved setting drawings and secure to prevent displacement during concrete placement.

3.05 PROVISIONS FOR OTHER TRADES

A. Install openings in concrete formwork to accommodate work of other trades. Determine size and location of openings and recesses from trades requiring such items. Obtain approval from Structural Engineer for openings not shown in Structural Drawings.

B. Accurately place and securely support items built into forms.

3.06 CONSTRUCTION JOINTS

A. Slabs On Grade: Install steel plate dowels in accordance with manufacturer's recommendations. Place plate dowels at mid-depth of slab (+/-1/4-inch), unless noted otherwise in the Structural Drawings.

B. Framed Construction:

1. Install construction joints in accordance with ACI 318.
2. Obtain Architect/Structural Engineer's prior approval for use and location of joints.
3. Provide 1½-inch deep key-type construction joints at end of each placement for framed slabs, beams, walls, and footings. Bevel forms for easy removal.
4. Remove loose particles and latency from surface prior to placing the next lift. Chip the surface to a depth sufficient to expose sound concrete.

3.07 FORMWORK REMOVAL

A. Remove formwork carefully in such manner and at such time as to ensure complete safety of structure. Do not remove formwork, shoring, or reshoring until members have acquired sufficient strength to support their weight and the load thereon safely.

3.08 FINISHES OF FORMED SURFACES

A. Standard Form Finish: Patch tie holes and defects. Chip or rub off fins exceeding ¼ inch in height. Leave surface with the texture imparted by the forms.

END OF SECTION

SECTION 03 20 00 CONCRETE REINFORCING

PART 1 – GENERAL

1.01 SUMMARY

A. Related Sections:

1. Division 01 Sections
2. Section 03 10 00 – Concrete Forming and Accessories.
3. Section 03 30 00 – Cast-in-Place Concrete.

B. References:

1. ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials.
2. ACI 301 – Standard Specifications for Structural Concrete.
3. ACI 315 – Details and Detailing of Concrete Reinforcement.
4. ACI 318 – Building Code Requirements for Structural Concrete.
5. ASTM A185 – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete Reinforcement.
6. ASTM A615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
7. ASTM A706 – Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
8. ASTM A1044 – Standard Specification for Steel Stud Assemblies for Shear Reinforcement of Concrete.
9. AWS D1.4 – Structural Weld Code - Reinforcing Steel.
10. AWS D12.1 – Recommended Practices for Welding Reinforcing Steel Metal Inserts, and Connections in Reinforced Concrete Construction.
11. CRSI – Manual of Standard Practice.

1.03 SUBMITTALS

A. Refer to Structural Quality Assurance Plan in the Structural Drawings for additional submittal requirements.

B. Shop Drawings:

1. Notify Structural Engineer prior to detailing reinforcing steel shop drawings.
2. Indicate size, spacing, location and quantities of reinforcing steel and wire fabric, bending and cutting schedules, splice lengths, stirrup spacing, supporting and spacing devices. Detail reinforcing steel in accordance with ACI 315 and CRSI Standards.
3. Written description of reinforcement without adequate sections, elevations, and details is not acceptable.
4. Reproduction of Structural Drawings for shop drawings is not permitted. Electronic drawing files will not be provided to the Contractor.

C. Submit manufacturer's data for tension and compression splicers.

1.04 QUALITY ASSURANCE

A. Refer to the Structural Quality Assurance Plan in the Structural Drawings.

1.05 STORAGE AND PROTECTING

A. Store reinforcing steel above ground so that it remains clean. Maintain steel surfaces free from materials and coatings that might impair bond.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Deformed Reinforcing Steel: ASTM A615, refer to Structural Drawings for grade (Grade 60 minimum).

B. Welded Steel Wire Fabric: ASTM A185.

2.02 ACCESSORY MATERIALS

A. Annealed Steel Tie Wire: 16½ gage minimum.

B. Bar Supports: Plastic-tipped steel Class I bar supports conforming to CRSI Specifications. Concrete brick may be used to support reinforcement to obtain proper clearance from earth.

2.03 SPLICERS

A. Tension Splicers: Capable of developing 125% of the reinforcing steel ASTM specified minimum yield strength.

2.04 DOWEL ADHESIVE

A. Dowel Adhesive: EPCON System Ceramic 6 Epoxy adhesive supplied by ITW Ramset/Red Head, HIT HY150 injection adhesive supplied by Hilti Fastening Systems, Power-Fast epoxy injection gel or AC100 Plus supplied by Powers Fasteners, SET High Strength Epoxy supplied by Simpson, or approved equal.

PART 3 - EXECUTION

3.01 FABRICATION

A. Fabricate reinforcing steel in accordance with ACI 318 and CRSI standards.

B. Bend bars cold. Do not heat or flame cut bars. No field bending of bars partially embedded in concrete is permitted, unless specifically approved Structural Engineer and checked by Testing and Inspection Agency for cracks.

C. Weld only as indicated. Perform welding in accordance with AWS D1.4 and AWS D12.1.

D. Tag reinforcing steel for easy identification.

3.02 INSTALLATION

A. Before placing concrete, clean reinforcement of foreign particles and coatings.

B. Place, support, and secure reinforcement against displacement in accordance with ACI 318 and CRSI standards. Do not deviate from alignment or measurement.

C. Place concrete beam reinforcement support parallel to main reinforcement.

D. Locate welded wire reinforcement in the top third of slabs. Overlap mesh one lap plus two inches at side and end joints.

E. Furnish and install dowels or mechanical splices at intersections of walls, columns and piers to permit continuous reinforcement or development lengths at such intersections.

F. Maintain cover and tolerances in accordance with ACI and CRSI Specifications, unless indicated otherwise on Structural Drawings.

3.03 SPLICES

A. Do not splice reinforcement except as indicated on Structural Drawings.

B. Tension couplers may be used and installed in accordance with manufacturer's recommendations.

3.04 HEADED STUD ASSEMBLIES

A. Place headed stud assemblies as indicated in the Structural Drawings.

3.05 DOWELS IN EXISTING CONCRETE

A. Install dowels and dowel adhesive in accordance with manufacturer’s recommendations.

B. Minimum embedment length into the existing concrete shall be 12 bar diameters, unless noted otherwise.

END OF SECTION

SECTION 03 30 00 CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. All cast-in-place concrete and other related items necessary to complete Project indicated by Contract Documents unless specifically excluded.

1.02 RELATED SECTIONS

A. Section 03 10 00 – Concrete Forming and Accessories.

B. Section 03 20 00 – Concrete Reinforcing.

C. Section 07 26 00 – Vapor Retarders.

D. Section 09 90 00 – Painting and Coating.

1.03 SUBMITTALS

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

1.04 TESTING LABORATORY SERVICES

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

1.05 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. 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, 2004 Edition, except concrete requiring a trowel finish shall not be air entrained. 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, 2004 Edition.

C. The Owner will mold and cure compression test cylinders (two cylinders per set) from concrete at the job site from the first placement of each mix design placed each day and additionally for each 75 cubic yards, or fraction thereof, of each mix design placed in a single day. In addition to sampling concrete in accordance with ASTM C 172, the Owner will follow the sampling requirements Paragraph 6.1.2 in the latest edition of the Department's *Concrete Field Manual*. 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. 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. 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. Copies of all test reports shall be furnished to the ready mixed concrete producer and as directed by the Project Engineer.

1.06 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

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 shall have 3,500-psi minimum compressive strengths at 28 days, unless noted otherwise.

C. Maximum slump for normal weight concrete shall be 4 inches. Sump may be increased to 6 inches with an approved mid-range water reducer and up to 8 inches with an approved high-range water reducer.

2.02 CONCRETE MATERIALS

A. Portland Cement: ASTM C-150, Type I.

B. Water: From an approved source.

C. Structural Concrete Aggregate: Nominal maximum aggregate size 57 shall be used and shall meet the requirements of MDOT Standard Specifications, 2004 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. The 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. 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. 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 PLACING CONCRETE

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 lease three hours.
2. Surfaces 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. 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. Blend standard Portland cement and white Portland cement, amounts determined by trial patches, so that the final color of dry grout will closely match adjacent concrete surfaces.

B. Thoroughly wet concrete surfaces and apply grout immediately to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.

END OF SECTION

SECTION 03 62 00 NON-SHRINK GROUTING

PART 1 - GENERAL

1.01 RELATED SECTIONS

A. Division 01 Sections

1.02 REFERENCES

A. CRD-C621 – Specification for Non Shrink Grout Packaged Dry, Hydraulic-Cement Grout.

B. ASTM C109 – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens).

C. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

1.03 QUALITY ASSURANCE

A. Refer to the Structural Quality Assurance Plan in the Structural Drawings.

1.04 SUBMITTALS

A. Refer to Structural Quality Assurance Plan in the Structural Drawings for additional submittal requirements.

PART 2 - PRODUCTS

2.01 GROUT

A. Grout: Flowable, non-shrink, non-metallic in accordance with CRD-C-621 and ASTM C1107.

B. Compressive Strength: 5,000 psi minimum at 28 days.

2.02 WATER

A. Water: Clean, potable water.

PART 3 - EXECUTION

3.01 HANDLING

A. Store and protect from moisture and contamination.

3.02 PREPARATION

A. Remove foreign materials including mud and dirt from areas to be grouted.

B. Use forms to contain grout. Forms shall be a minimum of 1½ inches larger on all sides than the item grouted.

3.03 MIXING

A. Mix grout to its fluid, self-leveling consistency in accordance with manufacturer's recommendations. Mix grout in a paddle-type mortar mixer; do not mix by hand.

B. Do not retemper grout. Do not exceed manufacturer's maximum limit on water content or use at a consistency that produces free bleeding.

3.04 PLACEMENT

A. Consolidate to provide grout uniformity. Do not vibrate grout.

3.05 PROTECTION

A. Protect grout and areas to be grouted from excessive heat and cold in accordance with manufacturer's Specifications. Protect grout from excessive drying shrinkage resulting from wind or direct sunlight. Protect areas grouted from excessive vibrations.

END OF SECTION

SECTION 04 22 00 CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.01 RELATED SECTIONS

A. Division 01 Sections.

B. Section 03 20 00 – Concrete Reinforcing.

C. Section 03 30 00 – Cast-in-Place Concrete.

1.02 REFERENCES

A. ACI 530.1-05/ASCE 6-05/TMS 602-05 – Specification for Masonry Structures.

B. ASTM

1. ASTM A82 – Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
2. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
3. ASTM A496 – Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
4. ASTM C90 – Standard Specification for Loadbearing Concrete Masonry Units.
5. ASTM C109 – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube Specimens).
6. ASTM C140 – Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
7. ASTM C144 – Standard Specification for Aggregate for Masonry Mortar.
8. ASTM C270 – Standard Specification for Mortar for Unit Masonry.
9. ASTM C404 – Standard Specification for Aggregates for Masonry Grout.
10. ASTM C476 – Standard Specification for Grout for Masonry.
11. ASTM C1019 – Standard Test Method for Sampling and Testing Grout.
12. ASTM C1314 – Standard Test Method for Compressive Strength of Masonry Prisms.
13. ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications.
14. ASTM D2287 – Standard Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds.

1.03 SUBMITTALS

A. Refer to Structural Quality Assurance Plan in Structural Drawings for additional submittal requirements.

B. Submit coarse grout mix design.

C. Shop Drawings: Submit for masonry reinforcement complying with Section 03 20 00.

D. Submit procedures for construction of masonry walls to be filled with coarse grout. Procedures should include low lift grouting as applicable to Project.

1.04 QUALITY ASSURANCE

A. Masonry construction and materials shall conform to all the requirements of ACI 530.1/ASCE 6/TMS 602, except as modified by the requirements of the Construction Documents.

B. Refer to the Structural Quality Assurance Plan in the Structural Drawings.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store materials in a dry condition to protect from elements and prevent contamination, deterioration, or damage due to moisture, temperature changes, contaminants, corrosion, and other causes.

PART 2 - PRODUCTS

2.01 CONCRETE MASONRY

A. Compressive Strength, f'm: See Structural Notes in the Structural Drawings.

2.02 CONCRETE MASONRY UNITS

A. Concrete masonry units: Comply with ASTM C90.

B. Weight: Lightweight.

C. Net Area Compressive Strength: As listed in Table 2 of ACI 530.1/ASCE 6/TMS 602 required for the specified f'm.

D. Face Dimensions: 16 inches long by 8 inches high nominal, unless indicated otherwise.

E. Special shapes: Where indicated on the Drawings.

2.03 MORTAR

A. Mortar: Type M or Type S in accordance with ASTM C270. Refer to Structural Drawings for locations.

B. Do not use admixtures that contain chlorides.

2.04 COARSE GROUT

A. Coarse Grout: In accordance with ASTM C476.

B. Compressive Strength: See Structural Notes in the Structural Drawings.

C. Slump: 8 and 10 inches.

D. Do not use admixtures that contain chlorides.

2.05 WATER

A. Water: Clean potable water free of deleterious substances.

2.06 REINFORCEMENT

A. Horizontal and Vertical Reinforcing Bars: Comply with Section 03 20 00.

2.07 HORIZONTAL JOINT REINFORCEMENT

A. Horizontal Joint Reinforcement: Manufactured with longitudinal, parallel, deformed side wires in accordance with ASTM A496 and of the size specified in the Structural Drawings. Cross wires shall be No. 9 gage, plain, in accordance with ASTM A82, unless noted otherwise in Structural Drawings.

B. Provide as a minimum, one side wire for each face shell of hollow masonry units. Provide additional side wires or eye sections for adjustable wall ties as specified for multiwythe wall construction.

C. Provide truss type joint reinforcement, except ladder type reinforcement shall be used for walls with vertical reinforcement.

D. Finish: Hot-dipped galvanized in accordance with ASTM A153, Class B-2.

E. Provide prefabricated corner and tee section accessories.

2.08 CONTRACTION JOINT MATERIAL

A. Contraction joint material:

1. Rubber shear keys complying with ASTM D2000, M2AA-805 and with a minimum durometer hardness of 80, or
2. PVC shear keys complying with ASTM D2287, Type PVC 654-4 and with a minimum durometer hardness of 85.

PART 3 - EXECUTION

3.01 PREPARATION

A. Cold weather masonry construction shall comply with ACI 530.1, Section 1.8, Paragraph C when either of the following conditions exist:

1. The ambient air temperature falls below 40 degrees Fahrenheit, or
2. The temperature of masonry units is below 40 degrees Fahrenheit.

B. Hot weather masonry construction shall comply with ACI 530.1, Section 1.8, Paragraph D when either of the following conditions exist:

1. The ambient air temperature exceeds 100 degrees Fahrenheit, or
2. The ambient air temperature exceeds 90 degrees Fahrenheit with a wind velocity greater than 8 mph.

3.02 CMU PLACEMENT

A. Use dry masonry units. No frozen or wet units shall be used.
B. Discard cracked, chipped, and spalled masonry units.

C. Lay hollow units as follows:

1. With full mortar coverage on horizontal and vertical face shells.
2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, pilasters, and in walls where adjacent to cells or cavities to be filled with grout.
3. For starting course on footings where cells are not to be grouted, spread out full mortar bed including area under cells.
4. Maintain joint widths indicated, except for minor variations to maintain joint alignment. If not indicated, lay walls with 3/8 inch joints.
5. Buttering corners of joints, deep or excess furrowing of mortar joints is not permitted.

D. Lay units in running bond, unless noted otherwise in the Structural Drawings.

E. Fully bond external corners of concrete masonry.

F. Where non-loadbearing masonry partitions extend to underside of floor, roof deck or structural system, stop masonry short 3/8 inch to ½ inch to allow for live load deflection. Fill gap with soft joint filler.

3.03 GROUT PLACEMENT

A. Execute placement of grout in accordance with ACI 530.1, Section 3.5.

B. Place coarse grout in maximum four-foot lifts, unless specifically approved in writing by the Architect/Structural Engineer.

C. Do not fill reinforced cells with mortar.

3.04 MOVEMENT JOINTS

A. Place expansion joints at locations indicated in the Structural Drawings.

1. Do not run any horizontal reinforcing through expansion joints.

B. Place contraction joints at locations indicated in the Structural Drawings.

1. Install contraction joint material.
2. Do not run horizontal reinforcement through contraction joints, except reinforcement in bond beams at floor and roof levels shall be continuous across contraction joints.

3.05 REINFORCEMENT

A. Place reinforcing bars as indicated in the Structural Drawings and in accordance with ACI 530.1, Section 3.4.

3.06 HORIZONTAL JOINT REINFORCEMENT

A. Place horizontal joint reinforcement in the horizontal mortar beds at spacings noted in the Structural Drawings and noted below.

B. For masonry below grade, space horizontal joint reinforcing at 8 inches vertically.

C. Place horizontal joint reinforcement above lintels and below sills at openings. Extend two feet beyond opening.

D. Joint reinforcement shall be continuous. Lap joint reinforcement a minimum of 6 inches.

3.07 ERECTION BRACING

A. Design, provide, and install temporary erection bracing during construction as required to stabilize erected masonry until complete structural system is constructed.

3.08 CLEANING AND POINTING

A. Dry brush masonry surfaces before mortar has set hard to remove mortar crumbs and accumulation.

B. Clean masonry with commercial brick cleaner approved by brick manufacturer. Protect other work from cleaning materials.

C. Cut out defective mortar and repoint.

3.09 PROTECTION OF FINISHED WORK

A. During erection cover top of wall, projections, and sills with strong waterproof membrane at end of each day's work.

1. Extend and secure cover a minimum of 24 in. down both sides.

B. Do not apply uniform floor or roof loading for at least 12 hours after placing masonry columns or walls.

C. Do not apply concentrated loads for at least 3 days after building masonry columns or walls.

END OF SECTION

SECTION 05 12 00 STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.01 RELATED SECTIONS

A. Division 01 Sections

B. Section 05 21 00 – Steel Joist Framing.

C. Section 05 31 00 – Steel Decking.

1.02 REFERENCES

A. AISC

1. AISC – Steel Construction Manual, 13th Edition.
2. AISC 303 – Code of Standard Practice for Steel Buildings and Bridges.
3. AISC 341-05 – Seismic Provisions for Structural Steel Buildings, including Supplement No. 1 dated 2006.
4. AISC 360-05 – Specification for Structural Steel Buildings.
5. AISC – Specification for Structural Joints Using ASTM A325 or A490 Bolts prepared by the Research Council on Structural Connections.

B. AWS

1. AWS D1.1 – Structural Welding Code.
2. AWS A5.1 – Specification for Carbon Steel Electrodes for Shield Metal Arc Welding.
3. AWS A5.5 – Specification for Low-Alloy Steel Covered Arc Welding Electrodes.
4. AWS A5.17 – Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding.
5. AWS A5.20 – Specification for Carbon Steel Electrodes for Flux Cored Arc Welding.

C. SSPC – Steel Structures Painting Manual.

D. ASTM

1. ASTM A6 – Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
2. ASTM A36 – Standard Specification for Carbon Structural Steel.
3. ASTM A123 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
4. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
5. ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
6. ASTM A325 – Standard Specification for Structural Bolts, Heat Treated, 120/105 KSI Minimum Tensile Strength.
7. ASTM A490 – Standard Specification for Structural Bolts, Alloy Steel, Heat-Treated, 150 KSI Minimum Tensile Strength.

8. ASTM A500 – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
9. ASTM A501 – Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
10. ASTM A563 – Standard Specification for Carbons and Alloy Steel Nuts
11. ASTM A572 – Standard Specification for High-Strength Low-Alloy Columbium Vanadium Structural Steel.
12. ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
13. ASTM A992 – Standard Specification for Structural Steel Shapes.
14. ASTM F436 – Standard Specification for Hardened Steel Washers.
15. ASTM F844 – Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.
16. ASTM F1554 – Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-Ksi Yield Strength.
17. ASTM F1852 – Standard Specification for "Twist Off" Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

1.03 SUBMITTALS

A. Refer to Structural Quality Assurance Plan in the Structural Drawings for additional submittal requirements.

B. Shop Drawings:

1. Contact Structural Engineer's Construction Administrator prior to detailing structural steel shop drawings.
2. Shop drawings shall be submitted on a 24" x 36" sheet minimum.
3. Shop drawings shall clearly indicate the profiles, sizes, ASTM Grade, spacing and locations of structural steel members, including connections, attachments, anchorages, framed openings, sizes and types of fasteners, method of tightening fasteners, cambers, and the number, type and spacing of the stud shear connectors and headed studs.
4. Beam sizes shall be shown on the erection drawings (plans).
5. Submit shop drawings for review.
6. Reproduction of Structural Drawings for shop drawings is not permitted. Electronic drawing files will not be provided to the Contractor.

C. Maintain at construction office written welding procedures for each type of welded joint used in accordance with AWS D1.1.

D. Submit certification that the fabricator meets the required qualifications and ultrasonic testing reports for complete penetration welds. If fabricator has an independent testing agency inspect fabrication as required by these specifications, submit the name and qualifications of the independent testing agency.

E. Upon request, submit the erection sequence and procedures to be used by the steel erector.

F. Submit certification that the erector meets the required qualifications.

1.04 QUALITY ASSURANCE

A. Refer to the Structural Quality Assurance Plan in the Structural Drawings.

1.05 FABRICATOR'S QUALIFICATIONS

A. Steel fabricator shall meet the requirements in the Structural Quality Assurance Plan in the Structural Drawings.

1.06 ERECTOR'S QUALIFICATIONS

A. Erector shall be experienced in erecting structural systems similar in complexity to this Project as evidenced by 10 completed projects.

B. Erector shall have a minimum of 5 years experience in the erection of structural steel or is an AISC Certified Advanced Steel Erector.

C. For qualification of welders, refer to the Structural Quality Assurance Plan in the Structural Drawings.

1.07 STORAGE

A. Store materials off ground to permit easy access for inspection and identification. Store steel members and packaged items in a manner that provides protection against contact with deleterious materials.

PART 2 - PRODUCTS

2.01 ANCHOR RODS

A. Anchor Rods: Headed rod or a threaded rod with a heavy hexagonal nut and plate washer welded to the bottom of the threaded rod conforming to ASTM F1554.

B. Nuts and Washers: Two hexagonal nuts and two plate washers conforming to ASTM A36 for each anchor rod assembly.

2.02 ROLLED STEEL SHAPES, PLATES, AND BARS

A. Rolled Steel Shapes, Plates, and Bars: ASTM A36; ASTM A572, Grade 50; or ASTM A992 as indicated by the Structural Drawings. ASTM A572, Grade 50 may be substituted for ASTM A992.

2.03 ROUND STRUCTURAL STEEL TUBING

A. Round Structural Steel Tubing: ASTM A501, 36 ksi minimum yield strength.

2.04 SHAPED STRUCTURAL STEEL TUBING

A. Shaped Structural Steel Tubing: ASTM A500, Grade B, 46 ksi minimum yield strength.

2.05 NON-HIGH-STRENGTH FASTENERS

A. Non-High-Strength Bolts: ASTM A307, Grade A, 60 ksi minimum, where noted on the Structural Drawings.

B. Hardened Steel Washers: ASTM F436.

2.06 HIGH-STRENGTH FASTENERS

A. High-Strength Bolts: ASTM A325 or ASTM A490 as noted on the Structural Drawings. 3/4-inch minimum diameter.

B. Hardened steel washers shall conform to ASTM F436.

C. Spline-Type Tension Control Bolts: ASTM spline-type tension control bolts with plain hardened washers and suitable nuts are an acceptable alternate design bolt assembly.

D. Do not use load indicating washers.

2.07 STUD SHEAR CONNECTORS

A. Stud Shear Connectors: 3/4-inch diameter in compliance with AWS D1.1.

2.08 HEADED STUDS

A. Headed Studs: Comply with AWS D1.1. Provide studs with the diameter shown on the Structural Drawings.

2.09 EXPANSION ANCHORS

A. Expansion Anchors: See Structural Notes.

2.10 ADHESIVE ANCHORS

A. Adhesive Anchors: See Structural Notes.

2.11 SCREW ANCHORS

A. Screw Anchors: See Structural Notes.

2.12 WELD ELECTRODES

A. Weld Electrodes: AWS A5.1, A5.5, A5.l7, or A5.20 E-70 series low hydrogen electrodes.

B. Properly store electrodes to maintain flux quality.

2.13 PAINT

A. Oxide Primer: AISC Specifications, Code of Standard Practice, and SSPC Steel Structure Painting Manual, unless indicated otherwise.

B. Paint Primer: Free of lead and chromate and comply with State and Federal volatile organic compound (VOC) requirements.

C. Paint Primer: Compatible with finish coating.

2.14 GALVANIZE

A. Galvanized Coating: ASTM A123.

B. Galvanize Bolts, Nuts, and Washers: ASTM A153 when used to connect steel members that are specified to be galvanized.

C. Expansion Anchors, Adhesive Anchors, or Screw Anchors: Where specified to be galvanized, anchors shall be mechanically galvanized in accordance with ASTM B695, Class 65, Type I.

PART 3 - EXECUTION

3.01 GENERAL

A. Fabricate and erect structural steel in accordance with AISC Specifications and Code of Standard Practice.

B. Notify Architect/Structural Engineer and Structural Testing/Inspection Agency at least 48 hours prior to structural steel fabrication and erection.

3.02 ANCHOR ROD SETTING

A. Provide templates for setting anchor rods. Position anchor rods by using templates with two nuts to secure in place prior to placement of concrete.

B. Do not erect steel where anchor rod nuts will not have full threads.

3.03 CONNECTIONS

A. Provide a minimum of two fasteners at each bolted connection.

B. Ensure fasteners are lubricated prior to installation.

C. Provide high-strength bolted connections in accordance with AISC Specifications for Structural Joints using ASTM A325 or A490 Bolts.

D. Provide connections for expansion and contraction where steel beams connect to concrete walls or concrete columns and at expansion joints. Secure nuts on bolts against loosening. (Dent threads with a chisel.)

3.04 FASTENER INSTALLATION

A. Bolts shall be installed in holes of the connection and brought to snug tight condition. Tighten connection progressing systematically from the most rigid part to the free edges of the connection to minimize relaxation of the bolts.

B. High-strength bolts installed shall have a hardened washer under the element turned in tightening.

C. Installation and tightening of bolts shall conform to the AISC Specifications for Structural Joints.

3.05 STUD SHEAR CONNECTORS FOR COMPOSITE CONSTRUCTION

A. Stud shear connectors shall be installed in accordance with AWS D1.1 with the resulting in-place length after burn-off as shown on the Structural Drawings.

B. Stud shear connectors shall be placed as follows:

1. Studs shall be uniformly spaced along beams.
2. Locate studs directly over the web of beams with flanges less than 0.3 inches thick.
3. Minimum spacing shall be 4½ inches along the longitudinal axis of the beam and 3 inches transverse to the longitudinal axis of the beam.
4. Where double rows of studs are required, begin double rows at each end of the beam. If possible, locate the studs at least 2 inches from the edge of the flange to the centerline of stud, but in no case locate the stud less than 1-1/4 inches from the edge of the flange to the centerline of stud.
5. Refer to the Structural Drawings for additional placement guidelines.

C. Remove ceramic arc shields after welding studs.

3.06 HEADED STUDS

A. Headed studs shall be installed in accordance with AWS D1.1 with the resulting in-place length after burn-off as shown on the Structural Drawings.

B. Do not locate headed studs closer than 1-1/4 inches from the edge of embedded steel member to the centerline of the stud.

C. Remove ceramic arc shields after welding studs.

3.07 EXPANSION ANCHOR INSTALLATION

A. Install in accordance with manufacturer's recommendation and the ICC ESR report for the particular anchor used.

B. Minimum Embedment: See Structural Notes on Drawings.

3.08 ADHESIVE ANCHOR INSTALLATION

A. Install in accordance with manufacturer's recommendation and the ICC ESR report for the particular anchor used.

B. Minimum Embedment: See Structural Notes on Drawings.

3.09 SCREW ANCHOR INSTALLATION

A. Install in accordance with manufacturer's recommendation and the ICC ESR report for the particular anchor used.

B. Minimum Embedment: See Structural Notes on Drawings.

3.10 WELDING

A. Comply with AWS D1.1. Use prequalified weld procedures.

B. Provide end returns where fillet welds terminate at ends or sides. Returns shall be continuous for a distance of not less than two times the nominal size of the weld.

C. Complete penetration joints shall be backgouged to sound metal before the second side is welded or have 1/4-inch root opening with 3/16 x 1 inch backing bar. Access holes are required. Filling access holes is not required.

D. Remove all slag and weld splatter from deposited weld metal.

3.11 SPLICING

A. Splice members only where indicated unless authorized in writing by Structural Engineer.

B. Provide shim plates at bottom flange splice at continuous beam splices with different depths.

3.12 CUTTING

A. Do not use flame cutting to correct errors unless authorized in writing.

B. Re-entrant corners shall have a minimum radius of one inch and be free of notches. Notches and gouges resulting from flame cutting shall be finished to a smooth appearance.

3.13 MILL SCALE

A. Remove loose mill scale.

3.14 BOLT HOLES

A. Cut, drill, or punch holes perpendicular to metal surfaces. Do not enlarge holes by burning. Drill or punch holes in bearing plates. Remove burrs.

3.15 PAINTING

A. Paint steel that is not encased in concrete, plaster, or sprayed fireproofing. Do not shop paint in areas to be field welded, contact surfaces of slip critical connections, or areas to receive special finishes.

B. Field paint as required steel that has been welded or that is unpainted after connections have been tightened.

3.16 GALVANIZING

A. Galvanize shelf angles that support the exterior building veneer, for example brick shelf angles.

B. Galvanize environmentally exposed steel, for example mechanical equipment supports.

C. Touch-up welds and abrasions in galvanized members in accordance with ASTM A780.

END OF SECTION

SECTION 05 21 00 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Section includes the design, manufacture, and erection of steel joists shown in the Structural Drawings.

1.02 RELATED SECTIONS

A. Division 01 Sections

B. Section 05 12 00 – Structural Steel Framing.

C. Section 05 31 00 – Steel Decking.

1.03 REFERENCES

A. ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

B. AWS D1.1 – Structural Welding Code.

C. OSHA – Safety and Health Regulations for Construction, Steel Erection, Open Web Steel Joists, Part 1926.757.

D. SJI – Standard Specifications for Open Web Steel Joists, K-Series.

E. SSPC – Paint 15 Steel Joist Shop Primer.

F. VULCRAFT – Specifications for Vulcraft Super Longspan Steel Joists, SLH-Series.

1.04 DESIGN REQUIREMENTS

A. Steel joists and bridging shall be designed by a Structural Engineer licensed in the project state in accordance with the Steel Joist Institute (SJI) Standard Specifications.

B. Refer to Structural Drawings for special design requirements, if any.

1.05 SUBMITTALS

A. Refer to Structural Quality Assurance Plan in the Structural Drawings for additional submittal requirements.

B. Shop Drawings:

1. Shall include the following:
   a. Plan of joist layout showing mark, number, type, location, bracing, and spacing of joists.
   b. Connection and seat details.
   c. Bridging requirements.
2. Shall be signed and sealed by an Engineer licensed in the Project state.

C. Upon request, submit the erection sequence and procedures to be used by the steel erector.

1.06 QUALITY ASSURANCE

A. Refer to the Structural Quality Assurance Plan in the Structural Drawings.

1.07 QUALIFICATIONS

A. Manufacturer shall be a member of the Steel Joist Institute.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store and handle joists as recommended in SJI Standard Specifications.

PART 2 - PRODUCTS

2.01 ROLLED STEEL PLATES, SHAPES, AND BARS

A. Steel: Steel in accordance with SJI Standard Specifications.

2.02 UNFINISHED BOLTS, WASHERS, AND NUTS

A. Unfinished Bolts: ASTM A307, Grade A, 60 ksi minimum tensile strength. Provide compatible hexagonal nuts and plain washers.

2.03 WELD ELECTRODES

A. Weld Electrodes: E-70 series low hydrogen electrodes conforming to AWS A5.1 or A5.5, A5.17 or A5.20.

B. Provide proper storage for electrodes to maintain flux quality.

2.04 PAINT

A. Primer shall conform to Steel Structures Painting Council Specification SSPC – Paint 15.

PART 3 - EXECUTION

3.01 MANUFACTURE AND ERECTION

A. Manufacture and erect joists in accordance with SJI Standard Specifications and OSHA Steel Erection Standards.

B. Members shall have parallel top and bottom chords unless otherwise indicated.

C. Provide for connections of kickers and hangers to members.

D. Provide bottom chord extensions at columns and as indicated by the Construction Drawings. Weld bottom chords to members after dead loads have been applied.

E. Provide ceiling extensions in areas having ceilings attached directly to joist bottom chord (not suspended ceilings). Extend ends to within 1/2 inch of the finished wall surface unless otherwise indicated.

F. Camber joists according to recommendations in the SJI Standard Specifications, unless noted otherwise on Structural Drawings. Negative camber and bent joists are unacceptable.

G. Do not erect joists until supporting work is secured.

H. Provide bridging complying with SJI Standard Specifications. Provide for connections where bridging terminates.

3.02 CONCENTRATED LOADS ON JOISTS

A. Do no place concentrated loads on the joists that are not shown in the Structural Drawings without receiving written consent from the steel joist manufacturer. Reinforcement required for concentrated loads applied to either the top or bottom chord shall be designed by joist manufacturer.

3.03 HEADER UNITS

A. Provide header units to support openings in floor or roof system not framed with steel shapes.

3.04 SHOP PAINTING

A. Remove loose scale, heavy rust, and other foreign materials from joists and accessories before application of shop paint.

B. Apply one shop coat of steel joist primer paint to joists and accessories, by spray, dipping, or other method to provide a continuous dry paint film thickness of not less than 1.50 mil.

3.05 BEARING

A. Extend ends of steel joists not less than 4 inches over masonry and concrete supports. Extend ends of joists not less than 2½ inches over steel supports. Positive attachment to support shall be made by welding or bolting. In such cases where a shorter end bearing length must be used, such condition must be designed.

B. Fabricate sloped bearing seats where indicated on Drawings or where slope of joist exceeds 1/4 inch per foot.

3.06 WELDING

A. Perform welding in accordance with AWS D1.1 "Structural Welding Code". Use AWS Certified Welders.

B. Weld ends of joists resting on steel supports with the minimum weld specified by the SJI standard specifications, unless otherwise indicated in the Structural Drawings.

C. Remove all slag and weld splatter from deposited weld material.

3.07 BRIDGING INSTALLATION

A. Permanently fasten bridging before the application of loads. Secure to steel beams or CMU walls where possible; otherwise terminate bridging with X-bracing to joists top chord.

B. In areas where joists will be exposed to view, align bridging in straight rows to create uniform appearance.

3.08 PROTECTION

A. Provide means for adequate distribution of concentrated loads so that carrying capacity of joists is not exceeded during construction.

B. Provide temporary bridging, bracing, connections, and anchors to ensure lateral stability during construction.

C. Joists damaged during construction shall be replaced or repaired with procedures submitted by the joist manufacturer.

3.09 CUTTING

A. Do not field cut or apply heat to joists unless authorized in writing.

3.10 REPAIRS OR MODIFICATIONS

A. If a steel joist is damaged or its bearing condition must be modified, Contractor shall have the joist supplier provide a sketch showing the required repairs or modifications.

END OF SECTION

SECTION 05 31 00 STEEL DECKING

PART 1 - GENERAL

1.01 RELATED SECTIONS

A. Division 01 Sections

B. Section 05 12 00 – Structural Steel Framing.

C. Section 05 21 00 – Steel Joist Framing.

1.02 REFERENCES

A. AISI – Specifications for the Design of Cold-Formed Steel Structural Members.

B. AWS D1.1 – Structural Welding Code.

C. AWS A5.5 – Specifications For Low Alloy Steel Covered Arc-Welding.

D. SDI 31 – Design Manual for Composite Decks, Form Decks, and Roof Decks

E. SDI RDCH1 – Roof Deck Construction Handbook

F. SDI DDMO3 – Diaphragm Design Manual, Third Edition

G. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

H. ASTM A1008 – Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

1.03 SUBMITTALS

A. Notify the Structural Engineer prior to detailing shop drawings.

B. Submit detailed shop drawings showing layout and types of deck panels, weld sizes, weld patterns and conditions requiring closure panels, supplementary framing, sump pans, cant strips, cut openings, special jointing or other accessories.

C. Submit manufacturer's information including section properties, deck gage, material yield strength, etc. for each type of steel deck required. The submittal shall demonstrate that the deck complies with the minimum section and material properties indicated in the structural notes and this Specification.

D. Submit supporting documentation and manufacturer's information for deck that does not comply with the minimum section and material properties specified. Deck shall be designed for the design criteria outlined herein and the submittal shall be stamped and signed by an Engineer licensed in the project state.

E. Upon request, submit mill certification that the steel supplied meets these Specifications.

F. Upon request, submit written welding procedures.

G. Submit manufacturer's certification of compliance with supplementary framing, sump pans, cant strips, curb openings, special jointing and other accessories.

1.04 QUALITY ASSURANCE

A. Refer to the Structural Quality Assurance Plan in the Structural Drawings.

B. Welders shall be certified by AWS for the welding process involved.

C. Fire Rated Assemblies: For steel decking that is a part of a specified fire rated assembly, identify steel deck bundles with labels bearing the U.L. mark.

1.05 STORAGE

A. Store materials off ground to permit easy access for inspection and identification. Store steel members and packaged items in a manner that provides protection against contact with deleterious materials.

PART 2 - PRODUCTS

2.01 GENERAL

A. Provide steel deck sheets of three spans minimum wherever possible.

2.02 DECK ATTACHMENT

A. Use E-60 series electrodes conforming to AWS A5.5.

B. Provide weld washers for material thinner than 22 gage.

2.03 PERMANENT FORM DECK

A. Permanent Form Deck: Steel sheets, minimum yield strength of 60,000 pounds per square inch, ASTM A653, gage as indicated on Drawings.

B. Finish: Galvanized, G60 coating.

PART 3 - EXECUTION

3.01 GENERAL

A. Installer must examine the areas and conditions under which metal decking is to be installed 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 Installer.

B. Steel deck shall be installed in accordance with the approved shop drawings, requirements of the Steel Deck Institute, the manufacturer's recommendations, and any applicable regulatory, safety guidelines.

3.02 PLACEMENT

A. Place steel deck units on supporting steel framework and adjust to final position before permanently fastening. Install deck units and accessories in accordance with manufacturer's recommendations and the Drawings, and as specified herein.

3.03 CUTTING

A. Cut holes in deck indicated by the Drawings. Other holes required shall be supplied by those requiring them. Obtain written authorization for additional holes and cutting not indicated on erection drawings.

3.04 WELDING

A. Perform welding in accordance with AWS Structural Welding Code.

B. Install weld washers for deck thinner than 22 gage.

3.05 CONCENTRATED LOADS

A. Concentrated loads suspended from the steel deck shall not exceed 50 pounds. No more than one suspended load shall be located in the sheet width in any span.

3.06 DECK SUPPORTS

A. Fasten deck to steel framework at ends and at each intermediate support by welding according to manufacturer's specifications unless indicated otherwise on structural drawings or otherwise specified herein. Do not weld deck in place until all bolted and welded connections for the structural frame are complete. A minimum of one floor over the area to be decked is to be bolted and welded prior to welding deck in place.

3.07 PERMANENT FORMS

A. Place forms in straight alignment for the entire length of the run of the sheets. Lap ends of sheets two inches.

B. Attach side laps of deck with screws spaced at a maximum of 24 inches on center for spans greater than 4'-0 unless, unless shown otherwise on the Drawings.

C. Weld deck in place with ½-inch puddle welds and weld washers with welds on each side of the sheet plus two intermediate welds at each support, unless shown otherwise on the Drawings.

END OF SECTION

SECTION 05 41 00 COLD-FORMED EXTERIOR STEEL STUD FRAMING

PART 1 - GENERAL

1.01 RELATED SECTIONS

A. Division 01 Sections.

B. Section 05 40 00 – Cold-Formed Steel Framing.

1.02 REFERENCES

A. AISI S100-07 – North American Specification for the Design of Cold-Form Steel Structural Members.

B. AISI S200-07 – North American Standard for Cold-formed Steel Framing – General Provisions.

C. ANSI Z49.1 – Safety in Welding, Cutting, and Allied Processes.

D. ASTM A653 – Standard Specification for Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

E. ASTM A924 – Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

F. AWS D1.3 – Structural Welding Code: Sheet Steel.

G. SSMA – Steel Stud Manufacturers Association Product Technical Information.

1.03 DESIGN REQUIREMENTS

A. Design of the following is the sole responsibility of the Contractor:

1. Cold-formed exterior steel studs including tracks, bridging, and window or door framing.
2. Any required temporary and permanent restraint/bracing.

B. Cold-formed exterior steel stud framing shall be designed by a Structural Engineer licensed in the Project state. Design criteria includes, but not limited to, the following:

1. Deflection of steel studs shall not exceed L/360.
2. Wind pressure for Components and Cladding as indicated in the Structural Notes.

C. Cold-formed steel design, fabrication and erection shall conform to AISI S100 and AISI S200.

D. Stud depth, layout and configuration of cold-formed exterior steel studs shall be compatible with the plans, sections, and details of the Construction Documents.

1.04 SUBMITTALS

A. Refer to Structural Quality Assurance Plan in the Structural Drawings for additional submittal requirements.

B. Shop Drawings

1. Shall include the following:
   a. Plans, cross-sections, or elevations as necessary to adequately depict component locations.
   b. Connection details showing screw types and locations, weld lengths or other fastener requirements.
   c. Bracing locations and details. Any required bracing to the primary structure that is not shown in the Construction Documents shall be specifically identified.
2. Design loads.
3. Shall be sealed by an Engineer licensed in the Project state.

C. Submit manufacturer's product information clearly describing quality, performance and finish for steel studs.

D. Submit manufacturer and Installer qualifications.

1.05 QUALITY ASSURANCE

A. Manufacturer shall have a minimum of three years documented experience in the manufacturing of products required by the Construction Documents.

B. Installer shall have a minimum of three years documented experience.

1.06 MOCKUP

A. Provide a minimum of one mockup of exterior wall framing sufficient in size to illustrate various construction conditions and as directed by the Architect. Construct mock-up to include, but not be limited to, the following components:

1. Stud framing, including runners, bridging, outlet box framing and other farming accessories. Include interior and exterior corner conditions, and intersections with interior rated stud walls.
2. Typical window frame, door frame and expansion joint.
3. Insulation, sheathing and vapor retarder.

B. The approved sample will serve as the standard of quality, as well as for coordination with related components.

C. Leave approved mock-up ready to receive insulated metal panel mock-up.

D. Do not place mock-up to remain as a part of the Work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Studs and accessories which are 12, 14, or 16 gage shall meet the requirements of ASTM A446, Grade D with a minimum yield of 50,000 psi. Studs and accessories which are 18 or 20 gage shall meet the requirements of ASTM A446, Grade A with a minimum yield of 33,000 psi.

B. Studs and accessories shall have a G60 galvanized coating meeting the requirements of ASTM A525.

2.02 ACCESSORIES

A. Bridging: 1-1/2-inch deep by 16 gage minimum.

B. Strap Bracing: Minimum of 1-1/2-inch wide by 18 gage unless noted otherwise.

C. Tracks: Deep leg type, unpunched, same gage, size, and finish as studs with minimum 18 gage thickness.

D. Compensation Tracks / Slip Tracks: Deep leg type with a flange width of 2½ inches. Track shall be same nominal depth as stud/track with allowance for slip of standard deep leg track. Minimum 14 gage.

E. Plates, Gussets, Clip Angles: Minimum 14 gage. Clip angles shall be a minimum of 2 inches by 2 inches.

F. Self-drilling, Self-tapping Screws: Hot-dip galvanized conforming to values given in the referenced SSMA document.

G. Anchorage Devices:

1. Powder Actuated Fasteners shall be manufactured from AISI 1062 or AISI 1065 steel austempered to a minimum core hardness of 50-54Rc and possess the following properties:
   a. Tensile strength = 270,000 psi
   b. Shear strength = 162,000 psi
   c. All fasteners shall meet the requirements of ASTM B-633-78.
   d. Fasteners shall be a minimum 9/64-inch diameter.
   e. Fasteners shall be zinc plated.
   f. Fastener minimum design values shall be in accordance with manufacturer's recommendations.
2. Expansion anchors shall be stud type, and shall be zinc plated in accordance with ASTM B633, Type III Fe/Zn 5. Expansion anchors shall be a minimum of 3/8-inch diameter with 2-1/2-inch embedment into concrete unless noted otherwise in the Drawings.

H. Welding: AWS D1.3-8 Structural Welding Code-Sheet Metal (field welding of material shall not be permitted for 20 gage material or thinner).

I. Acoustical Sealant: USG, or approved equal.

J. Sizes and thicknesses are minimum acceptable, regardless of load. Actual sizes shall be determined by Steel Stud manufacturer in accordance with loads given in the Structural Notes. Minimum listed size shall not be construed to be the actual designed component size.

PART 3 - EXECUTION

3.01 ERECTION

A. General:

1. Framing components shall be cut squarely for attachment to perpendicular members or, as required, for angular fit against abutting members.
2. Erect framing plumb, level, and square.
3. Studs shall be plumbed, aligned, and securely attached to the flanges or web of both the upper and lower tracks.
4. Fastening of components shall be with self-drilling screws or welds. Wire tying of components shall not be permitted. Touch-up field welds and scratched or damaged finish to studs with zinc rich paint.
5. Splices in framing components shall not be permitted other than in runner tracks.
6. Runner tracks shall be securely anchored to the supporting structure.

B. Studs Spacing: Stud manufacturer shall determine stud spacing at interior and corner zones to resist Component and Cladding Loads given in the Structural Notes. Stud spacing shall not exceed 16 inches, center-to-center, regardless of design loads.

C. Stud Tracks: Before installing stud tracks for exterior walls, apply two 1/2- inch round beads of acoustical sealant longitudinally under stud tracks to seal runner to floor.

D. Door Openings: Install multiple studs each side of door openings as required to resist design loads.

1. Install multiple studs horizontally between door jambs at top of doors as required to resist design loads.
2. On top of headers, install runners to receive bottom ends of studs over door openings.

E. Window Openings: Install multiple studs each side of window openings as required to resist design loads.

1. Install multiple studs horizontally between window jambs to form sills and headers as required to resist design loads.
2. Install multiple studs horizontally between window jambs to form sills and headers as required to resist design loads.
3. On top of headers and bottom of sills, install runners to receive short studs.

4. Attach blocking to stud framing with 1/2-inch diameter galvanized bolts 12 inches on-center. Coordinate attachment of window system to blocking/stud framing prior to erection of metal stud framing.
5. Where indicated on the Structural Drawings (for example, at windows over 8 feet wide and at cantilevered parapets), attach studs / track to structural steel reinforcement with self-drilling screws.

F. Corners: Construct using a minimum of three studs designed to resist the design loads.

G. Between Studs: Install framing for attachment of electrical boxes, mechanical and for other items to be anchored to walls.

H. At Butting Walls: Place studs not more than 2 inches from walls.

I. Insulation: In all multiple jamb studs and multiple headers not accessible to insulation contractors, insulation equal to that specified elsewhere shall be provided.

END OF SECTION

SECTION 05 50 00 METAL FABRICATIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Steel ladders.
2. Loose bearing and leveling plates.
3. Loose steel lintels.
4. Shelf angles.
5. Steel framing and supports for mechanical and electrical equipment.
6. Steel framing and supports for applications where framing and supports are not specified in other Sections.
7. Miscellaneous metal trim.
8. Pipe guards.
9. Pipe bollards.

B. Related Sections include the following:

1. Division 5 Section "Structural Steel" for structural-steel framing system components.
2. Division 6 Section "Rough Carpentry" for metal framing anchors and other rough hardware.

1.03 SUBMITTALS

A. Shop Drawings: Detail fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

1. Provide templates for anchors and bolts specified for installation under other Sections.

1.04 PROJECT CONDITIONS

A. Field Measurements: Where metal fabrications are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

1.05 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. 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.

PART 2 - PRODUCTS

2.01 METALS, GENERAL

A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

2.02 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500.

C. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

D. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 (ASTM A 47M) malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.

E. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.03 PAINT

A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

C. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

2.04 FASTENERS

A. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

B. Anchor Bolts: ASTM F 1554, Grade 36.

C. Machine Screws: ASME B18.6.3 (ASME B18.6.7M).

D. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).

E. Wood Screws: Flat head, carbon steel, ASME B18.6.1.

F. Plain Washers: Round, carbon steel, ASME B18.22.1 (ASME B18.22M).

G. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1 (ASME B18.21.2M).

H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

1. Material: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

I. Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as needed.

2.05 GROUT

A. 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.

2.06 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Shear and punch metals cleanly and accurately. Remove burrs.

C. Ease exposed edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. 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 so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

E. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

F. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

G. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

H. Allow for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening up of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

I. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

J. Remove sharp or rough areas on exposed traffic surfaces.

K. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

2.07 STEEL LADDERS

A. General: Fabricate ladders for locations shown, with dimensions, spacings, details, and anchorages as indicated.

1. Comply with ANSI A14.3, unless otherwise indicated.

B. Siderails: Continuous, 1/2-by-2-1/2-inch (12-by-64-mm) steel flat bars, with eased edges, spaced 18 inches (457 mm) apart.

C. Bar Rungs: 3/4-inch- (19-mm-) diameter steel bars, spaced 12 inches (300 mm) o.c.

D. Fit rungs in centerline of side rails; plug-weld and grind smooth on outer rail faces.

E. Support each ladder at top and bottom and not more than 60 inches (1500 mm) o.c. with welded or bolted steel brackets. Size brackets to support design loads specified in ANSI A14.3.

F. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.

G. Provide safety-cage as shown on drawings.

2.08 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

2.09 LOOSE STEEL LINTELS

A. Fabricate loose structural-steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.

B. Weld adjoining members together to form a single unit where indicated.

C. Size loose lintels to provide bearing length at each side of openings equal to one-twelfth of clear span, but not less than 8 inches (200 mm), unless otherwise indicated.

2.10 SHELF ANGLES

A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch (19-mm) bolts, spaced not more than 6 inches (150 mm) from ends and 24 inches (600 mm) o.c., unless otherwise indicated.

B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete. Align expansion joints in angles with indicated control and expansion joints in cavity-wall exterior wythe.

C. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.11 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports that are not a part of structural-steel framework as necessary to complete the Work.

B. General: Provide steel framing and supports indicated and as necessary to complete the Work.

C. Fabricate units from structural-steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.

1. Fabricate units from slotted channel framing where indicated.
2. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors 1-1/4 inches (32 mm) wide by 1/4 inch (6 mm) thick by 8 inches (200 mm) long at 24 inches (600 mm) o.c., unless otherwise indicated.
3. Furnish inserts if units must be installed after concrete is placed.

D. Fabricate supports for operable partitions as follows:

1. Beams: Continuous steel shapes of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.

2.12 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from structural-steel shapes, plates, and bars of profiles shown with continuously welded joints, and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work. Provide anchors, welded to trim, for embedding in concrete or masonry construction, spaced not more than 6 inches (150 mm) from each end, 6 inches (150 mm) from corners, and 24 inches (600 mm) o.c., unless otherwise indicated.

2.13 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.

2.14 PIPE RAILINGS

A. Fabricate railings and posts from 1-1/4 inch round tube steel, ASTM A 53, Type E or S, Grade A, Schedule 40. 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.

B. 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.

C. 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.

D. 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.

2.15 CAST-IRON DOWNSPOUT SHOE:

A. Provide cast-iron downspout shoe with brass cleanout where indicated on the drawings and shall be “NEEHAH” R-4929 or equivalent.

2.16 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

2.17 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:

1. ASTM A 123, for galvanizing steel and iron products.
2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:

1 Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning

C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.18 STAINLESS-STEEL FINISHES

A. Remove tool and die marks and stretch lines or blend into finish

B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

C. Bright, Directional Polish: No. 4 finish.

D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.19 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. As-Fabricated Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).

C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 607.1.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors.

B. 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.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

D. 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.

E. 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 so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.02 SETTING 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 grout.

1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.03 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings, if any.

B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

C. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

1. Where grout space under bearing plates is indicated at girders supported on concrete or masonry, install as specified above for setting and grouting bearing and leveling plates.

D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified above for setting and grouting bearing and leveling plates.

1. Do not grout baseplates of columns supporting steel girders until girders are installed and leveled.

3.04 INSTALLING THRESHOLDS

A. Install with anchorage system indicated to comply with manufacturer's written instructions.

B. Seal thresholds exposed to exterior with elastomeric sealant complying with Division 7 Section "Joint Sealants" to provide a watertight installation.

3.05 INSTALLING PIPE BOLLARDS

A. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete. After bollards have been inserted into sleeves, fill annular space between bollard and sleeve solidly with nonshrink, nonmetallic grout, mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch (3 mm) toward bollard.

B. Anchor bollards in concrete in formed or core-drilled holes not less than 8 inches (200 mm) deep and 3/4 inch (19 mm) greater than OD of bollard. After bollards have been inserted into holes, fill annular space surrounding bollard solidly with nonshrink, nonmetallic grout, mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch (3 mm) toward bollard.

C. Anchor bollards in place with concrete footings. Support and brace bollards in position in footing excavations until concrete has been placed and cured.

D. Anchor bollards to existing construction with postinstalled anchors and bolts. Provide four 3/4-inch (19-mm) anchors at each bollard, unless otherwise indicated. Embed anchors at least 4 inches (100 mm) in existing concrete.

E. Anchor internal sleeves for removable bollards in concrete by inserting into pipe sleeves preset into concrete. After internal sleeves have been inserted, fill annular space between sleeves solidly with nonshrink, nonmetallic grout, mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch (3 mm) toward internal sleeve.

1. Place removable bollards over internal sleeves and secure with 1/2-inch machine bolts and nuts. After tightening nuts, drill holes in bolts for inserting padlocks. Owner will furnish padlocks.

F. Fill bollards solidly with concrete, mounding top surface.

1. Do not fill removable bollards with concrete.

3.06 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 the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 Section "Painting."

C. 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

1.01 DESCRIPTION OF WORK

A. Metal stair work shall include, but not be limited to the following:

1. Steel framed stairs.
2. Steel tube handrails.
3. Steel tube wall rails.
4. Supplementary items required for proper installation.

B. Related Work Described Elsewhere:

1. Concrete Fill for Treads and Landings: Section 03 30 00.
2. Structural Steel Framing: Section 05 12 00.
3. Miscellaneous and ornamental metals: Section 05 50 00.
4. Painting other than shop priming: Section 09 90 00.

1.02 QUALITY ASSURANCE

A. Comply with the provisions of the following standards and Specifications:

1. American Institute of Steel Construction (AISC) "Specification for the Design, Fabrication and Erection of Structural Steel Specification, " 1978 Edition.
2. The National Association of Architectural Metal Manufacturers (NAAMM), "Metal Stairs Manual", 1974 Edition.
3. American Welding Society (AWS) Standard D1.1-9\80.

1.03 SUBMITTALS

A. Submit shop drawings for fabrication and erection of stair work. Include plans and elevations at not less than 1/2 inch to 1'-0" scale. Show members sizes and thicknesses, anchorage locations and accessory items. Furnish setting diagrams for anchorage installation as required.

B. Test Data: Submit certified test results or calculations indicating compliance with Uniform Load Capacity, and Safety of Design. Reports shall be compiled by a recognized independent testing agency. Design entire assembly to support a minimum live load of 100 lbs./sq.ft.

C. Having on file calculations for the architect and all governmental agencies having jurisdiction justifying structural design and sizes of members.

1.04 WARRANTY

A. Provide American Stair Corporation's standard warranty covering defects in materials and workmanship for the life of the building.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Drawings and Specifications are based on SpeedStair manufactured by American Stair Corporation, Inc., One American Stair Plaza, Willow Springs, IL 60480. Tel. (312) 839-5880.

B. Equivalent products by the following manufacturers are acceptable:

1. ALFAB, Inc., Enterprise, AL. Tel. (334) 347-9516.
2. Sharon Stairs, Medina, OH. Tel. (800) 792-0129.

C. Substitutions shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures

2.02 MATERIALS

A. For fabrication of steel stair work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness. Remove blemishes by grinding and/or welding and grinding prior to cleaning, treating and application of surface finished.

B. Structural Steel Plates, Shapes and Bars: ASTM A36.

C. Hot Rolled Carbon Steel Sheets and Strips: ASTM A570.

D. Steel Tube/Pipe: ASTM A53, Type S, Grade A and ASTM A-500-A.

E. Shop Primer Paint: Comply with Federal Specification TT-P-636.

2.03 FACTORY FABRICATED STAIRS

A. Use welding for joining pieces together, unless otherwise shown or specified. Fabricate units so that bolts and other fastenings do not appear on finish surfaces. Make joints true and tight, and make connections between parts light-proof tight. Provide continuous welds, ground smooth, where exposed. Construct stair units to uniform to sizes and arrangements as shown. Provide metal framing, hangers, columns, railings, newels, baluster, struts, clips, brackets, bearing plates and other components for the support of stair and platforms. Erect stair work to line, plumb, square, and true with runs registering level with floor and platform levels. Provide brackets and bearing surfaces as detailed and as required to anchor and contain the stairs on the supporting structure.

2.04 RAILINGS

A. Railings shall be fabricated of 1-5/8 inch O.D. seamless 14 gage tubing. Rail supports shall be 1-1/2 inch, 11 gage seamless tubing with closed ends. Railings and support shall be of welded flush construction with all exposed welds ground smooth. Comply with OSHA, NFPA 101 (1981), and ANSI A117.1 (1981) requirements for required loads and spacing of members.

B. Wall rail shall be of 1-5/8 inch round tubing with closed ends and return to wall. Provide either cast or wrought iron wall brackets for securing pipe handrails at stairs along wall lines. Brackets shall have rounded seat drilled for screwing from underside to handrail. Brackets shall be spaced not over 5'-0" on center, bolted to walls.

C. Provide metal escutcheon plates where handrail returns to or terminates at wall.

2.05 FABRICATION

A. Form work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to radius of approximately 1/32 inch. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

B. Weld corners and seams in accordance with recommendations of AWS. Grind these exposed welds to match and blend with adjoining surfaces.

C. Join rails and corners by mitered and welded joints made by fitting top rail and intermediate rails in a unit and bracketed, or welded to posts as indicated. Butt railing splices and reinforce by a tight fitting interior sleeve. Plumb posts in each direction. Secure posts by welding direct to stair stringers.

D. Remove scale, rust and other deleterious materials before applying shop primer. Apply one shop coat of metal primer to fabricated metal items.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Provide anchorage devices and fasteners where necessary for securing steel stair items to in-place construction; including threaded fasteners for concrete inserts, toggle bolts, through-bolts and other connectors as required.

B. Perform cutting, drilling and fitting required for installation of stair work. Set work in location, alignment and elevation, plumb, level and true, and free of rack measured with approved shop drawings.

END OF SECTION

SECTION 06 10 00 ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

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

B. Related Sections:

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

1.03 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.

1.04 QUALITY CONTROL

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

1.05 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 LUMBER

A. For each use, comply with the "American Softwood Lumber Standard" PS 20 by the U.S. Department of Commerce. Nominal sizes are shown or specified; provide actual sizes complying with the minimum size requirements of PS20 for the moisture content specified for each use. Provide dressed lumber, S4S, unless otherwise shown or specified. Provide seasoned lumber with 19 percent maximum moisture content at time

of dressing and complying with dry size requirements of PS 20, unless otherwise specified.

2.02 BOARDS

A. Where lumber less than 2 inches in nominal thickness and 2 inches or more in nominal width is shown or specified, provide boards complying with dry size requirements of PS 20.

B. Concealed Boards: Where boards will be concealed by other work, provide the following:

1. Moisture Content: 19 percent maximum, mark boards "S- Dry".
2. Species and Grade: Provide one of the following:
   a. Southern Pine (SPIB) No. 2 boards.
   b. WCLB (any species) No. 3 boards.

2.03 PLYWOOD

A. For each use, comply with the requirements for "Softwood Plywood/Construction and Industrial" PS 1 by the U.S. Department of Commerce.

B. Concealed Plywood: Where plywood will be concealed by other work, provide 5/8-inch minimum thickness Interior Type plywood C-D Plugged Grade, unless otherwise specified or shown on Drawings. For backing panels for electrical or telephone equipment, provide fire-retardant treated Standard grade plywood with exterior glue.

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.

2.04 ANCHORAGE AND FASTENING MATERIALS

A. For each use, select proper type, size, material, and finish complying with the applicable Federal Specifications. Zinc electroplated steel fasteners for high humidity and treated wood locations. All nails shall be coated.

2.05 TREATED WOOD

A. Complete fabrication of treated items prior to treatment, wherever possible. If cut after treatment, coat cut surfaces with heavy brush coat of same fire-retardant chemical used for treatment. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

B. Preservative Treatment: Where lumber or plywood is indicated as "Treated", or is specified herein to be treated, comply with the applicable requirements of the American Wood Preservers Institute (AWPI). Mark each treated item to comply with the AWP Quality Mark requirements for the specified requirements.

1. Pressure-treat aboveground items with water-borne preservatives complying with AWPI P-2. After treatment, kiln-dry to maximum moisture content of 15 percent. Treat indicated items and the following:

a. Wood cants, nailers, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers and waterproofing.
b. Wood sills, sleepers, blocking, furring stripping and similar concealed members in contact with masonry or concrete.

C. Fire-Retardant Treatment: Where "PR-S" lumber or plywood is shown or scheduled, comply with the AWPI Specification C-208 for pressure impregnation with fire-retardant chemicals to achieve a flame-spread rating of not more than 25 when tested in accordance with UL Test 723, ASTM E A4, or NFPA Test 355. Where treated items are indicated to receive a transparent or paint finish, use a fire-retardant treatment that will not bleed through or adversely affect bond of finish.

PART 3 - EXECUTION

3.01 INSTALLATION

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

B. Securely attach carpentry work to substrates by anchoring and fastening as shown and as required by recognized standards. Countersink nail heads on exposed carpentry work and fill holes.

C. Set carpentry work accurately to required levels and lines, with members plumb and true and accurately cut and fitted.

3.02 ATTACHMENT AND ANCHORAGE

A. Use common wire nails, except as otherwise shown or specified. Use finishing nails for finish Work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; pre-drill as required.

B. Exposed Plywood: Panel ends and edges shall have spacing of 1/8 inch maximum, unless otherwise indicated by the panel manufacturer. Use screws to fasten 6 inches on center along supported panel edges and 10 inches on center at intermediate supports.

3.03 WOOD GROUND NAILERS, BLOCKING, AND SLEEPERS

A. Provide wherever shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Set true to line and level, plumb with intersections true to required angle. Coordinate location with other Work involved.

B. Attach to substrates securely with anchor bolts and other attachment devices as shown as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise shown. Building into masonry; anchor to formwork before concrete placement.

C. Provide grounds of dressed, preservative treated, key-beveled lumber not less than 1-1/2 inch wide and of the thickness required to bring face of ground to exact thickness of finish material involved. Remove temporary grounds when no longer required.

3.04 WOOD FURRING

A. Install plumb and level with closure strips at all edges and openings. Shim with wood as required.

B. Suspended Furring: Provide of size and spacing shown, complete including hangers and all attachment devices. Level to a tolerance of 1/8 inch in 12 feet.

END OF SECTION

SECTION 06 40 00 ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. 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. Miscellaneous work.

1.02 RELATED SECTIONS

A. Section 05 50 00 – Metal Fabrications.

B. Section 06 10 00 – Rough Carpentry.

C. Section 09 05 15 – Color Design.

D. Section 09 90 00 – Painting and Coating.

1.03 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.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer’s product data, specifications, and installation instructions for each item of Factory-fabricated woodwork prior to fabrication.

B. Shop Drawings: Submit Shop Drawings showing location of each item, including Lumber, Panel Products, Standing and Running Trim, Cabinets, Countertops, Shelving, and miscellaneous work. Dimensioned plans and elevations shall be provided and drawn at a minimum scale of 1/2 inch = 1’-0”. Large scale details shall be provided and drawn at a minimum scale of 3 inches = 1’-0”. Shop drawings shall clearly indicate location of joints, countertops, grommets, plastic laminates, brackets, hardware, metal finishes, attachment devices and other materials necessary for complete fabrication.

1.05 QUALITY ASSURANCE

A. Comply with specified provisions of the Architectural Woodwork Institute (AWI) “Quality Standards”. All construction, fabrication, finishes, and materials shall meet AWI Premium 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. The millwork manufacturer shall :

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. For the following types of architectural woodwork, comply with the indicated standards as applicable:

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.

1.06 PRODUCT 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.

1.07 PROJECT 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. Conditioning: The Installer shall advise the Contractor of temperature and humidity requirements for woodwork installation areas. Do not install woodwork until the required temperature and relative humidity have been stabilized and will be maintained in installation areas.

C. Maintain temperature and humidity in installation area as required to maintain moisture content of installed woodwork within a 1.0-percent tolerance of the optimum moisture content, from the date of installation through the remainder of the construction period. The fabricator of the woodwork shall determine the optimum moisture content and required temperature and humidity conditions.

1.08 COORDINATION

A. Coordinate the work of this Section with work of other Sections that require penetrations, attachments, or supports for architectural woodwork.

PART 2 - PRODUCTS

2.01 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. Refer to Section 09 05 15 - Color Design for selection of manufacturer, color and finish.

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 AWI 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.

2.02 ARCHITECTURAL WOODWORK TYPES

A. Wood cabinets: Fabricate millwork in accordance with AWI Premium Standards, Section 400 Cabinets and as indicated on the Drawings. On exposed portions provide solid wood and plywood (no plywood substitutes) meeting the requirements for the specified AWI Quality Grade.

1. Exposed surfaces: Birch.

2. Semi-Exposed surfaces: Birch.
3. Concealed surfaces: Birch.

B. Plastic Laminate Colors and Patterns: As selected by the Project Engineer/MDOT Architect from manufacturer's standard products, satin finish (5-34 reflectance).

2.04 CABINET 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. Hardware finishes to be selected by the Project Engineer / MDOT Architect.

PART 3 - EXECUTION

3.01 PREPARATION

A. Condition woodwork to average prevailing humidity conditions in installation areas prior to installing.

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

3.02 INSTALLATION

A. All work shall be installed in strict accordance with the premium grade standards of Section 1700 – Installation of woodwork of AWI Quality Standards.

B. 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.

C. 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.

D. 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.

E. 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 AWI Quality Standards for joinery.

F. Countertops: Anchor securely to base units and other support systems as indicated.

3.03 PREPARATION FOR SITE FINISHING

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

3.04 ADJUSTMENT, CLEANING, FINISHING AND PROTECTION

A. Repair damaged and defective woodwork wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace woodwork. Adjust joinery for uniform appearance.

B. Clean hardware, lubricate and make final adjustments for proper operation. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop applied finishes to restore damaged or soiled areas.

C. Refer to Section 09 90 00 for final finishing of installed painted and stained architectural woodwork.

D. Protection: The Installer of architectural woodwork shall advise the Contractor of final protection and maintenance conditions necessary to ensure that the Work will be without damage or deterioration at the time of acceptance.

END OF SECTION

SECTION 07 21 28 CELLULOSE THERMAL INSULATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Building insulation for exterior and interior walls

1. Pneumatically sprayed damp into open wall cavities.

1.02 RELATED SECTIONS

A. Section 13 34 19 Metal Building Systems for thermal glass-fiber blanket insulation.

1.03 SUBMITTALS

A. 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.

1.04 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 62 14-Product Options and Substitution Procedures.

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 and shall contain a EPA registered fungicide, be mold-resistant, non-toxic, non-corrosive, shall not irritate normal skin, shall not give off odor during or after installation, shall not attract vermin or insects and shall not adversely affect other building materials.

B. Thermal Performance: Cellulose insulation shall resist the flow of heat. Heat transfer is limited as indicated by its R-Value of 3.8 per inch. Air infiltration through the material shall be limited by the density of the material and methods used to install it.

C. Sound Control: Cellulose insulation shall provide significant noise reduction in walls and floors.

D. Standards: Cellulose insulation shall conform to the CPSC standard 16 CFR Parts 1209 and 1404. In addition, the cellulose insulation shall meet or exceed all of the test requirements of ASTM C-739, E-84 and E-119, and UL-723.

2.03 MATERIAL CHARACTERISTICS

A. The following properties were tested by Underwriters Laboratories (R-8078):

1. Settled Density: The maximum density after long-term settling of dry application: 1.6 lb/ft©.
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 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 Architect.

3.02 INSTALLATION

A. Comply with manufacturer's instructions for the particular condition of installation in each case. 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.

B. 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.

C. Nu-Wool WALLSEAL: Cellulose insulation shall be pneumatically sprayed with a controlled water fog for adhesion into open wall cavities after mechanical, plumbing, electrical and other utility installations have been completed. Drywall may be installed 24 hours after application. Total drying time is approximately 30 days. Installation shall be made only by Nu-Wool factory-certified WALLSEAL contractors using approved equipment.

END OF SECTION

SECTION 07 26 00 VAPOR RETARDERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Vapor retarder under concrete floor slab.

B. Concrete curing paper on top of freshly poured concrete floor slab.

C. Floor protection paper used for positive protection of finished floors.

1.02 SUBMITTALS

A. Submit manufacturer's technical product data, installation instructions and recommendations for products specified.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Drawings and specifications are based on products manufactured by Fortifiber Corporation, 300 Industrial Drive, Fernley, NV 89408. Tel. (800) 773-4777.

B. Equivalent products by the following manufacturers are acceptable:

1. Grace Construction Products, Cambridge, Ma. Tel: (800) 444-6459.
2. Griffolyn ® Division, Reef Industries, Inc., Houston, TX. Tel: (800) 231-6074.
3. Stego Industries LLC, San Juan Capistrano, CA. Tel: (877) 464-7834.

C. Substitutions shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures.

2.02 VAPOR RETARDER

A. Membrane shall be a 15 mil polyolefin film meeting ASTM E-1745-97 Class A Test Method, equal to Fortifiber Corporation, Moistop® Ultra™ 15, including Moistop® tape and sealants with the following characteristics:

1. Moisture Vapor Permeance: ASTM E-154, Section 7 (E-96, Method A) = .02 Perms.
2. Tensile Strength: ASTM E-154, Section 9 (Method D-882) = (70lb f/in min)-MD & CD.
3. Puncture Resistance: ASTM D-1709, Method B = 3,000 Grams.

2.03 CONCRETE CURING PAPER

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

2.04 FLOOR PROTECTION PAPER

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

PART 3 - EXECUTION

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

3.02 INSTALLATION

A. Vapor Retarder: Unroll underslab vapor retarder over thoroughly compacted subgrade and turn down at inside perimeter of grade beams. Seal joints watertight, with a pressure sensitive tape as recommended by manufacturer, allowing a minimum overlap of 6 inches. Apply tape evenly over seams and rub out wrinkles formed during application. Seal pipes and conduits passing through the membrane with Moistop boot and tape. 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. Comply with manufacturer’s recommendations and installation procedures as outlined in ASTM E-1643.

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

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

3.03 CLEANING

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

END OF SECTION

SECTION 07 84 00 FIRESTOPPING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Firestopping as indicated on the drawings, specified herein, and/or required for completion of the work. Firestopping shall be required at all rated fire and smoke "fire barrier" walls and at floors.

1.02 SUBMITTALS

A. 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.

1.03 QUALITY ASSURANCE

A. Penetrations and miscellaneous openings in rated fire and smoke "fire barrier" walls shall be protected in accordance with NFPA 101, Life Safety Code, Chapter 6, Features of Fire Protection. All openings for air-handling ductwork or air movement, pipes, conduits, bus ducts, cables, wires, air ducts, pneumatic tubes and ducts and similar building service equipment that pass through or penetrate in any way a rated fire or smoke "fire barrier" wall or floor shall be protected. All firestopping materials used shall conform to ASTM E814, ASTM E119, and UL 1479 and tested in accordance with NFPA 90A and NFPA 251 as part of a rated assembly.

1.04 FIRE AND SMOKE PARTITIONS AND RELATED ASSEMBLIES

A. Based on Underwriters Laboratories (UL) systems and tests and are designed in accordance with UL fire resistance ratings. Contractor shall comply with the applicable UL requirements for fire and smoke partitions and assemblies shown on the drawings.

B. Materials not conforming to these firestopping specifications shall not be used. Materials that are not UL rated and approved shall not be allowed. Materials containing asbestos are not acceptable and shall not be used in this project.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver packaged materials in manufacturer's original unopened containers and store in weathertight enclosure. Handle and store all materials so as to prevent inclusion of foreign materials, breakage or damage by water.

1.04 WORKMANSHIP

A. Materials and workmanship not conforming to provisions of the Specifications and manufacturer's printed instructions shall be rejected at any time during the course of the work. Rejected materials shall be removed from the site at the time of rejection. Rejected workmanship shall be corrected immediately after rejection.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Equivalent products by the following manufacturers are acceptable:

1. Hilti, Inc., Tulsa, OK. Tel. (800) 879-8000.
2. International Protective Coatings Corp., Hatfield, PA. Tel. (800) 334-8796.
3. 3M Fire Protection Products, Saint Paul, MN. Tel. (800) 328-1687.
4. United States Gypsum Company, Chicago, IL. Tel. (880) 874-4968.

B. Substitutions shall fully comply with specified requirements and Section 01 62 14- Product Options and Substitution Procedures.

2.02 SEALANT

A. Equal to Hilti, Inc. FS-One.

2.03 CAULKING AND PUTTY

A. Equal to 3M Brand Fire Barrier CP- 25 Caulk and Putty 303.

2.04 PENETRATION SEALANTS

A. Equal to 3M Fire Barrier Penetration Sealing Systems 7902 and 7904 series as required.

2.05 INSULATION

A. Equal to United States Gypsum Company “Thermafiber” Safing Insulation, 4 pcf density, unfaced.

2.06 INTUMESCENT FIRESTOPPING

A. Equal to Hilti, Inc. FS-One, CP 642 and FS 657 Fire Block as required.

2.07 ACCESSORIES

A. Provide backing / filling materials, retainers, collars, clamps, sleeves, primers and other necessary items of types and duration required by regulatory requirements and / or as recommended by product manufacturer for the specific substrates, surfaces and applications.

2.08 FINISHES

A. Concealed locations: Manufacturer’s Standards.

B. Exposed to View Locations: “Custom” Colors as selected by Project Engineer / MDOT Architect unless Manufacturer’s Standards closely matches finish of penetrated surfaces.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation of firestopping materials for small openings, cracks, crevices, and penetrations shall be in accordance with manufacturer's printed instructions.

B. Verify application required and location for each type of firestopping to be used and conform to manufacturer's exact instructions for specific applications.

C. 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.

D. Install fireproof sealant at all penetrations through rated walls and floors and at top and bottom on each side of rated walls.

E. Install approved metal sleeves with fireproof sealant at all communication and control wiring passing through rated walls throughout the entire project.

F. Install firestopping at fire and smoke walls and floors where construction passes through those areas.

END OF SECTION

SECTION 07 92 00 JOINT SEALANTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Preparation of substrate surfaces to receive materials.

B. Sealant and joint backing (backer rod) materials and installation in the following general locations (even though not shown on the Drawings):

1. Exterior and interior wall joints, including control / expansion joints and abutting like or similar materials (in walls, ceilings, and roof construction) that have spaces between in excess of 3/16 inch (except where less restrictive tolerances are indicated or where the condition is specifically the responsibility of others).
2. Abutting dissimilar materials, exterior and interior.
3. 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).
4. Joints in pavement and walks.
5. Other locations, not included above but, specifically required by manufacturers of installed materials / products (except that sealing materials for glazing are under provision of other Section.).

C. Accessories: Including, but not limited to, primer, cleaner, backer rod, bond breaker, and masking tape.

1.02 RELATED SECTIONS

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

1.03 DEFINITIONS

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

1.04 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.

1.05 SUBMITTALS

A. Submit manufacturer's product data and installation instructions for each type of sealant required. Product data shall include chemical characteristics, limitations, and color availability.

1.06 QUALITY ASSURANCE

A. Applicator: Company specializing in the work of this Section with minimum 3 years documented satisfactory experience.
B. Manufacturer's Certificate: Provide manufacturer's letter of certification that products meet or exceed specified requirements and are appropriate for uses indicated.

C. Installation: Conform to Sealant and Waterproofers Institute requirements.

1.07 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.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Drawings and Specifications are based on products manufactured by Pecora Corporation, 165 Wambold Road, Harleysville, PA 19438. Tel: (800) 523-6688.

B. Equivalent products by the following manufacturers are acceptable:

1. Dow Corning Corporation, Midland, MI. Tel: (800) 322-8723
2. GE Silicones, Waterford, NY. Tel: (518) 233-2639.
3. Sonneborn Building Products, Shakopee, MN. Tel: (800) 433-9517.
4. Tremco, Inc., Beachwood, OH. Tel: (800) 562-2728.

C. Substitutions shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures.

2.02 SEALANT TYPES AND USE SCHEDULE

A. Type 1: Use for interior locations, sealing around windows, doors, louvers, drywall and other locations to be painted and where joints are less than 1/8 inch with none to slight movement anticipated: Pecora AC-20 + Silicone (Acrylic Latex Caulking Compound).

B. Type 2: Use for sealing nonporous interior surfaces where conditions of high humidity and temperature extremes exist, including at and in conjunction with toilet fixtures, counters, vanities, thresholds and joints in tile finishes: Pecora 898 (Silicone Sanitary Sealant).

C. Type 3: Use for horizontal floor and pavement joints: Pecora Urexpan NR-200 (two-part, self-leveling, traffic-bearing, polyurethane sealant).

D. Type 4: Use for exterior sealing at door, louver, and window frames at masonry, and other materials: Pecora 890NST (one-part Architectural Silicone Sealant). Color(s) to

be selected by the Project Engineer / MDOT Architect from manufacturer's full range of standard Architectural colors.

2.03 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Backer Rod: Open cell polyurethane foam or closed cell polyethylene foam, compatible with sealant, sized and shaped to provide proper compression upon insertion in accordance with manufacturer's recommendations.

D. Bond Breaker: Pressure sensitive adhesive polyethylene, TEFLON, or polyurethane foam tape.

E. Masking Tape: Pressure sensitive adhesive paper tape.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Installer must examine areas and conditions under which this Work is to be installed 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 installer.

3.02 PREPARATION

A. Cleaning: Clean joint surfaces, using joint cleaner as necessary, to remove dust, dirt, oil, grease, rust, lacquers, laitance, release agents, moisture, frost or other matter that might adversely affect adhesion of sealant. Rake joints out to a depth equal to one-half the width.

B. Masking: Mask areas adjacent to joints.

C. Priming: If required, prime substrate surfaces following manufacturer's instructions.

D. Mixing: When required, mix components of sealant materials in accordance with manufacturer's instructions to achieve required characteristics of sealant.

3.03 APPLICATIONS

A. Mixing, application, surface condition, weather condition shall be as recommended by the manufacturer. Do not use material that has exceeded the recommended pot life.

B. Install backing material in joints using blunt instrument to avoid puncturing. Do not twist the backing rod while installing. Install backing rod so that joint depth is 50 percent of joint width, but a minimum of 1/8-inch deep and a maximum of 3/8-inch deep.

C. Apply sealant in joints using a pressure gun with nozzle cut to fit joint width. Ensure sealant is deposited in a uniform, continuous bead without gaps or air pockets.

D. Tool joints to the required configuration within 10 minutes of sealant application. Remove masking materials immediately after tooling.

3.04 CLEANING AND REPAIRING

A. Do not allow sealant or compounds to overflow or spill onto adjoining surfaces, or to migrate into voids of adjoining surfaces. Clean adjoining surfaces by whatever means necessary to eliminate evidence of spillage.

B. When using flammable solvents, avoid heat, sparks and open flames. Provide necessary ventilation. Follow all precautions and safe handling recommendations from the solvent manufacturer and pertinent local, state and federal regulations.

C. Leave finished work in a neat, clean condition with no evidence of spillovers onto adjacent surfaces.

D. Repair or replace defaced or disfigured finishes.

3.04 CURE AND PROTECTION

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

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

END OF SECTION

SECTION 08 11 13 HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Hollow metal Work, including but not limited to, the following:

1. Interior and exterior hollow metal doors and frames; rated and non-rated.
2. Trimmed openings.
3. Preparation of metal doors and bucks to receive finish hardware, including reinforcements, drilling and tapping necessary.
4. Preparation of hollow metal door to receive glazing (where required).
5. Factory prime painting of Work in this Section.

1.02 RELATED SECTIONS

A. Section 06 10 00 - Rough Carpentry.

B. Section 08 14 29 - Prefinished Wood Doors.

C. Section 08 71 00 - Door Hardware.

D. Section 08 80 00 - Glazing.

E. Section 09 05 15 - Color Design.

F. Section 09 90 00 - Painting and Coatings.

1.03 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 80 "Fire Doors and Windows", National Fire Protection Association.
4. 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.

1.04 SUBMITTALS

A. Product Data: Submit schedule and manufacturer's technical product data / literature.

B. Shop Drawings: Shop drawings shall indicate door and frame elevations, frame configuration, anchor types and spacing, reinforcement, location of cut-outs for hardware, glazing and louvers (if required).

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, corner of louver opening construction (if required).

1.05 PRODUCT IDENTIFICATION

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

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle all metal doors and frames in a manner to prevent damage and deterioration.

B. Provide packaging, separators, banding, spreaders, and individual wrappings as required to completely protect all metal doors and frames during transportation and storage.

C. Store doors upright, in a protected dry area, at least 4 inches off the ground and with at least 1/4 inch air space between individual pieces, protect all pre-finished and hardware surfaces.

PART 2 - PRODUCTS

2.01 ACCEPTABLE 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. Republic Builders Products, McKenzie, TN. Tel. (901) 352-3383.

C. Substitutions shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures.

2.02 FABRICATION

A. Fabricate hollow metal units rigid, neat in appearance and free from defects, warp or buckle. Accurately form metal to required sizes and profiles. Weld exposed joints continuously, grind, dress, and make smooth, flush and invisible. Metallic filler to conceal manufacturing defects is not acceptable. Unless otherwise indicated, provide countersunk flat Philips or Jackson heads for exposed screws and bolts.

B. Prepare hollow metal units to receive finish hardware, including cutouts, reinforcing, drilling and tapping per final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 "Specifications for Door and Frame Preparation for Hardware".

C. Locate finish hardware in accordance with approved shop drawings.

2.03 FRAMES

A. Frames for exterior openings 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.

B. Frames for interior openings 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.

C. 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.
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 inches 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.

2.04 HOLLOW METAL DOORS

A. 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. Face sheets for interior doors shall be18 gage minimum. Face sheets for 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.

B. 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. Stiffen face sheets 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. 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 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 profiles 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.

F. 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. Reinforcements for all other surface mounted hardware - 16 gage.

G. 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.

H. 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.

I. Flatness: Doors shall maintain a flatness tolerance of 1/16 inch maximum in any direction, including a diagonal direction.

2.05 HOLLOW METAL PANELS

A. Hollow metal panels shall be made of the same materials and constructed and finished in the same way as specified for hollow metal doors.

2.06 LABELED DOORS & FRAMES

A. Labeled doors and frames shall be provided for those openings requiring fire protection ratings, and as scheduled on Drawings. Such doors and frames shall be Underwriters' Laboratories, Inc. labeled or other nationally recognized agency having a factory inspection service.

B. When door or frame specified to be fire-rated cannot qualify for appropriate labeling because of its design, size, hardware or any other reason, the Project Engineer / Architect shall be advised before fabricating work on that item is started.

2.07 HARDWARE LOCATIONS

A. Hinges:

1. Top – 5 inches from head of frame to top of hinge.
2. Bottom – 10 inches plus 1 inch from finished floor to bottom of hinge.
3. Intermediate, centered between top and bottom hinges.
4. on Half doors:
   a. 5 inches from top of door to top of hinge.
   b. 10 inches from finished floor to bottom of bottom hinge.
5. All over 7’-0” tall shall receive two pair of hinges per leaf or continuous hinges.

B. Unit and integral type locks and latches – 3’- 2” to centerline of knob.

C. Deadlocks – 5’- 0” to centerline of cross bar.

D. Panic hardware – 3’-1” to centerline of cross bar.

E. Door pulls – 3’-6” to center of grip.

H. Push-pull bars – 3’-1” to centerline of bar.

I. Arm pulls – 3’-11” to centerline.

J. Push plates – 4’- 0” to centerline of plate.

K. Roller latches – 3’-9” to centerline.

L. All of the above dimensions from paragraph 2.07(B) through 2.07(K) are from finished floor.

2.08 CLEARANCES

A. Edge clearances:

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

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

2.09 PREPARATION FOR FINISH HARDWARE

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

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

2.10 REJECTION

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

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine areas and conditions where hollow metal Work is to be installed and notify Project Engineer of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install hollow metal units and accessories in accordance with approved Shop Drawings, manufacturer's data, and Specifications.

B. Provide masonry anchorage devices where required for securing hollow metal frames to in-place concrete or masonry construction. Set anchorage devices opposite each anchor location, in accordance with details on final shop drawings and anchorage device manufacturer's instructions. Leave drilled holes rough, not reamed, and free from dust and debris.

C. Placing frames: Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

1. At wood stud partitions, attach wall anchors to studs with tapping screws. Place frames at fire-rated openings in accordance with NFPA Standard No. 80.
2. Make field splices in frames as detailed on final Shop Drawings, welded and finished to match factory work.

3. Remove spreader bars only after frames or bucks have been properly set and secured.
4. Door installation: Fit hollow metal doors accurately in their respective frames, with the following clearances:
   a. Jambs and head: 3/32 inch.
   b. Meeting edges, pairs of doors: 1/8 inch.
   c. Bottom: 1/4 inch, where no threshold or carpet.
   d. Bottom: at threshold or carpet: 1/8 inch.
   e. Place fire-rated doors with clearances as specified in NFPA Standard No. 80.

END OF SECTION

SECTION 08 14 29 PREFINISHED WOOD DOORS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. 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. Louvers for wood doors, including furnishing and installation, are specified under this Section.

1.02 RELATED SECTIONS

A. Section 08 80 00 – Glazing.

B. Section 09 05 15 – Color Design.

1.03 SUBMITTALS

A. Product Data: Indicate door core material and construction; veneer species, type and characteristics.

B. Shop drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, identify cutouts for glazing and louvers, and installation instructions. Indicate by transmittal form that copy of each instruction has been transmitted to the installer

1.04 QUALITY ASSURANCE

A. Comply with the requirements of the following standards unless otherwise indicated.

B. Non-Fire Rated Wood Doors: AWI “Architectural Flush Doors” of the Architectural Woodwork Institute.

C. Fire-Rated Wood Doors: Where fire-resistance classifications are shown or scheduled for wood door assemblies, provide doors which comply with requirements of NFPA No. 80 "Standard for Fire Doors and Windows" and which have been tested and rated with single point hardware by UL. Provide UL Label on each door and panel.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect wood doors during transit, storage and handling to prevent damage, soiling and deterioration. Comply with the on-site care recommendations of AWI “Care & Instruction at Job Site” Section 1300, G-22.

1.06 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
   b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
2. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Drawings and specifications are based on products manufactured by Graham Manufacturing Corp., P.O. Box 1647, Mason City, IA. Tel. (641) 423-2444.

B. Equivalent products by the following manufacturers are acceptable:

1. Algoma Hardwoods, Inc., Algoma, WI. Tel. (800) 678-8910.
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 62 14-Product Options and Substitution Procedures.

2.02 DOOR CONSTRUCTION, GENERAL

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

B. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.

1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
2. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals Comply with specified requirements for exposed edges.

E. Mineral-Core Doors:

1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as follows:
   a. 5-inch top-rail blocking.
   b. 5-inch bottom-rail blocking, in doors indicated to have protection plates.

c. 5-inch 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.

2.03 VENEERED-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.
9. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
10. Transom Match: Continuous match.
11. Exposed Vertical Edges: Same species as faces or a compatible species.
12. Core: Particleboard.
13. Construction: Five plies (PC-5). Stiles and rails are bonded to core, then entire unit 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.

C. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.

2.04 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated. Comply with requirements in NFPA 80 for fire-rated doors.

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:

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 Division 8 Section "Glazing."
3. Louvers: Factory install louvers in prepared openings.

2.05 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing. Finish faces, all four edges, edges of cutouts, and mortises.

B. Finish doors at factory.

C. Transparent Finish:

1. Grade: Premium.
2. Finish: WDMA TR-4 conversion varnish or TR-6 catalyzed polyurethane.
3. Staining: As selected by Architect from manufacturer's full range.
4. Sheen: Gloss

PART 3 - EXECUTION

3.01 EXAMINATION

A. Installer shall 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. Install fire-rated doors in corresponding fire-rated frames in accordance with the requirements of NFPA No. 80.

3.02 PREPARATION

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

3.03 INSTALLATION

A. Install wood doors in accordance with manufacturer's instructions and approved Shop Drawings. Fit doors to frame for proper fit and uniform clearance at each edge and machine for hardware. Seal cut surfaces after fitting and machining. Bevel non-fire

rated doors 1/8 inch in 2 inches at lock and hinge edges. Bevel fire rated doors 1/16 inch in 2 inches at lock edge.

B. Door Clearances: Fit to frames and machine for hardware for proper fit and uniform clearance at each edge.

1. For non-fire rated doors, provide following clearances:
   a. 1/8 inch at jambs and heads.
   b. 1/8 inch at meeting stiles for pairs of doors.
   c. 1/2 inch from bottom of door to top of decorative floor finish or covering, except where threshold is shown or scheduled provide 1/4 inch clearance from bottom of door to top of threshold.
2. For fire-rated doors, provide clearances complying with limitations of authority having jurisdiction.

3.04 ADJUSTING AND CLEANING

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

3.05 PROTECTION OF COMPLETED WORK

A. Installer shall advise Contractor of proper procedures required for protection of installed wood doors from damage or deterioration until acceptance of the Work.

B. Doors damaged before acceptance of the Work shall be repaired or replaced.

END OF SECTION

SECTION 08 33 23 OVERHEAD COILING DOORS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: The 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 Sections:

1. Division 05 Sections: Miscellaneous Metals for steel supports.
2. Division 09 Section -09 05 15 - Color Design
3. Division 26 Sections: Electrical connections and service for powered door operators.

1.02 REFERENCES

A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to the extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.

B. American Society for Testing and Materials: ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.03 PERFORMANCE REQUIREMENTS

A. Structural Performance: Design and reinforce overhead coiling doors to withstand a 20 PSF (87 MPH) wind loading pressure in the fully closed position unless otherwise indicated.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer’s product data and installation instructions.

B. Shop Drawings: Provide drawings indicating guide details, head and jamb conditions, clearances, anchorage, accessories, finish colors, patterns and textures, operator mounts and other related information.

C. Quality Assurance Submittals:

1. Certificates: Submit manufacturer’s certificate that products meet or exceed specified requirements.
2. Certificates: Submit installer qualifications.

D. Closeout Submittals: Submit Warranty documents.

1.05 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. Regulatory Requirements and Approvals: Comply with IBC 2009 and AHJ requirements.

C. Preinstallation Meetings: 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.

1.06 DELIVERY, STORAGE & 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.

1.07 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.

1.08 MAINTENANCE

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

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Drawings and specifications are based on products manufactured by Raynor Garage Doors, P.O. Box 448, Dixon, IL 61021. Tel. (800) 472-9667.

B. Equivalent products by the following manufacturers are acceptable:

1. Overhead Door Corp., Dallas, TX. Tel. (800) 887-3667.
2. Windsor Door, Little Rock, AR. Tel. (800) 946-3767.

C. Substitutions shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures.

2.02 COILING DOOR

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

2.03 DOOR OPERATORS

A. Provide doors designed for electric motor operation.

B. Operators shall comply with UL 325 standards.

C. Manufacturer Product Designation: Raynor ControlHoist Standard (Model Series CHS).

1. Type: Jackshaft with manual chain hoist.
2. Motor Horsepower Rating: Continuous Duty-sized by manufacturer's recommendation.
3. Electrical 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: Doors shall have "Monitored electric safety edges" to reverse.

2.04 CURTAIN

A. Material: Interlocking steel slats, 22 gage (0.030 inch minimum thickness) roll-formed from commercial quality hot-dipped galvanized (G-90) steel in compliance with ASTM A-653.

1. Slat Type: Flat 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

C. Color and Finish: One finish coat of ArmorBrite™ Powdercoat applied over one coat of white epoxy primer. Color as indicated in Section 09 05 15 – Color Design.

D. Endlocks: Lateral movement of the slats to be contained by means of zinc-plated malleable endlocks 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.

2.05 GUIDES

A. Guide Assemblies: To consist of three structural steel angles, minimum 3 inches by 2 inches by 3/16 inch and fitted with removable curtain stops. Steel guides to be provided with one coat of rust-inhibitive primer.

B. Jamb Construction: Steel Jambs with self-tapping fasteners.

C. Weather Seal: Snap-on vinyl seal.

2.06 COUNTERBALANCE SYSTEM

A. Headplates: 3/16 inch steel plate, attached to wall angle of guide assembly with 1/2 inch diameter class 5 case hardened bolts. Inside of drive bracket fitted with sealed ball bearing. Provide head plates with one coat of rust-inhibitive primer

B. Barrel: Minimum 4-1/2 inches O.D. and 0.120 inch wall thickness structural steel pipe. Deflection of pipe under full load shall not exceed 0.03 inch per foot of span.

C. Counterbalance: Provide torsion counterbalance mechanism as follows: Torsion Spring: Oil-tempered, helical torsion springs, grease packed and mounted on a continuous steel torsion shaft.

2.07 ENCLOSURES

A. Round Hood: 24 gauge steel, finish-painted to match curtain.

B. Hood Baffle: With EPDM rubber seal to inhibit air infiltration through hood cavity.

PART 3 - EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

A. Comply with instructions and recommendations of door manufacturer.

3.02 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.

B. Do not proceed with installation of doors, operators, controls and accessories until unacceptable conditions are corrected.

3.03 INSTALLATION

A. General: Install door, guide and operating equipment complete with all necessary accessories and hardware according to shop drawings, manufacturer's instructions.

B. Instruct Owners personnel in proper operating procedures and maintenance.

3.04 ADJUSTING

A. General: Lubricate bearings and sliding parts and adjust doors for proper operation, balance, clearance and similar requirements.

3.05 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.

END OF SECTION

SECTION 08 71 00 DOOR HARDWARE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Hardware as shown on the Drawings and in Schedules. Door hardware is hereby defined to include all items known commercially as builders hardware, as required for swing doors, except special types of unique and non-matching hardware specified in the same section as the door and door frame. 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

B. 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. Labeled doors shall be fitted with labeled hardware.

C. All modifications of hardware required by reason of construction characteristics shall be such as to provide the proper operation or functional features. 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. Hardware for application to metal shall be made to standard templates. Template information shall be furnished 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.

D. Hardware shall be free from defects affecting appearance and serviceability. Working parts shall be well fitted and smooth working without unnecessary play. All items of hardware shall be delivered to the building site in sufficient time in advance of its requirement for use for inspection prior to installation.

E. Electronic Hardware: Coordinate with Owner’s vendor for keypads located at exterior doors. Also coordinate with Electrical subcontractor and Electrical Specifications and Drawings.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's product data, roughing-in diagrams, and Installation instructions for each type of hardware. Include operating instructions, maintenance information and spare part sources.

B. Contractor's Hardware Schedule: After all samples have been approved but prior to delivery of hardware, Contractor shall prepare and submit to the Project Engineer / MDOT Architect a complete schedule of all finish hardware required. Schedule shall follow requirements of Specifications and shall indicate type, manufacturer's name and number, location and finish of each item required. Approval of schedule will not relieve Contractor of responsibility for furnishing all necessary hardware.

C. Submit such samples as required by the Project Engineer / MDOT Architect for approval. Do not deliver hardware until approval is obtained.

1.03 QUALITY ASSURANCE

A. Perform work in accordance with the following requirements:

1. ANSI A117.1 – Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
2. NFPA 101.

B. Hardware Supplier: Company specializing in supplying commercial door hardware with five years documented experience and approved by manufacturer.

C. Hardware supplier shall have in his employment, an Architectural Hardware Consultant (AHC) in good standing as certified by the Society of Hardware Consultants Council. The Architectural Hardware Consultant shall assist the Contractor in installation and verify that hardware has been furnished and installed in accordance with manufacturer's instructions and as specified herein.

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

1.04 PACKING AND MARKING

A. 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.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Equivalent products by the following manufacturers are acceptable:

1. Hinges – Hager, Ives, McKinney.
2. Cylinders – Best, Corbin/Russwin, Sargent, Schlage.
3. Flushbolts and Accessories – Hager, Ives, Rockwood.
4. Locksets – Baldwin, Corbin/Russwin, Sargent, Schlage.
5. Deadlocks – Baldwin, Corbin/Russwin, Sargent, Schlage.
6. Exit Devices – Precision, Sargent, Von Duprin.
7. Door Closers – Corbin/Russwin (DC3000), LCN (1460), Sargent (1430).
8. Protective Plates – Hager, Ives, Rockwood.
9. Door Stops – Hager, Ives, Rockwood.
10. Overhead Stops / Holders – Glynn Johnson, Rixson, Sargent.

11. Gasketing and Thresholds – National Guard Products, Pemko, Reese.
12. Silencers – Hager, Ives, Rockwood.

B. Substitutions shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures.

2.02 KEYING / CYLINDERS

A. All cylinders and locksets shall be set to the existing masterkey system. 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.

B. All cylinders shall be keyed in sets as directed by the Project Engineer / MDOT Architect. Furnish 3 change keys per lock and 6 masterkeys per set.

2.03 MATERIALS

A. See Hardware Schedule at end of this Section. Products listed set standard.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Mount hardware units at heights recommended in "Recommended Locations for Builders' Hardware" NBHA, except as other wise specifically indicated or required to comply with governing regulations, and except as may be otherwise directed by the Project Architect.

B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, install each item completely and then remove and store in a secure place during the finish application. After completion of the finishes, re-install each item. Do not install surface-mounted items until finishes have been completed on the substrate.

C. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation. Drill and countersink units that are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

D. Cut and fit threshold and floor covers to profile of door frames, with mitered corners and hairline joints. Join units with concealed welds or concealed mechanical joints. Cut smooth openings for spindles, bolts and similar items, if any.

E. 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.

1. At exterior doors, and elsewhere as indicated, set thresholds in a bed of either butyl rubber sealant or polyisobutylene mastic sealant to completely fill concealed voids and exclude moisture from every source.
2. Do not plug drainage holes or block weeps. Remove excess sealant.

3.02 ADJUSTING AND CLEANING

A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Lubricate moving parts with type lubrication recommended by manufacturer (graphite-type if no other recommended). Replace units that cannot be adjusted and lubricated to operate freely and smoothly as intended for the application made.

3.03 SCHEDULE:

HW1 (For Exterior Dbl Hollow Metal Doors)
Each Opening Shall Have:

6 – Each Hinges	Hager	BB1191 4 1/2 X 4 1/2 X NRP X 629
1 – Lockset	Schlage	ND80HD Rhodes X 626
1 – Cylinder	Best	As Required
2 – Flushbolts	Rockwood	555-12” X 626
1 – Closer	LCN	P1460 AL X TBGN (Mounted Active Leaf)
2 – Kickplates	Rockwood	8 X 2 LDW 0.050 X 630 (Mounted push side)
1 – Threshold	Pemko	2005AV X Required Length
1 – W/Strip	Pemko	303AV
2 – Door Bottoms	Pemko	2211AV (for Hollow Metal Doors)
2 – Stops		(As Required)
2 – Silencers		

Note: Coordinate with Owner’s vendor for electronics.

HW2 (For Exterior Single Hollow Metal Doors-Scale Maintenance)
Each Opening Shall Have:

3 – Each Hinges	Hager	BB1191 4 1/2 X 4 1/2 X NRP X 629
1 – Lockset	Schlage	ND80HD Rhodes X 626
1 – Closer	LCN	P1460/1460 AL X TBGN
1 – Kickplate	Rockwood	8 X 2 LDW 0.050 X 629 (mounted push side)
1 – Threshold	Pemko	2005AV
1 – W/Strip	Pemko	303AV
1 – Door Bottom	Pemko	2211AV (for Hollow Metal Doors)
1 – Stop		(As Required)
3 – Silencers		

Note: Coordinate with Owner’s vendor for electronics.

HW3 (For Interior Single Wood Doors @ Offices)
Each Opening Shall Have:

3 – Each Hinges	Hager	BB1279 4 1/2 X 4 1/2 X 652
1 – Lockset	Schlage	ND50PD Rhodes X 626
1 – Closer	LCN	1460 AL X TBGN @ Rated Walls & as indicated
1 – Kickplate	Rockwood	8 X 2 LDW 0.050 X 630 (mounted push side)
1 – Mop Plate	Rockwood	6 X 1 LDW 0.050 X 630 (mounted pull side)
1 – Stop	Rockwood	440 X 626
3 – Silencers		

HW4 (For Interior Single Wood Doors @ Single Toilet Room)
Each Opening Shall Have:

3 – Each Hinges	Hager	BB1279 4 1/2 X 4 1/2 X 652
1 – Lockset	Falcon	D271
1 – Passage	Schlage	ND10S Rhodes X 626
1 – Closer	LCN	1460 AL X TBGN
1 – Kickplate	Rockwood	8 X 2 LDW 0.050 X 630 (mounted push side)
1 – Mop Plate	Rockwood	6 X 1 LDW 0.050 X 630 (mounted pull side)
1 – Stop	Rockwood	440 X 626
3 – Silencers		

HW5 (For Interior Dbl HM Doors @ Work Area to Corridor)
Each Opening Shall Have:

6 – Each Hinges	Hager	BB1279 4 1/2 X 4 1/2 X 652
1 – Lockset	Schlage	ND50PD Rhodes X 626 (active leaf)
1 – Cylinder	Best	As Required
1 – Flushbolt	Rockwood	555-12” X 626 (inactive leaf)
1 – Closer	LCN	1461 AL X TBGN (active leaf)
2 – Kickplate	Rockwood	8 X 2 LDW 0.050 X 630 (mounted push side)
2 – Mop Plate	Rockwood	6 X 1 LDW 0.050 X 630 (mounted pull side)
2 – Stop	Rockwood	440 X 626
2 – Silencers		

HW6 (For Interior Dbl Wd Doors @ Secure Storage Rooms)
Each Opening Shall Have:

6– Each Hinges	Hager	BB1279 4 1/2 X 4 1/2 X 652
1 – Lockset	Schlage	ND50RD Rhodes X 626
1 – Cylinder	Best	As Required
2 – Flushbolts	Rockwood	555-12” X 626
1 – Stop	Rockwood	440 X 626
2 – Silencers		

HW7 (For Interior Dbl Half Wd Door @ Waiting)
Each Opening Shall Have:

1 – Set Spring Hinges	Hager	1256 4 1/2 X 4 1/2 X 652 (active leaf)
2 – Each Hinges	Hager	BB1279 4 1/2 X 4 1/2 X 652 (inactive leaf)
1 – Passage	Schlage	ND10S Rhodes X 626
1 – Flushbolt	Rockwood	580-8” X 626 (inactive leaf)
2 – Kickplates	Rockwood	8 X 2 LDW 0.050 X 630 (mounted push side)
2 – Mop Plates	Rockwood	6 X 1 LDW 0.050 X 630 (mounted pull side)
2 – Stops	Rockwood	440 X US26D
2 – Silencers		

HW8 (For Interior Single HM Doors @ Communication Room)
Each Opening Shall Have:

1 – Set Spring Hinges	Hager	1256 4 1/2 X 4 1/2 X 652
1 – Lockset	Schlage	ND80RD Rhodes X 626
1 – Cylinder	Best	As Required
1 – Stop	Rockwood	440 X 626
3 – Silencers		

HW9 (For Exterior Single Hollow Metal Doors-Warehouse)
Each Opening Shall Have:

3 – Each Hinges	Hager	BB1191 4 1/2 X 4 1/2 X NRP X US32D
1 – Lockset	Schlage	ND80HD Rhodes X US26D
1 – Closer	LCN	P1460/1460 AL X TBGN
1 – Kickplate	Rockwood	8 X 2 LDW 0.050 X US32D(mounted push side)
1 – Threshold	Pemko	2005AV
1 – W/Strip	Pemko	303AV
1 – Door Bottom	Pemko	2211AV (for Hollow Metal Doors)
1 – Stop		(As Required)
3 – Silencers		

END OF SECTION

SECTION 08 80 00 GLAZING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Glass and glazing for doors, windows and other glazed openings, interior and exterior locations.

1.02 RELATED SECTIONS

A. Section 08 11 13 - Hollow Metal Doors and Frames.

B. Section 08 14 29 - Prefinished Wood Doors.

1.03 QUALITY ASSURANCE

A. Comply with recommendations of Flat Glass Marketing Association (FGMA) "Glazing Manual" and "Sealant Manual" except where more stringent requirements are indicated. Refer to those publications for definitions of glass and glazing terms not otherwise defined in this section or other referenced standards.

B. Prime Glass Standard: FS DD-G-45l.

C. Heat-Treated Glass Standard: FS DD-G-l403.

D. Safety Glass Standard: CPSC l6 CFR l20l.

1.04 DELIVERY, STORAGE, AND HANDLING

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

1.05 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Equivalent products by the following prime glass manufacturers are acceptable:

1. Zeledyne, Tulsa, OK. Tel. (800) 331-2607. .
2. AFGD Glass, Inc., Atlanta, GA. Tel. (800) 766-2343.
3. Guardian Industries Corp., Carleton, MI. Tel. (800) 521-9040.
4. Pilkington North America, Toledo, OH. Tel. (419) 247-3731.
5. PPG Industries, Inc., Pittsburgh, PA. Tel. (800) 377-5267.

B. Substitutions shall fully comply with specified requirements and Section 01 62 14- Product Options and Substitution Procedures

2.02 INSULATING GLASS

A. Material: Shall consist of 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; Kind Heat Strengthen except where fully Tempered required.
2. Airspace Thickness: 1/2 - inch.
3. Sealing System: Manufacturer's standard 1 inch sealing system.
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 – equal to "Versalux Grey" by Zeledyne, with MSVD (Sputter) Low-E on 2nd (air space) surface.
8. Interior Pane: Clear
9. Unit Performance Requirements for "Versalux Grey":
   a. Light Transmission (visible): 35 percent.
   b. U-Value, Summer daytime: 0.26.
   c. U-Value, Winter nighttime: 0.29.
   d. Shading Coefficient: 0.28.
   e. Relative Heat Gain: 60 BTU per Hour Ft².
10. Warranty: Manufacturer's Ten year.

2.03 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.

2.04 SETTING MATERIALS

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

PART 3 - EXECUTION

3.01 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.

3.02 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.

3.03 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.

B. Apply primer or sealant to joint surfaces where recommended by sealant manufacturer.

3.04 GLAZING

A. Install setting blocks of proper size in sill rabbet, located l/4 of glass width from each corner. Set blocks in thin course of heel-bead compound, if any.

B. Provide spacers inside and out, of proper size and spacing, for glass sizes larger than 50 united inches, except where gaskets or pre-shimmed tapes are used for glazing. Provide l/8" minimum bite of spacers on glass and use thickness equal to sealant width, except with sealant tape use thickness slightly less than final compressed thickness of tape.

C. Set units of glass in each series with uniformity of pattern, draw, bow and similar characteristics.

D. Force sealant into channel to eliminate voids and to ensure complete "wetting" or bond of sealant to glass and channel surfaces.

E. 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.

F. Clean and trim excess glazing materials from glass and stops or frames promptly after installation, and eliminate stains and discoloration.

G. 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.

3.05 CURE AND PROTECTION

A. Protect glass from breakage immediately upon installation, by use of crossed streamers attached to framing and held away from glass. Do not apply markers to surfaces of glass. Remove nonpermanent labels and clean surfaces. Cure sealant for high early strength and durability.

B. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.

3.06 CLEANING

A. Wash and polish glass on both faces not more than 4 days prior to date scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Comply with glass product manufacturer's recommendations for final cleaning.

B. The General Contractor shall be responsible for removal of protective materials and cleaning with plain water, or water with soap or household detergent as approved by the glass manufacturer. The General Contractor shall be held responsible for damages resulting from the use of other cleaning material.

END OF SECTION

SECTION 08 91 19 FIXED LOUVERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Extruded aluminum louvers with insect/bird screens as indicated on the Drawings including indications of sizes and locations.

1.02 RELATED SECTION

A. Section 09 05 15 – Color Design.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's specifications; certified test data, where applicable; and installation instructions for required products, including finishes.

B. Shop Drawings: Submit Shop Drawings for the fabrication and erection of louver units and accessories. Include plans, elevations and details of sections and connections to adjoining Work. Indicate materials, finishes, fasteners, joinery and other information to determine compliance with specified requirements.

C. Samples: Submit 6-inch square samples of each required finish. Prepare samples on metal of same gage and alloy to be used in Work. Where normal color and texture variations are to be expected, include two or more units in each sample showing limits of such variations.

1.04 QUALITY ASSURANCE

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. Louvers shall be licensed to bear AMCA Certified Ratings Seal.

B. SMACNA Recommendations: Comply with SMACNA "Architectural Sheet Metal Manual" recommendations for fabrication, construction details and installation procedures, except as otherwise indicated.

C. Field Measurements: Verify size, location and placement of louver units prior to fabrication, wherever possible.

D. 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. Pre-assemble units in shop to greatest extent possible and disassemble as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation.

1.05 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Drawings and Specifications are based on products manufactured by Construction Specialties, Inc., 49 Meeker Ave., Cranford, NJ 07016. Tel. (908) 272-5200

B. Equivalent products by the following manufacturers are acceptable:

1. All-Lite Louvers, Mineral Wells, WV. Tel. (304) 489-8113.
2. Ruskin Manufacturing, Kansas City, MO. Tel. (816) 761-7476.

C. Substitutions shall fully comply with specified requirements and Section 01630-Product Options and Substitution Procedures

2.02 WALL LOUVERS

A. Drainable Blade Fixed Louver: 6 inch deep extruded aluminum louver equal to C/S Model A6097H. Free area to be 50.44 percent minimum for 48 inches square. Pressure drop to be no more than 0.14-inch of water gage at 872 FPM in intake direction.

2.03 MATERIALS

A. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming or as otherwise recommended by metal producer to provide required finish.

B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T52. Blade and frame thickness shall be 0.125 inch nominal.

C. Fastenings: Use same material as items fastened, unless otherwise indicated. Fasteners for exterior applications may be hot-dip galvanized, stainless steel or aluminum. Provide types, gages, and lengths to suit unit installation conditions. Use Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

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: SSPC-Paint 12 (cold-applied asphalt mastic).

2.04 FABRICATION, GENERAL

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. Provide 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. At horizontal joints between louver units provide horizontal mullions except where continuous vertical assemblies are indicated.

E. Provide sill extensions and loose sills made of same material as louvers, where indicated, or required for drainage to exterior and to prevent water penetrating to interior. Setback dimension is 3-3/4 inches to 6 inches.

F. Join frame members to one another and to stationary louver blades. Maintain equal blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.

G. Finish: Kynar 500 (70% PVDF) finish to be selected by MDOT Architect from full range of standard and premium colors. Refer to Section 09 05 15 for color.

2.05 PERFORMANCE DATA

A. Free Area: 52.1 percent for a 48 inch x 48 inch size.

B. Free Area Size: 8.34 square feet.

C. Maximum Recommended Air Flow Thru Free Area: 990 feet per minute.

D. Air Flow: 8256 cubic feet per minute.

E. Maximum Pressure Drop: 0.16 inches.

F. Water Penetration: Maximum of 0.01 ounces per square foot of free area at an air flow of 1,023 feet per minute free area velocity when tested for 15 minutes.

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 (no insect screen) for louvers that are connected to duct work or fans.

PART 3 - EXECUTION

3.01 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions and directions for installation of anchorage. Coordinate delivery of such items to Project Site.

3.02 INSTALLATION

A. Locate and place louver units plumb, level and in proper alignment with adjacent Work. Use concealed anchorage wherever possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather-tight connection.

B. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealant and joint fillers, as indicated.

C. Repair finishes damaged by cutting, welding, soldering, and grinding operations required for fitting and jointing. Restore finishes so there is no evidence of corrective Work. Return items that cannot be refinished in field to shop, make required alterations and refinish entire unit, or provide new units, at Contractor's option.

D. Protect galvanized and non-ferrous metal surfaces from corrosion or galvanic action by application of a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry or dissimilar metals.

E. Refer to Section 07 92 00 for sealant in connection with installations of louvers.

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. Manufacture'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. If no selection is listed herein for products, the Project Engineer / MDOT Architect shall be contacted for a color selection. 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. Samples shall be submitted for approval prior to applying or installing any finishes or items that are not 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. Any 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 / MATERIAL	MANUFACTURER / NUMBER & COLOR NAME	COLOR DESCRIPTION
05 50 00 – Metal Bollards	Safety Yellow	(yellow)
05 50 00 – Stair Steel & Railing	Safety Yellow	(yellow)
06 10 00 – Exposed Plywood	Sherwin Williams SW 6106 #Kilim Beige	(light tan)
06 40 00 – Arch. Wdwrk. (Counter)	Nevamar AL5001T Herbal Illusion	(medium tan)
06 40 00 – Arch. Wdwrk. (Cab.)	Nevamar S2084T Foundry	(gray brown)
07 92 00 - Joint Sealants	Pecora (Match adjacent material inside & outside)	

08 11 13 - HM Dr & Frames (Int.)	Sherwin Williams SW #6146 Umber	(dark brown)
08 11 13 - HM Dr & Frames (Ext.)	Sherwin Williams SW #7034 Status Bronze	(dark brown)
08 14 00 - Wood Doors (stained)	Graham #700 Dark Brown	(dark brown)
08 33 23 - Overhead Coiling Doors	Raynor –Dark Brown	(brown)
08 71 00 - Door Hardware	Satin Chrome	(silver)
09 29 00 - Gyp Bd (Walls)	Sherwin Williams SW #6106 Kilim Beige	(light tan)
09 29 00 - Gyp Bd (Ceiling)	Sherwin Williams SW #7010 White Duck	(white)
09 31 13 - Grout (Floors)	Laticrete-Platinum #42 (gray)	
09 31 13 - Grout (Walls)	Laticrete-Almond #85	(off white)
09 31 13 - Ceramic Tile (Floors)	A.O. Shadow Bay, Beach Sand #SH51	(tan)
09 31 13 - Ceramic Tile (Wall Field)	DalTile 0135 Almond Gloss	(beige)
09 31 13 - Ceramic Tile (Wall Accent)	DalTile 0171 Cityline KOH	(dark brown)
09 65 10 - Resilient Floor	Amtico, Oriental Slate Brown #OL27	(dark brown)
09 65 10 - Rubber Base	Johnsonite, Seaweed #101	(dark brown)
10 11 00 – Visual Display Board	Claridge – 7SLCS -11	(low gloss white)
10 11 00 – Tack board	Claridge - Cork 1113 Steel Gray	(gray)
10 14 00 – ASI (Int-border)	SC 905 Black	(black)
10 14 00 – ASI (Int-background)	SC 922 Bone	(beige)
10 14 00 – ASI (Int-copy)	SC905 Black	(black)
10 56 13 – Metal Storage Shelving	Penco - 028 Gray	(gray)
11 31 15 – Appliances (Microwave)	GE-Bisque	(light tan)
11 31 15 – Appliances (Refrigerator)	GE-Bisque	(light tan)
12 21 13 – Horiz Lvr Blinds (at Windows)	Hunter Douglas #269 Chenille	(light tan)
12 48 43 – Floor Mats	Pedimat #9325 Graphite	(black)
13 34 17 – Pre-Engr Bldgs Roof	Ceco-Galvalume	(silver/gray)
13 34 18 – Metal Buildngs Roof	Ceco-Kynar-White	(white)
13 34 19 – Metal Building Main Roof	Ceco-Kynar-White	(white)
13 34 19 – Wall Panel	Ceco-Surry Tan	(tan)
13 34 19 – Roof Fascia & Rake	Ceco-Burnished Slate	(brown)
13 34 19 – Gutter, Downspout & Trim	Ceco-Burnished Slate	(brown)
13 34 19 – Structural Framing	Sherwin Williams SW #6108 Latte	(tan)
13 34 19 – All Exposed Steel	Sherwin Williams SW #6108 Latte	(tan)

PART 3 - EXECUTION

3.01 EXECUTION, GENERAL

A. Refer to execution requirements specified in other Sections of this Specification for the specific products listed. Any remaining 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 ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Nonload-bearing steel framing members for gypsum board assemblies.
2. Gypsum board assemblies attached to steel framing.
3. Glass-mat, water-resistant gypsum backing board installed with gypsum board assemblies.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Section 05 41 00 "Cold-Formed Exterior Steel Stud Framing" for load-bearing steel framing.

1.3 DEFINITIONS

A. Gypsum Board Construction Terminology: Refer to ASTM C 11 and GA-505 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.4 ASSEMBLY PERFORMANCE REQUIREMENTS

A. Fire Resistance: Provide gypsum board assemblies with fire-resistance ratings indicated.

1.5 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of product specified.

1.6 QUALITY ASSURANCE

A. Single-Source Responsibility for Steel Framing: Obtain steel framing members for gypsum board assemblies from a single manufacturer, unless otherwise indicated.

B. Single-Source Responsibility for Panel Products: Obtain each type of gypsum board and other panel products from a single manufacturer.

C. Single-Source Responsibility for Finishing Materials: Obtain finishing materials from either the same manufacturer that supplies gypsum board and other panel products or from a manufacturer acceptable to gypsum board manufacturer.

D. Fire-Test-Response Characteristics: Where fire-resistance-rated gypsum board assemblies are indicated, provide gypsum board assemblies that comply with the following requirements:

1. Fire-Resistance Ratings: As indicated by GA File Numbers in GA-600 "Fire Resistance Design Manual" or design designations in UL "Fire Resistance Directory" or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.
2. Gypsum board assemblies indicated are identical to assemblies tested for fire resistance according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
3. Deflection and Firestop Track: Top runner provided in fire-resistance-rated assemblies indicated is labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum panels flat to prevent sagging.

1.8 PROJECT CONDITIONS

A. Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C 840 requirements or gypsum board manufacturer's recommendations, whichever are more stringent.

B. Room Temperatures: For nonadhesive attachment of gypsum board to framing, maintain not less than 40 deg F. For adhesive attachment and finishing of gypsum board, maintain not less than 50 deg F for 48 hours before application and continuously after until dry. Do not exceed 95 deg F when using temporary heat sources.

C. Ventilation: Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Steel Framing and Furring:
   a. Consolidated Systems, Inc.
   b. Dale Industries, Inc.
   c. Marino/Ware (formerly Marino Industries Corp.).
   d. National Gypsum Co.; Gold Bond Building Products Division.
2. Grid Suspension Assemblies:
   a. Armstrong World Industries, Inc.
   b. Chicago Metallic Corp.
   c. USG Interiors, Inc.
   d. Worthington Steel Company (formerly National Rolling Mills).
3. Gypsum Board and Related Products:
   a. Georgia-Pacific Corp.
   b. National Gypsum Co.; Gold Bond Building Products Division.
   c. United States Gypsum Co.

2.2 STEEL FRAMING COMPONENTS FOR SUSPENDED AND FURRED CEILINGS

A. General: Provide components complying with ASTM C 754 for conditions indicated.

B. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190 conducted by a qualified independent testing agency.

1. Note: Powder-Actuated fastens not allowed without prior approval from the MDOT Project Engineer.

C. Wire Ties: ASTM A 641, Class 1 zinc coating, soft temper, 0.062 inch thick.

D. Wire Hangers: ASTM A 641, Class 1 zinc coating, soft temper, 0.162-inch diameter.

E. Hanger Rods: Mild steel and zinc coated or protected with rust-inhibitive paint.

F. Flat Hangers: Mild steel and zinc coated or protected with rust-inhibitive paint.

G. Angle-Type Hangers: Angles with legs not less than 7/8 inch wide, formed from 0.0635-inch- thick galvanized steel sheet complying with ASTM A 653, G 90 coating designation, with bolted connections and 5/16-inch diameter bolts.

H. Channels: Cold-rolled steel, 0.0598-inch minimum thickness of base (uncoated) metal and 7/16-inch- wide flanges, and as follows:

1. Carrying Channels: 1-1/2 inches deep, 475 lb/1000 feet, unless otherwise indicated.
2. Furring Channels: 3/4 inch deep, 300 lb/1000 feet, unless otherwise indicated.
3. Finish: Rust-inhibitive paint, unless otherwise indicated.
4. Finish: ASTM A 653, G 60 hot-dip galvanized coating for framing for exterior soffits and where indicated.

I. Steel Studs for Furring Channels: ASTM C 645, with flange edges of studs bent back 90 degrees and doubled over to form 3/16-inch- wide minimum lip (return), and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:

1. Depth: 2-1/2 inches, unless otherwise indicated.
2. Depth: 3-5/8 inches, unless otherwise indicated.
3. Depth: As indicated.
4. Protective Coating: Manufacturer's standard corrosion-resistant coating.

J. Steel Rigid Furring Channels: ASTM C 645, hat shaped, depth of 7/8 inch, and minimum thickness of base (uncoated) metal as follows:

1. Protective Coating: Manufacturer's standard corrosion-resistant coating.

K. Grid Suspension System for Interior Ceilings: ASTM C 645, manufacturer's standard direct-hung grid suspension system composed of main beams and cross-furring members that interlock to form a modular supporting network.

2.3 STEEL FRAMING FOR WALLS AND PARTITIONS

A. General: Provide steel framing members complying with the following requirements:

1. Protective Coating: Manufacturer's standard corrosion-resistant coating.

B. Steel Studs and Runners: ASTM C 645, with flange edges of studs bent back 90 degrees and doubled over to form 3/16-inch- wide minimum lip (return), and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:

1. Thickness: 20 gauge unless otherwise indicated.
2. Depth: 3-5/8 inches, unless otherwise indicated.
3. Depth: 6 inches where indicated.
4. Depth: 2-1/2 inches where indicated.

C. Deflection Track: Manufacturer's top runner complying with the requirements of ASTM C 645 and with 2-inch- deep flanges.

D. Deflection Track: Manufacturer's standard top runner designed to prevent cracking of gypsum board applied to interior partitions resulting from deflection of the structure above fabricated from steel sheet complying with ASTM A 653 or ASTM A 568. Thickness as indicated for studs, and width to accommodated depth of studs, and of the following configuration:

1. Top Runner with Compressible Flanges: 2-1/2-inch- deep flanges with V-shaped offsets that compress when pressure is applied from construction above.

E. Deflection and Firestop Track: Top runner designed to allow partition heads to expand and contract with movement of structure above while maintaining continuity of the assembly. Comply with requirements of ASTM C 645 except configuration, of thickness indicated for studs and width to accommodate depth of studs indicated with flanges offset at midpoint to accommodate gypsum board thickness.

F. Z-Furring Members: Manufacturer's standard Z-shaped furring members with slotted or nonslotted web, fabricated from steel sheet complying with ASTM A 653 or ASTM A 568; with a minimum base metal (uncoated) thickness of 0.0179 inch, face flange of 1-1/4 inch, wall-attachment flange of 7/8 inch, and of depth required to fit insulation thickness indicated.

G. Steel Channel Bridging: Cold-rolled steel, 0.0598-inch minimum thickness of base (uncoated) metal and 7/16-inch- wide flanges, 1-1/2 inches deep, 475 lb/1000 feet, unless otherwise indicated.

H. Steel Flat Strap and Backing Plate: Steel sheet for blocking and bracing complying with ASTM A 653 or ASTM A 568, length and width as indicated, and with a minimum base metal (uncoated) thickness as follows:

1. Thickness: 0.0179 inch, unless otherwise indicated.

I. Fasteners for Metal Framing: Provide fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum board manufacturers for applications indicated.

2.4 GYPSUM BOARD PRODUCTS

A. General: Provide gypsum board of types indicated in maximum lengths available that will minimize end-to-end butt joints in each area indicated to receive gypsum board application.

1. Widths: Provide gypsum board in widths of 48 inches.

B. Gypsum Wallboard: ASTM C 36 and as follows:

1. Type: Type X where required for fire-resistance-rated assemblies – all gypsum board uses.
2. Edges: Tapered.
3. Thickness: 5/8 inch.

C. Water-Resistant Gypsum Backing Board: ASTM C 630 and as follows:

1. Type: Type X for fire-resistance-rated assemblies and where indicated.
2. Thickness: 5/8 inch.

2.5 CEMENTITIOUS BACKER UNITS

A. Provide cementitious backer units complying with ANSI A118.9, of thickness and width indicated below, and in maximum lengths available to minimize end-to-end butt joints.

1. Thickness: 5/8 inch, required as tile backer-typical.

2.6 TRIM ACCESSORIES

A. Accessories for Interior Installation: Cornerbead, edge trim, and control joints complying with ASTM C 1047 and requirements indicated below:

1. Material: Formed metal or plastic, with metal complying with the following requirement:
   a. Steel sheet zinc coated by hot-dip or electrolytic process, or steel sheet coated with aluminum or rolled zinc.
2. Shapes indicated below by reference to Fig. 1 designations in ASTM C 1047:
   a. Cornerbead on outside corners, unless otherwise indicated.
   b. LC-bead with both face and back flanges; face flange formed to receive joint compound. Use LC-beads for edge trim, unless otherwise indicated.
   c. L-bead with face flange only; face flange formed to receive joint compound. Use L-bead where indicated.
   d. U-bead with face and back flanges; face flange formed to be left without application of joint compound. Use U-bead where indicated.
   e. One-piece control joint formed with V-shaped slot and removable strip covering slot opening.

B. Aluminum Accessories: Where indicated, provide manufacturer's standard extruded-aluminum accessories of profile indicated complying with the following requirements:

1. Aluminum Alloy: Alloy and temper recommended by aluminum producer and finisher for type of finish indicated and with not less than the strength and durability properties of aluminum extrusions complying with ASTM B 221 for alloy and temper 6063-T5.
   a. Color: As selected by Architect from manufacturer's standard colors.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering aluminum accessories that may be incorporated in the Work include, but are not limited to, the following:
   a. Fry Reglet Corp.
   b. MM Systems, Inc.
   c. Pittcon Industries, Inc.

2.7 JOINT TREATMENT MATERIALS

A. General: Provide joint treatment materials complying with ASTM C 475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.

B. Joint Tape for Gypsum Board: Paper reinforcing tape, unless otherwise indicated.

1. Use pressure-sensitive or staple-attached, open-weave, glass-fiber reinforcing tape with compatible joint compound where recommended by manufacturer of gypsum board and joint treatment materials for application indicated.

C. Joint Tape for Cementitious Backer Units: As recommended by cementitious backer unit manufacturer.

D. Drying-Type Joint Compounds for Gypsum Board: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.

1. Ready-Mixed Formulation: Factory-mixed product.
   a. Taping compound formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories.
   b. Topping compound formulated for fill (second) and finish (third) coats.
   c. All-purpose compound formulated for both taping and topping compounds.

E. Joint Compound for Cementitious Backer Units: Material recommended by cementitious backer unit manufacturer.

2.8 MISCELLANEOUS MATERIALS

A. General: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.

B. Laminating Adhesive: Special adhesive or joint compound recommended for laminating gypsum panels.

C. Spot Grout: ASTM C 475, setting-type joint compound recommended for spot-grouting hollow metal door frames.

D. Fastening Adhesive for Wood: ASTM C 557.

E. Fastening Adhesive for Metal: Special adhesive recommended for laminating gypsum panels to steel framing.

F. Steel drill screws complying with ASTM C 1002 for the following applications:

1. Fastening gypsum board to steel members less than 0.033 inch thick.
2. Fastening gypsum board to wood members.
3. Fastening gypsum board to gypsum board.

G. Steel drill screws complying with ASTM C 954 for fastening gypsum board to steel members from 0.033 to 0.112 inch thick.

H. Steel drill screws of size and type recommended by unit manufacturer for fastening cementitious backer units.

I. Gypsum Board Nails: ASTM C 514.

J. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Ceiling Anchorages: Coordinate installation of ceiling suspension systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support ceilings.

1. Furnish concrete inserts and other devices indicated to other trades for installation well in advance of time needed for coordination with other construction.

3.3 INSTALLING STEEL FRAMING, GENERAL

A. Steel Framing Installation Standard: Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation.

B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with recommendations of gypsum board manufacturer or, if none available, with United States Gypsum Co.'s "Gypsum Construction Handbook."

C. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement. Comply with details shown on Drawings.

1. Where building structure abuts ceiling perimeter or penetrates ceiling.
2. Where partition framing and wall furring abut structure, except at floor.
    a. Provide slip- or cushioned-type joints as detailed to attain lateral support and avoid axial loading.
    b. Install deflection track top runner to attain lateral support and avoid axial loading.
    c. Install deflection and firestop track top runner at fire-resistance-rated assemblies where indicated.
        1) Attach jamb studs at openings to tracks using manufacturer's standard stud clip.

D. Do not bridge building control and expansion joints with steel framing or furring members. Independently frame both sides of joints with framing or furring members as indicated.

3.4 INSTALLING STEEL FRAMING FOR SUSPENDED AND FURRED CEILINGS

A. Screw furring members to framing.

B. Suspend ceiling hangers from building structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
4. Secure flat, angle, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure as well as for type of hanger involved, and in a manner that will not cause them to deteriorate or otherwise fail.
5. Do not support ceilings directly from permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
6. Do not attach hangers to steel deck tabs.
7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

C. Sway-brace suspended steel framing with hangers used for support.

D. Install suspended steel framing components in sizes and at spacings indicated, but not less than that required by the referenced steel framing installation standard.

1. Wire Hangers: 48 inches on center.
2. Carrying Channels (Main Runners): 48 inches on center.
3. Furring Channels (Furring Members): 24 inches on center.

E. Installation Tolerances: Install steel framing components for suspended ceilings so that cross-furring or grid suspension members are level to within 1/8 inch in 12 feet as measured both lengthwise on each member and transversely between parallel members.

F. Wire-tie or clip furring members to main runners and to other structural supports as indicated.

G. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

3.5 INSTALLING STEEL FRAMING FOR WALLS AND PARTITIONS

A. Install runners (tracks) at floors, ceilings, and structural walls and columns where gypsum board stud assemblies abut other construction.

1. Where studs are installed directly against exterior walls, install asphalt felt strips or foam gaskets between studs and wall.

B. Installation Tolerances: Install each steel framing and furring member so that fastening surfaces do not vary more than 1/8 inch from the plane formed by the faces of adjacent framing.

C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.

1. Cut studs 1/2 inch short of full height to provide perimeter relief.
2. For STC-rated and fire-resistance-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid structural surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed, to support gypsum board closures needed to make partitions continuous from floor to underside of solid structure.

D. Terminate partition framing at deck for all walls unless shown otherwise.

E. Install steel studs and furring in sizes and at spacings indicated.

1. Single-Layer Construction: Space studs 24 inches on center, unless otherwise indicated.
2. Cementitious Backer Unit Construction: Space studs 16 inches on center, unless otherwise indicated.

F. Install steel studs so flanges point in the same direction and leading edge or end of each gypsum board panel can be attached to open (unsupported) edges of stud flanges first.

G. Frame door openings to comply with GA-219, and with applicable published recommendations of gypsum board manufacturer, unless otherwise indicated. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

1. Install 2 studs at each jamb, unless otherwise indicated.
2. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint.
3. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

H. Frame openings other than door openings to comply with details indicated or, if none indicated, as required for door openings. Install framing below sills of openings to match framing required above door heads.

3.6 APPLYING AND FINISHING GYPSUM BOARD, GENERAL

A. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C 840 and GA-216.

B. Install sound-attenuation blankets, where indicated, prior to installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

C. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

D. Install gypsum panels with face side out. Do not install imperfect, damaged, or damp panels. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

E. Locate both edge or end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Avoid joints other than control joints at corners of framed openings where possible.

F. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

G. Attach gypsum panels to framing provided at openings and cutouts.

H. Spot grout hollow metal door frames for solid-core wood doors, hollow metal doors, and doors over 32 inches wide. Apply spot grout at each jamb anchor clip and immediately insert gypsum panels into frames.

I. Form control and expansion joints at locations indicated and as detailed, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels.

J. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases that are braced internally.

1. Except where concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect open concrete coffers, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffers, joists, and other structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

K. Isolate perimeter of nonload-bearing gypsum board partitions at structural abutments, except floors, as detailed. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

L. Where STC-rated gypsum board assemblies are indicated, seal construction at perimeters, behind control and expansion joints, openings, and penetrations with a continuous bead of acoustical sealant including a bead at both faces of the partitions. Comply with ASTM C 919 and manufacturer's recommendations for location of edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.

M. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's recommendations.

1. Space screws a maximum of 12 inches on center for vertical applications.

N. Space fasteners in panels that are tile substrates a maximum of 8 inches on center.

3.7 GYPSUM BOARD APPLICATION METHODS

A. Single-Layer Application: Install gypsum wallboard panels as follows:

1. On ceilings, apply gypsum panels prior to wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated, and provide panel lengths that will minimize end joints.
3. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing), unless parallel application is required for fire-resistance-rated assemblies. Use maximum-length panels to minimize end joints.
   a. Stagger abutting end joints not less than one framing member in alternate courses of board.
   b. At stairwells and other high walls, install panels horizontally.
4. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.

B. Single-Layer Fastening Methods: Apply gypsum panels to supports as follows:

1. Fasten with screws.

C. Direct-Bonding to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's recommendations, and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.8 INSTALLING TRIM ACCESSORIES

A. General: For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer's directions for type, length, and spacing of fasteners.

B. Install corner bead at external corners.

C. Install edge trim where edge of gypsum panels would otherwise be exposed. Provide edge trim type with face flange formed to receive joint compound, except where other types are indicated.

1. Install LC-bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.
2. Install L-bead where edge trim can only be installed after gypsum panels are installed.
3. Install U-bead where indicated.
4. Install aluminum trim and other accessories where indicated.

D. Install control joints at locations indicated but not to exceed 30 ft on center.

E. Install control joints according to ASTM C 840 and manufacturer's recommendations and in specific locations approved by Architect for visual effect.

3.9 FINISHING GYPSUM BOARD ASSEMBLIES

A. General: Treat gypsum board joints, interior angles, flanges of cornerbead, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration.

B. Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound.

C. Apply joint tape over gypsum board joints and to flanges of trim accessories as recommended by trim accessory manufacturer.

D. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.

1. Level 1 for ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
2. Level 2 where panels form substrates for tile and where indicated.
3. Level 2 for gypsum board where indicated.
4. Level 3 for gypsum board where indicated.
5. Level 4 for gypsum board surfaces, unless otherwise indicated.
6. Level 5 for gypsum board surfaces where indicated.

E. Finish cementitious backer units to comply with unit manufacturer's directions.

END OF SECTION

SECTION 09 31 13 THIN-SET CERAMIC TILING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Thin set ceramic mosaic floor tile, glazed cove base, wall tile and accessories.

1.02 RELATED SECTIONS

A. Section 07 26 00 – Vapor Retarders (Floor protection paper).

B. Section 09 29 00 – Gypsum Board (For cement based backer board).

C. Section 09 05 15 – Color Design.

1.03 SUBMITTALS

A. Submit manufacturer’s product data and written instructions for recommended installation and maintenance practices for each product specified.

B. Submit 2 samples of types and colors of tile and grout required in similar pattern of tile shown on Drawings, mounted on not less than 12 inches square plywood or hardboard and grouted as required.

C. Submit one full size sample of each tile accessory and marble threshold. Submit samples of trim and other units if requested by the Project Engineer / MDOT Architect. Review will be for color, pattern and texture only. Compliance with all other requirements is the exclusive responsibility of the Contractor.

1.04 QUALITY ASSURANCE

A. Furnish tile conforming to the Standard Grade Requirements of ANSI A137.1.

B. When using setting and grouting materials manufactured under TCNA license, include identification, and formula number on each container. Provide materials obtained from only one source for each type of tile, grout and color to minimize variations in appearance and quality.

C. Install ceramic tile in accordance with manufacturers instructions and applicable installation specifications of the Tile Council of North America's "Handbook for Ceramic Tile Installation", latest edition.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

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

1.06 PROJECT CONDITIONS

A. Continuously heat areas to receive tile to 50 degrees F. for at least 48 hours prior to installation, when project conditions are such that heating is required. Maintain 50 degrees F. temperature continuously during and after installation as recommended by tile manufacturer but not less than 7 days. Maintain a minimum lighting level of 50 fc during installation.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Equivalent products by the following manufacturers are acceptable:

1. American Olean Tile Company, Lansdale, Pennsylvania
2. Dal-Tile Corporation, Dallas, Texas
3. Floor Gres Ceramiche, Italy
4. Florida Tile Industries, Lakeland, Florida.
5. United States Ceramic Tile Co., East Spatra, Ohio

B. Substitutions shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures.

2.02 MATERIALS

A. Ceramic Mosaic Floor Tile: 2 inches by 2 inches by 5/16 inch.

B. Ceramic Floor Tile: 12 inches by 12 inches by 5/16 inch, cushioned edge, unglazed, color to be selected from standard colors available.

C. Ceramic Base Tile: 6 inches by 6 inches by 5/16 inch, cushioned edge, bright glaze, cove base round top, color to match glazed wall tile and be selected from standard colors available.

D. Glazed Wall Tile: Size 6 inches by 6 inches by 5/16 inch, cushioned edge, bright glaze, colors to be selected from standard colors available.

E. Trim And Special Shapes: Provide necessary units with rounded internal and external corners, and rounded internal and external corner units of same material and finish as field tile, and as follows:

1. Base: Sanitary cove units.
2. External Corners: Bullnose shapes, with a radius of not less than 3/4 inch, unless otherwise shown.
3. Internal Corners: Field-butted square, except use square corner, combination angle and stretcher type cap.

F. Marble Thresholds: Provide sound Group "A" marble with an abrasive hardness of not less than 10.0, when tested in accordance with ASTM C 241. Color of marble threshold to be selected by the Project Engineer / MDOT Architect from manufacturer’s full range of standard colors.

G. 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.

H. 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. Color of grout to be selected by the MDOT Architect from manufacturer's full range of standard colors.

PART 3 - EXECUTION

3.01 INSPECTION

A. Installer must examine the substrate and the conditions under which ceramic tile is to be installed and notify the contractor in writing of any conditions detrimental to the proper and timely completion of the Work.

B. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

3.02 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 North America's "Handbook for Ceramic Tile Installation", latest edition.

B. Handle, store, mix and apply proprietary setting and grouting materials in compliance with the manufacturer's instructions.

C. Extend tile Work into recesses and under equipment and fixtures, to form a complete covering without interruptions, except as otherwise shown. Terminate Work neatly at obstructions, edges and corners without disruption of pattern or joint alignment.

D. 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, and fixtures so that plates, collars, or covers overlap tile.

E. Stainless steel edging profiles to be installed simultaneous with the tile, for wall and floor applications.

3.03 JOINTING PATTERN

A. Unless otherwise shown, lay tile in grid pattern. Align joints where adjoining tiles on floor, base, walls and trim are the same size. Layout tile Work and center tile fields both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise shown.

3.04 COLOR PATTERN

A. 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.

3.05 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. 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. Protect metal surfaces, cast iron and vitreous plumbing fixtures from effects of acid cleaning. 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. Protect installed tile Work by covering with floor protection paper during the construction period to prevent damage and wear. Prohibit all foot and wheel traffic from using tiled floors for 7 days after installation. Before final inspection, remove protective covering and rinse neutral cleaner from all tile surfaces.

END OF SECTION

SECTION 09 51 00 ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Lay-in acoustical panels (2’ by 2’ Grids) for metal ceiling suspension systems.

B. Suspended metal grid system complete with wall trim.

1.02 RELATED SECTIONS

A. Section 07 21 00 – Thermal Insulation.

B. Section 09 29 00 – Gypsum Board.

C. Division 23 for Mechanical Requirements.

D. Division 26 for Electrical Requirements.

1.03 SUBMITTALS

A. Manufacturer's product specifications, samples, 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. 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.

1.04 QUALITY ASSURANCE

A. Installer shall be a company with not less than 3 years of documented successful experience in installation of acoustical ceilings similar to requirements for this Project and acceptable to manufacturer of acoustical units, as shown by current written statement from manufacturer (required for approval).

1.05 PROJECT CONDITIONS

A. Do not install interior 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.

1.06 PROJECT 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. Any additional components required shall be furnished and installed by this contractor.

1.07 MAINTENANCE STOCK

A. At time of completing installation, deliver stock of maintenance material to Owner. Furnish full size units matching units installed, packaged with protective covering for storage, and identified with appropriate labels. Furnish amount equal to 2 percent of acoustical units and exposed suspension installed.

PART 2 - PRODUCTS

2.01 ACOUSTICAL PANELS

A. 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’ by 2’ grid-size panels, with white washable finish.

B. Mineral Fiber Acoustical Tile: Provide units with Intersept Antimicrobial solution (MOLD AND MILDEW GUARD) not less than 5/8-inch thick and of density not less than l0 pounds per cubit 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. 770 Cortega Square Edge; Armstrong World Industries, Inc.
2. Van-157 Vantage 10 Trim Edge ; CertainTeed/BPB Celotex.
3. No. 2210 Radar ClimaPlus Square Edge; U.S. Gypsum Co.

2.02 CEILING SUSPENSION MATERIALS

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 l, Direct Hung.

1. Hanger Wires: Galvanized carbon steel, ASTM A 64l, soft temper pre-stretched, yield-stress load of at least 3 times design load, but not less than l2 gage (0.l06 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. Chicago Metallic Corp. Donn Corp.
   b. W. J. Haertel Div.; Leslie-Locke.
   c. National Rolling Mills Co. Roblin Building Products Roper.

d. Eastern Building Systems.

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, white unless otherwise selected by MDOT Architect.

2.03 MISCELLANEOUS MATERIALS

A. Edge Trim Molding: Metal or extruded PVC plastic, of types and profiles indicated, white finish unless otherwise indicated.

B. Hold-Down Clips: Where required for wind uplift resistance or fire-resistance rating, provide standard spring steel clips, except provide accessible type at locations indicated on drawings.

PART 3 - EXECUTION

3.01 COORDINATION

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

3.02 EXAMINATION

A. Installer must examine conditions under which acoustical ceiling work is to be performed and must notify Contractor in writing of unsatisfactory conditions. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.03 PREPARATION

A. Furnish layouts for inserts, clips, or other supports required to be installed by other trades for support of acoustical ceilings. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half width units at borders, and comply with reflected ceiling plans wherever possible.

3.04 INSTALLATION

A. Install materials in accordance with manufacturer's printed instructions, and to comply with governing regulations, fire resistance rating requirements as indicated, and industry standards applicable to the Work.

B. Install suspension systems to comply with ASTM C 636, with hangers supported only from building structural members. Locate hangers near each end and spaced 4 feet along each carrying channel or direct-hung runner, unless otherwise indicated, leveling to tolerance of l/8 inch in l2 feet. 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.

C. Install edge moldings of type indicated at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units. Screw-attach moldings to substrate at intervals not over l6 inches on center and not more than 3 inches from ends, leveling with ceiling suspension system to tolerance of l/8 inch in l2 feet. Miter corners accurately and connect securely.

D. Install acoustical panels in coordination with suspension system, with edges concealed by support of suspension members. Scribe and cut panels to fit accurately at borders and at penetrations. 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.

3.05 ADJUSTING AND CLEANING

A. Adjust sags or twists which develop in the ceiling system and replace parts that are damaged or faulty.

B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09 65 10 LUXURY SOLID VINYL TILE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Luxury Solid Vinyl Tile (LVT) Flooring, Vinyl Base, and Accessories.

1.02 RELATED SECTIONS

A. Section 07 26 00 – Vapor Retarders (Floor protection paper).

B. Section 09 05 15 – Color Design.

1.03 SUBMITTALS

A. Submit manufacturer's product data and written instructions for recommended installation and maintenance practices for each type of resilient flooring and accessories.

B. Submit complete line of color samples for selection.

1.04 QUALITY ASSURANCE

A. Wherever possible, provide resilient flooring, adhesives, cleaners, polishes and accessories produced by a single manufacturer.

B. Secure the service of an experienced, professional floor service to provide necessary equipment and manpower to complete the Work.

1.05 PROJECT CONDITIONS

A. Continuously heat areas to receive flooring to 70 degrees F. for at least 48 hours prior to installation, when project conditions are such that heating is required. Maintain 70 degrees F. temperature continuously during and after installation as recommended by flooring manufacturer but not less than 48 hours. Maintain a minimum lighting level of 50 fc during installation.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Drawings and specifications are based on products manufactured by Amtico International, Atlanta, GA. Tel. No. (800) 268-4260 for luxury solid vinyl tile (No Substitutions).

B. Equivalent products by the following manufacturers are acceptable (for rubber base and accessories):

1. Amtico International, Atlanta, GA, Tel. No. (800) 268-4260.
2. Azrock Commercial Flooring, Florence, AL. Tel. No. (800) 558-2240.
3. 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 62 14-Product Options and Substitution Procedures.

2.02 LUXURY SOLID VINYL TILE FLOORING

A. Luxury Solid Vinyl Tile: Classification: ASTM F 1700: Class III (Printed Film) Types A & B. Flexibility: ASTM F137, as manufactured by Amtico International.

B. Size: 18 inches by 18 inches.

C. Thickness: 2.5 mm/100 mil thick with unbevelled edges.

D. Color: Color to be selected by Project Engineer / MDOT Architect from manufacturer's full range of Multi-Color Premium colors. Refer to Section 09 05 15 – Color Design.

2.03 ACCESSORIES

A. Provide rubber base complying 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. Base shall be 4 inches high, 0.125 inch gage, length 120 feet, standard top-set cove.

B. Resilient Edge Strips: 1/8-inch thick, homogenous vinyl of rubber composition, tapered or bullnose edge, color to match flooring, or as selected by MDOT Architect from standard colors available; not less than 1 inch wide.

C. Adhesives (Cements): As recommended by flooring manufacturer to suit material and substrate conditions.

D. Concrete Slab Primer: Non-staining type as recommended by flooring manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Installer shall examine the areas and conditions under which resilient flooring and accessories are to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

3.02 PREPARATION

A. Acclimate tile and base to job site conditions for at least 48 hours prior to installation. Prior to laying flooring, broom clean or vacuum surfaces to be covered and inspect subfloor. Start of flooring installation indicates acceptance of subfloor conditions and full responsibility for completed Work.

B. Use leveling compound as recommended by flooring manufacturer for filling small cracks and depressions in subfloors.

C. Perform moisture tests on concrete slabs to determine that concrete surfaces are sufficiently cured and ready to receive flooring. Apply concrete slab primer, if recommended by flooring manufacturer, prior to application of adhesive.

3.03 INSTALLATION

A. Install flooring after finishing operations, including painting, have been completed and permanent-heating system is operating. Moisture content of concrete slabs, building air temperature and relative humidity must be within limits recommended by flooring manufacturer.

B. Place flooring with adhesive cement in strict compliance with manufacturer's recommendations. Butt tightly to vertical surfaces, thresholds, nosings and edgings. Scribe around obstructions to produce neat joints, lay tight, even, and straight. Extend flooring into toe spaces, door reveals, and into closets and similar openings.

C. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other non-permanent marking device.

1. Install flooring on covers for telephone and electrical ducts, and other such items as occur within finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed in these covers.
2. Tightly cement edges to perimeter of floor around corners and to corners. Tightly cement flooring to subbase without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections.

D. Tile Flooring: Lay tile from center marks established with principal walls, discounting minor off-sets, so that tile at opposite edges of the room are of equal width. Adjust as necessary to avoid use of cut widths less than 1/2 tile at room perimeters. Lay tile square to room axis, unless otherwise shown. Match tiles for color and pattern by using tile from cartons in the same sequence as manufactured and packaged. Cut tile neatly to and around all fixtures. Broken, cracked, chipped or deformed tiles are not acceptable.

1. Tightly cement tile to subbase without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks through tile, or other surface imperfections.
2. LAY TILE WITH GRAIN IN ALL TILES RUNNING IN THE SAME DIRECTION.
3. Rolling: Roll floor using 100 lb. roller in both directions within one (1) hour.

E. Accessories: 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. Tightly bond base to backing throughout the length of each piece, with continuous contact at horizontal and vertical surfaces. Place resilient edge strips tightly butted to flooring and secure with adhesive. Install edging strips at all unprotected edges of flooring, unless otherwise shown. Comply with manufacturer's written instructions for installing resilient base.

3.04 PATTERN

A. A simple color pattern shall be provided to Contractor with approved color chart and sample submittal using 3 or less colors.

3.05 CLEANING AND PROTECTION

A. Initial Cleaning: Remove excess adhesive or other surface blemishes, using neutral type cleaners as recommended by flooring manufacturer.

B. Maintenance Immediately After Installation:

1. Do not wash or scrub the floor for 5 days after installation to allow the floor tiles to bond to the underlayment / subfloor.
2. Keep heavy furniture and equipment off the floor at least 48 hours to allow the adhesive to set.
3. Sweet or vacuum thoroughly, and remove residual adhesive with a clean white cloth dampened with cleaners as recommended by flooring manufacturer.

C. Protection: Protect installed flooring from damage by covering with floor protection paper.

D. Finishing: After completion of project and just prior to final inspection of Work, 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.

1. Thoroughly rinse the floor (avoid flooding the floor) and allow the floor to dry completely.
2. Protect completed Work from traffic and damage until acceptance by the Owner.

END OF SECTION

SECTION 09 90 00 PAINTS AND COATINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Painting and finishing of exterior and interior exposed items and surfaces throughout the project, except as otherwise indicated. Surface preparation, priming and finish coats specified in this Section are in addition to shop priming and surface treatment specified under other Sections of the Work.

1. The Work includes field painting of exposed bare and covered pipes and ducts (including color coding), and of hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under the mechanical and electrical Work, except as otherwise indicated.
2. “Paint” means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.
3. Paint all exposed surfaces whether or not colors are designated in "schedules", except where the natural finish of the material is specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint these the same as adjacent similar materials or areas. If color or finish is not designated, the Architect will select these from standard colors available for the materials system specified.

B. Related Sections: Section 09 05 15 – Color Design.

1.02 PAINTING NOT INCLUDED

A. The following categories of Work are not included as parts of the field-applied finish Work, or are included in other Sections of these Specifications.

B. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under the various Sections for structural steel, miscellaneous metal, hollow metal work, and similar items. Also, for fabricated or factory-built mechanical and electrical equipment or accessories.

C. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer finishing is specified for such items as (but not limited to) plastic toilet enclosures, prefinished partition systems, acoustic materials, architectural woodwork and casework, finished mechanical and electrical equipment including light fixture, switch-gear and distribution cabinets, elevator entrance frames, door and equipment.

D. Concealed Surfaces: Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, foundations spaced, furred areas, utility tunnels, pipe spaces, duct shafts and elevator shafts.

E. Finished Metal surfaces: Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting, unless otherwise indicated.

F. Operating Parts and Labels: Moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts will not require finish painting, unless otherwise indicated. Do not paint over any code-required labels, such as Underwriter's Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's technical information including basic materials analysis and application instructions for each coating material specified.

B. Samples for Initial Selection: For each type of topcoat product indicated. Submit color samples for selection by Architect from manufacturer's full range of colors. Indicate submitted manufacturer's closest STANDARD colors that match colors specified or provide "Custom" color if not match.

C. Samples for Verification: For each type of paint system and each color and gloss/sheen of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

1. Comply with Articles 3.7 and 3.8 indicating each type of primer, intermediate coat and topcoat required for each substrate by product name and number.
2. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

E. Substitutions for Convenience: Architect will consider formal written requests from Contractor for substitution of products in place of those specified if received within 30 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect. Substitutions which decrease the film thickness, the number of coats applied, change the generic type of coating or fail to meet the performance criteria of the specified materials WILL NOT be approved. All primers and topcoats plus the seam sealer and pit filler shall be furnished by the same manufacturer to ensure compatibility.

1.04 QUALITY ASSURANCE

A. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified.
   a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
   b. Other Items: Architect will designate items or areas required.
2. Final approval of color selections will be based on benchmark samples.
   a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver all materials to the job site in original, new and unopened packages and containers bearing manufacturer's name and label, and the following information:

1. Name or title of material.
2. Fed. Spec. Number, if applicable.
3. Manufacturer's stock number and date of manufacturer.
4. Manufacturer's name.
5. Contents by volume, for major pigment and vehicle constituents.
6. Thinning instructions.
7. Application instructions.
8. Color name and number.

B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.06 PROJECT CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paint in snow, rain, fog or mist; or when the relative humidity exceeds 85 percent; or to damp or wet surfaces; unless otherwise permitted by the paint manufacturer's printed instruction. Painting may be continued during inclement weather only if the areas and surfaces to be painted are enclosed and heated within the temperature limits specified by the paint manufacturer during application and drying periods.

1.07 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent, but not less than 1 gallon of each material and color applied.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Benjamin Moore & Company, Montvale, NJ. Tel. (800) 344-0400.
2. Farrell-Calhoun Paint, Memphis, TN. Tel. (901) 526-2211.
3. PPG Industries, Inc., Pittsburgh, PA. Tel (412) 434-3131.
4. Sherwin-Williams Company, Cleveland, OH 44115. Tel. (800) 321-8194.

B. Substitutions shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures.

2.02 COLORS AND FINISHES

A. Paint colors, surface treatments, and finishes will be selected from color chips submitted by contractor. Prior to beginning Work, the Architect will select color chips for surfaces to be painted. Use representative colors when preparing samples for review. Final acceptance of colors will be from samples.

B. Colors Pigments: Pure, non-fading, applicable types to suit the substrates and service indicated. Lead content in the pigment, if any, is limited to contain not more than 0.5 percent lead, as lead metal based on the total non-volatile (dry-film) of the paint by weight.

C. Paint Coordination: Provide finish coats which are compatible with prime paints used. Review other sections of these Specifications in which prime paints are to be provided to ensure compatibility of total coats system for various substrates. Upon request from other trades, furnish information on characteristics of finish materials provided for use, to ensure compatible prime coats are used. Provide barrier coats over incompatible primer or remove and reprime as required. Notify the Architect in writing of any anticipated problems using specified coating systems with substrates primed by others.

2.03 MATERIAL QUALITY

A. Provide the best quality grade of the various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying the manufacturer's identification as a standard, BEST GRADE product WILL NOT be acceptable. Proprietary names used to designate colors or materials are not intended to imply that products of the named manufacturers are required to the exclusion of equivalent products of other manufacturers.

B. Provide undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer, and use only within recommended limits.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Applicator must examine the areas and conditions under which painting Work is to be applied and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the Applicator. Starting of painting Work will be construed as the Applicator's acceptance of the surfaces and conditions within any particular area.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Wood: 15 percent.

4. Plaster: 12 percent.
5. Gypsum Board: 12 percent.

C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to the formation of a durable paint film.

3.02 SURFACE PREPARATION

A. Perform preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified, for each particular substrate condition. Remove all hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for the complete painting of the items and adjacent surfaces. Following completion of painting of each space or area, re-install the removed items by workmen skilled in the trades involved. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. 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.

3.03 MATERIALS PREPARATION

A. Mix and prepare painting materials in accordance with manufacturer's directions. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing and application of paint in a clean condition, free of foreign materials and residue. Stir materials before application to produce a mixture of uniform density, and stir as required during the application of the materials. Do not stir surface film into the material. Remove the film and if necessary, strain the material before using.

3.04 APPLICATION

A. Apply paint in accordance with the manufacturer's directions. Use applications and techniques best suited for the substrate and type of material being applied. Apply additional coats when undercoats, stains or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance. Give special attention to insure that all surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

B. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint. Paint the back-sides of access panels, and removable or hinged covers to match the exposed surfaces.

C. Finish exterior doors on tops, bottoms and side edges the same as the exterior faces, unless otherwise indicated.

D. Sand lightly between each succeeding enamel or varnish coat.

E. Omit the first coat (primer) on metal surfaces that have been shop-primed and touch-up painted, unless otherwise indicated or barrier coat is required for compatibility.

F. Scheduling Paint: Apply the first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration. Allow sufficient time between successive coatings to permit proper drying. Do not re-coat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

G. Minimum Coating Thickness: Apply each material at not less than the manufacturer's recommended spreading rate, to establish a total dry film thickness as indicated or, if not indicated, as recommended by coating manufacturer.

H. Mechanical and Electrical Work: Painting of mechanical and electrical Work include items exposed to view in mechanical equipment rooms, in occupied spaces and where indicated on Drawings or specified in other Sections. Coordinate with Division 15 and Division 16 Sections.

1. Mechanical items to be painted include, but are not limited to, the following:
   a. Piping, pipe hangers, and supports.
   b. Heat exchangers.
   c. Tanks.
   d. Ductwork.
   e. Motor, mechanical equipment and supports.
   f. Accessory items.
2. Electrical items to be painted include, but are not limited to, the following:
   a. Conduit and fittings.
   b. Switchgear.

I. Prime Coats: Apply a prime coat of material which is required to be painted or finished, and which has not been prime coated by others. Re-coat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

J. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, or other surface imperfections will not be acceptable.

K. Transparent (Clear) Finishes: Use multiple coats to produce glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections. Provide satin finish for final coats, unless otherwise indicated.

L. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint Work not in compliance with specified requirements.

3.05 FIELD QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:

1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will perform tests for compliance of paint materials with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.06 CLEANING AND PROTECTION

A. Cleaning: During the progress of the Work, remove from the site all discarded paint materials, rubbish, cans and rags at the end of each workday. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

B. Protection: Protect Work of other trades, whether to be painted or not, against damage by painting and finishing Work. Correct any damage by others for protection of their Work, after completion of painting operations. At the completion of Work of other trades, touch-up and restore all damaged or defaced painted surfaces.

3.07 EXTERIOR PAINTING SCHEDULE

A. Provide the following Benjamin Moore paint systems for the various substrates, as indicated:

1. Ferrous and Zinc Coated Metal
   a. Prime Coat: Super Spec HP P04 Acrylic Metal Primer
   b. Intermediate Coat: Super Spec HP P29 D.T.M. Acrylic Semi-gloss
   c. Topcoat: Super Spec HP P29 D.T.M. Acrylic Semi-gloss
2. Steel Shop Primed: (structural steel framing exposed to view including steel lintels and steel stairs and handrails)
   a. Prime Coat: Super Spec HP P04 Acrylic Metal Primer
   b. Intermediate Coat: Super Spec HP P77 Waterborne Urethane
   c. Topcoat: Super Spec HP P77 Waterborne Urethane
3. Concrete Retaining Walls
   a. Prime Coat: #068 Moore's Hi-build Acrylic Masonry Primer
   b. Topcoat: #056 Moorlastic Elastomeric Waterproofing Coating

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 Retaining 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)

C. Provide the following PPG Industries 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 Retaining 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)

D. 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 Centurion® Water Based Urethane, B65-700 Series (2.0-3.0 mils dry)
   c. Topcoat: S-W Centurion® Water Based Urethane, B65-700 Series (2.0-3.0 mils dry)
3. Concrete Retaining 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)

3.08 INTERIOR PAINTING SCHEDULE

A. Provide the following Benjamin Moore paint systems for the various substrates, as indicated:

1. Gypsum Drywall(Egg Shell)
   a. Prime Coat: #372 EcoSpec Interior Latex Primer Sealer
   b. Intermediate Coat: #374 EcoSpec Interior Latex Eggshell Enamel
   c. Topcoat: #374 EcoSpec Interior Latex Eggshell Enamel
2. Gypsum Drywall (in wet areas)
   a. Prime Coat: #372 EcoSpec Interior Latex Primer Sealer
   b. Intermediate Coat: #256 Super Spec Acrylic Epoxy Coating
   c. Topcoat: #256 Super Spec Acrylic Epoxy Coating
3. Concrete Masonry Units (Enamel)
   a. Prime Coat: #285 Supercraft Latex Block Filler
   b. Intermediate Coat: #376 Eco Spec Interior Latex Semi-Gloss Enamel
   c. Topcoat: #376 Eco Spec Interior Latex Semi-Gloss Enamel

4. Ferrous and Zinc Coated Metal
   a. Prime Coat: P04 Super Spec HP Acrylic Metal Primer
   b. Intermediate Coat: #376 Eco Spec Interior Latex Semi-Gloss Enamel
   c. Topcoat: #376 Eco Spec Interior Latex Semi-Gloss Enamel
5. Exposed Structural steel and Roof Deck (shop primed steel)
   a. Prime Coat: P04 Super Spec HP Acrylic Metal Primer
   b. Intermediate Coat: #153 Super Spec Sweep Up Spray Latex Flat
   c. Topcoat: #153 Super Spec Sweep Up Spray Latex Flat
6. Painted Woodwork
   a. Prime Coat: #372 Eco Spec Interior Latex Primer Sealer
   b. Intermediate Coat: #376 Eco Spec Interior Latex Semi-Gloss Enamel
   c. Topcoat: #376 Eco Spec Interior Latex Semi-Gloss Enamel
7. Concrete Floor Stain & Sealer (Opaque Color)
   a. Prime Coat: #075 Benjamin Moore Waterproofing Sealer
   b. Topcoat: #075 Benjamin Moore Waterproofing Sealer; P67 Anti-slip Aggregate added to the prime coat. Note-New concrete must be etched prior to application.
8. Interior Concrete Stairs
   a. Prime Coat: #072 100% Acrylic Concrete Stain
   b. Topcoat: #072 100% Acrylic Concrete Stain; P67 Anti-slip Aggregate added to the prime coat. Note-New concrete must be etched prior to application.

B. Provide the following Ferrell-Calhoun paint systems for the various substrates, as indicated:

1. Gypsum Drywall(Egg Shell)
   a. Prime Coat: F/C#235 Interior/Exterior 100% Acrylic Latex Undercoater (1.3 mils DFT)
   b. Intermediate Coat: F/C 3900 Line Sun-Flo Interior Latex Acrylic Eggshell (1.6 mils DFT)
   c. Topcoat: F/C 3900 Line Sun-Flo Interior Latex Acrylic Eggshell Enamel (1.9 mils DFT)
2. 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)
3. Concrete Masonry Units (Enamel)
   a. Prime Coat: F/C #470 Interior/Exterior Latex Masonry Block Filler (8-15 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 (1.9 mils DFT)
4. 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 (1.9 mils DFT)

5. 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)
6. 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)
7. Concrete Floor Stain & Sealer (Opaque Color)
   a. Prime Coat: F/C Anvil #1500 Series Solid Color Acrylic Concrete Stain
   b. Topcoat: F/C Anvil #1500 Series Solid Color Acrylic Concrete Stain. Skid-Tex Slip Resistant Additive to the topcoat. Note-New concrete must be etched prior to application.
8. Interior Concrete Stairs
   a. Prime Coat: F/C 700 Line Tuff-Boy Interior/Exterior Floor & Deck Enamel (1.0 mils DFT)
   b. Topcoat: F/C 700 Line Tuff-Boy Interior/Exterior Floor & Deck Enamel (1.0 mils DFT). Add Skid-Tex Slip Resistant to topcoat

C. Provide the following PPG Industries, Inc. paint systems for the various substrates, as indicated:

1. 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, 9-300 (1.4 mils dry)
   c. Topcoat: PPG Pure Performance Zero VOC Interior Latex Eggshell, 9-300 (1.4 mils dry)
2. 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)
3. Concrete Masonry Units (Enamel)
   a. Prime Coat: PPG Speedhide Interior Exterior Latex Block Filler, 6-7 Series (7.4 mils dry)
   b. Intermediate Coat: PPG Interior Exterior Semi-Gloss Acrylic Metal Finish, 7-374 (1.5 to 2.0 mils dry)
   c. Topcoat: PPG Interior Exterior Semi-Gloss Acrylic Metal Finish, 7-374 (1.5 to 2.0 mils dry)

4. 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)
5. 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
6. 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)
7. Concrete Floor Stain & Sealer Solvent Based(Opaque Color)
   a. Prime Coat: PPG Color Seal Solvent Based Acrylic Concrete Stain, PP3249.
   b. Topcoat: PPG Color Seal Solvent Based Acrylic Concrete Stain, PP3249; Anti Slip Additive to the topcoat. Note-New concrete must be etched prior to application.
8. Interior Concrete Stairs
   a. Prime Coat: PPG Perma Crete Color Seal WB Waterborne Acrylic Concrete Stain, 4-4210.
   b. Topcoat: PPG Perma Crete Color Seal WB Waterborne Acrylic Concrete Stain, 4-4210; Anti Slip Additive to the topcoat. Note-New concrete must be etched prior to application.

D. Provide the following Sherwin-Williams paint systems for the various substrates, as indicated:

1. Gypsum Drywall(Egg Shell)
   a. Prime Coat: S-W Harmony Low Odor Interior Latex Primer, B11W900 (1.3 mils dry)
   b. Intermediate Coat: S-W Harmony Low Odor Interior Latex Eg-Shel, B9 Series (1.6 mils dry)
   c. Topcoat: S-W Harmony Low Odor Interior Latex Eg-Shel, B9 Series (1.6 mils dry)
2. Gypsum Drywall (in wet areas)
   a. Prime Coat: S-W Harmony Low Odor Interior Latex Primer, B11W900 (1.3 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)

3. Concrete Masonry Units (Enamel)
   a. Prime Coat: S-W PrepRite Block Filler, B25W25 (8.0 mils dry)
   b. Intermediate Coat: S-W ProClassic Waterborne Acrylic Semi-Gloss, B31 Series (1.4 mils dry)
   c. Topcoat: S-W ProClassic Waterborne Acrylic Semi-Gloss, B31 Series (1.4 mils dry)
4. 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)
5. 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
6. Painted Woodwork
   a. Prime Coat: S-W Harmony Low Odor Interior Latex Primer, B11W900 (1.3 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)
7. Concrete Floor Stain & Sealer (Opaque Color)
   a. Prime Coat: H&C Concrete Sealer Solid Color Solvent Based
   b. Topcoat: H&C Concrete Sealer Solid Color Solvent Based; H&C SharkGrip Slip Resistant Additive to the topcoat. Note-New concrete must be etched prior to application.
8. Interior 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.

END OF SECTION

SECTION 10 11 00 VISUAL DISPLAY SURFACES

PART 1- GENERAL

1.01 SECTION INCLUDES

A. Visual display boards as described in this section. Types specified in this section include Tackboard, and Markerboard.

1.02 RELATED SECTIONS

A. Section 09 05 15 – Color Design.

B. Division 26 Sections for visual aid board electrical requirements.

1.03 SUBMITTALS

A. Submit manufacturer's technical data and installation instructions for each material and component parts, including data substantiating materials comply with requirements.

B. Samples: Submit full range of color samples for each type of visual display board, surface, trim and accessories required. Provide 12-inch square samples of sheet materials and 12-inch lengths of trim members for color verification after selections have been made.

C. Shop Drawings: Submit for each type of visual display board. Include sections of typical trim members and dimensioned elevations. Show anchors, grounds, reinforcement, accessories, and installation details.

D. Certification: Submit manufacturer's certification that all materials furnished for Project complies with requirements specified herein.

1.04 QUALITY ASSURANCE

A. Unless otherwise acceptable to Project Engineer / MDOT Architect, furnish all visual display boards by one manufacturer for entire project.

B. Fire Hazard Classification: Provide tackboard surfaces which have been tested in accordance with ASTM E-84 and have been certified as complying with the following fire hazard classifications: Flame spread, fuel contributed and Smoke developed not more than 25.

C. Field Measurements: Take field measurements prior to preparation of Shop Drawings and fabrication where possible, to ensure proper fitting of Work. However, allow for trimming and fitting wherever taking of field measurements before fabrication might delay Work.

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. Draper, Inc., P.O. Box 425, Spiceland, IN 47385. Tel. (765) 987-7999.
2. March Industries, Inc., P.O. Box 509, Dover, OH 44622. Tel. (330) 343-8825.
3. NACO, 180 N. Sherman Ave., Corona, CA 91720. Tel. (909) 340-2800.

C. Substitutions shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures.

2.02 MATERIALS

A. Tackboard: Equal to Claridge Series # 1 type “CO” factory framed tackboard. Tackboard is Claridge 1/4-inch Cork on 1/4 inch Hardboard, color as selected by Project Engineer / MDOT Architect from manufacturer’s standards. Size, 4 feet by 6 feet. Quantity required as indicated on the Drawings.

B. Marker Board: Equal to Claridge Series #LCS-2000-R type “A” factory built marker board with jamb trim, and chalk trough with end closures. LCS 3 coat porcelain enamel liquid chalk surface on Duracore with 0.002 aluminum foil back approx. 1/2 inch thick overall. Extruded aluminum trim to have anodized satin finish. Include standard eraser and assorted LCS markers. Size to be 4 feet by 8 feet. One unit required unless additional units are indicated on the Drawings.

PART 3 - EXECUTION

3.01 EXAMINATION

A. 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. Deliver factory-built units completely assembled in one piece without joints, whenever possible. Where dimensions exceed panel size, provide 2 or more pieces of length as acceptable to Project Engineer / MDOT Architect. When overall dimensions require delivery in separate units, pre-fit at factory, disassemble for delivery, and make final joints at site. Use splines at joints to maintain surface alignment.

B. Install units in locations and mounting heights as shown on Drawings and in accordance with manufacturer's instructions, keeping perimeter lines straight, plumb, and level. Provide all grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories for complete installation. If units are not shown on Drawings, install units in locations as directed by Project Engineer.

C. Coordinate job-assembled units with grounds, trim, and accessories. Join all parts with neat, precision fit.

3.03 ADJUSTING AND CLEANING

A. Verify accessories required for units are properly installed and operating units are adjusted and properly functioning.

B. Clean units in accordance with manufacturer's instructions, breaking in only as recommended.

END OF SECTION

SECTION 10 14 00 SIGNAGE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Signage for room identification system, informational and directional signage, and exterior individual building signage and free standing, ground mounted sign.

1.02 RELATED SECTIONS

A. Section 09 05 15 – Color Design.

1.03 SUBMITTALS

A. Submit manufacturer's technical data and installation instructions for each type of sign required.

B. Samples: Submit 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. When requested, furnish full-size samples of specialty sign materials.

1. Cast Acrylic Sheet and Plastic Laminate: Manufacturer's color charts consisting of actual selections of material including the full range of colors available for each material required.
2. Aluminum: Samples of each finish type and color, on 6-inch-long sections of extrusions and not less than 4-inch squares of sheet or plate showing the full range of colors available.

C. Shop Drawings: Submit Shop Drawings for fabrication and erection of specialty signs. Include plans, elevations, and large-scale details of sign wording and lettering layout. Show anchorage and accessory items. Furnish location template drawings for items supported or anchored to permanent construction.

1.04 QUALITY ASSURANCE

A. Provide each type of sign as a complete unit produced by a single manufacturer including necessary mounting accessories, fittings and fastenings.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver components correctly packed to prevent damage. Store in secure area out of weather. Handle per manufacturer's instructions.

1.06 WARRANTY

A. Provide manufacturer's standard one-year warranty covering manufacturing defects.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Drawings and specifications are based on products manufactured by ASI Sign Systems, Inc., 3890 W. NW Hwy, Suite 102, Dallas, TX 75220. Tel. (800) 274-7732.

B. Equivalent products by the following manufacturers are acceptable:

1. Matthews International Corp., Pittsburgh, PA. Tel. (800) 628-8439.
2. Metal Arts, Mandan, ND. Tel. (701) 663-6535.
3. Mohawk Sign Systems, Inc., Schenectady, NY. Tel. (518) 370-3433.
4. Scott Sign Systems, Inc., Sarasota, FL. Tel. (800) 237-9447.

C. Manufacturers of Dimensional Letters and Numbers:

1. A.R.K. Ramos Mfg. Co., Oklahoma City, OK. Tel. (800) 725-7266.
2. ASI Sign Systems, Inc., Dallas, TX. Tel. (800) 274-7732.
3. Matthews International Corp., Pittsburgh, PA. Tel. (800) 628-8439.
4. Metal Arts, Mandan, ND. Tel. (701) 663-6535.

D. Substitutions shall fully comply with specified requirements and Section 0 162 14-Product Options and Substitution Procedures

2.02 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.

2.03 COMPONENTS – EXTERIOR SIGNAGE

A. Material: Cast aluminum, projected mount with sleeve and stud.

B. Finish: Baked-Enamel Finish. Color as selected by architect from full range of colors.

2.04 COMPONENTS – INTERIOR SIGNAGE

A. Window Inserts: Laser printed paper insert with MDOT watermark. Text to be furnished by Owner.

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 1: 10 inches wide by 3 inches high.
2. Type 2: 6 inches wide by 9 inches high.
3. Type 3: 9 inches wide by 8 inches high.
4. Type 4: 10 inches wide by 3 inches high.

2.05 BRAILLE AND TACTILE COPY

A. Comply with requirements of the Americans with Disabilities Act. 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.

2.06 FINISHES – INTERIOR SIGNAGE

A. Colors: Selected from manufacturer's standard.

B. Surface Texture: Matte.

2.07 FONT

A. Shall be Helvetica Medium, unless noted otherwise.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Installer shall examine the substrates and conditions under which the specialty signs are to be installed 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 Installer.

3.02 INSTALLATION

A. 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.

B. 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.

C. Position sign on wall surface 2 inches from strike side of doorframe and 60 inches high to center of sign from finish floor, typical unless indicated otherwise.

D. Dimensional Letters and Numbers: Mount letters and numbers using standard fastening methods recommended by the manufacturer for letter form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish letter spacing and to locate holes for fasteners.

3.03 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

3.04 SCHEDULES

A. Sign Type 1: Offices, single occupant
Conference / Break
Storage
Mechanical

B. Sign Type 2: Toilets

C. Sign Type 3: Offices, multiple occupants

D. Sign Type 4: Office (Desktop at Secretary / Receptionists)

END OF SECTION

SECTION 10 26 13 CORNER GUARDS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Vinyl / Acrylic surfaced mounted Corner Guards.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's technical data and installation instructions for corner guards.

B. Samples: Submit samples of material finishes, profiles and colors for corner guards.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Equivalent products by the following manufacturers are acceptable:

1. Arden Architectural Specialties, Inc., Saint Paul, MN. Tel. (651) 631-1607.
2. Construction Specialties, Inc., Muncy, PA. Tel. (570) 546-5941.
3. Koroseal Wall Protection Systems, Inc. Fairlawn, OH. Tel. (330) 668-7600.

B. Substitutions shall fully comply with specified requirements and Section 01 62 14- Product Options and Substitution Procedures

2.02 CORNER GUARDS

A. Corner guards shall be installed full height, unless height indicated otherwise on the Drawings, at all outside corners in corridors and elsewhere as shown on the Drawings.

1. Corner guards shall be equal to C/S Model SSM-20 series surface mounted corner guards with optional full height aluminum retainers, vinyl covers and matching top and bottom end caps.
2. Color to be selected by Project Engineer / MDOT Architect from full range of standard colors. Refer to Section 09 05 15 for color(s).

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install units plumb and level, in locations as shown or described. Securely attach to supporting structure, 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. Protect units from damage until acceptance by Owner.

END OF SECTION

SECTION 10 28 13 TOILET ACCESSORIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. The extent of each type of toilet accessory is shown on the Drawings and Schedules, unless otherwise indicated. The types of toilet accessories required include the following:

1. Mirrors
2. Toilet Paper Dispenser
3. Grab Bars
4. Soap Dispensers
5. Paper Towel Dispenser
6. Clothes Hook

1.02 SUBMITTALS

A. Submit 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.

1.03 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.

1.04 DELIVERY, STORAGE AND HANDLING

A. Upon receipt of toilet accessories and other materials, installer shall examine the shipment for damage and completeness. Materials shall be stored in a clean, dry place. Stack all materials to prevent damage.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Drawings and specifications are based on products manufactured by Bradley Washroom Accessories Division, P.O. Box 309, Menomonee Falls, WI 53051. Tel. (414) 354-0100.

B. Equivalent products by the following manufacturers are acceptable:

1. A & J Washroom Accessories, 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 (800) 475-8629; (760) 343-7363.
4. TCI Products. Hillsboro, OR (866) 533-4273; (503) 533-9223.
5. Truebro, Inc. Ellington, CT (800) 340-5969; (860) 875-2868.

C. Substitutions shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures.

2.02 ACCESSORIES

A. 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.

B. Toilet Paper Dispenser: Provide surface mounted stainless steel multi-roll toilet tissue dispenser equal to Bradley model 5402. Locate at each toilet mounted in locations shown.

C. Grab Bars: Provide 1-1/2 inches diameter horizontal 2 wall stainless steel grab bars with safety-grip non-slip finish and concealed mounting equal to Bradley model 8122-059, 36 inches by 52 inches standard dimensions.

1. Locate at toilets where indicated at heights shown. Contractor has option to use one 36-inch horizontal grab bar and one 42-inch horizontal grab bar and one 18-inch grab bar, but installation must meet all ADA requirements.
2. Locate at shower where indicates at height shown. Horizontal grab bars shall be provided across the control wall and on the back wall to point 18 inches from control wall. A vertical grab bar 18 inches minimum in length shall be provided on the control end wall 3 inches minimum to 6 inches maximum above the horizontal grab bar and 4 inches maximum inward from the front edge of the shower.

D. Soap Dispensers: Provide surface mounted liquid type stainless steel soap dispenser units equal to Bradley model 6542(Horizontal) or 6562 (Vertical) as indicated on the Drawings. Locate at each lavatory at heights shown.

E. Paper Towel Dispenser: Provide surface mounted stainless steel paper towel dispensers equal to Bradley model 250-15. 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.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Installer shall examine the areas and conditions under which toilet accessories are to be installed 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 Installer.

3.02 INSTALLATION

A. Use concealed fastenings wherever possible. Provide anchors, bolts, blocking in wall and other necessary anchorage, and attach accessories securely to walls and partitions in locations as shown or directed. Install concealed mounting devices and fasteners fabricated of the same material as the accessories, or of galvanized steel, as recommended by manufacturer.

B. Install exposed mounting devices and fasteners finished to match the accessories. Provide theft-resistant fasteners for all accessory mountings. Secure toilet room accessories in accordance with the manufacturer's instructions for each item and each type of substrate construction. Blocking for all toilet accessories, specifically for grab bars and barrier free shower seat, to be verified on site by architect or photographically prior to concealment behind wall construction.

C. Installation shall meet all ADA requirements including proper mounting heights.

END OF SECTION

SECTION 10 44 16 FIRE EXTINGUISHERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Portable, multi-purpose, and dry-chemical fire extinguishers including cabinets, accessories and mounting brackets.

1.02 SUBMITTALS

A. Submit manufacturer's technical data and installation instructions for all portable fire extinguishers required.

1.03 QUALITY ASSURANCE

A. Provide new portable fire extinguishers which are UL listed and bear UL "Listing Mark" for each type, rating, and classification of extinguisher indicated.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Drawings and specifications are based on products manufactured by J.L. Industries, Inc., 4450 W. 78th Street Circle, Bloomington, MN 55435. Tel. (612) 835-6850.

B. Equivalent products by the following manufacturers are acceptable:

1. Amerex Corp., Trussville, AL. Tel. (205) 655-3271.
2. Larsen's Mfg. Co., Minneapolis, MN. Tel. (612) 571-1181.
3. Potter-Roemer, Santa Ana, CA. Tel. (800) 366-3473.

C. Substitutions shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures.

2.02 FIRE EXTINGUISHERS

A. Provide fire extinguishers for each location indicated, in colors and finishes that comply with requirements of governing authorities.

B. Multi-Purpose Dry Chemical for Cabinet Mounting: Equal to J.L. Industries Cosmic 10E, UL rated 4A-60BC, 10 lb. nominal capacity.

2.03 MOUNTING BRACKETS

A. Provide manufacturer's bracket designed to prevent accidental dislodgment of extinguisher, of proper size for type and capacity of extinguisher indicated, in manufacturer's standard plated finish.

2.04 EXTINGUISHER CABINETS

A. Equal to J.L. Industries Cosmopolitan 1032F12 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.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install items included in this section in locations and at mounting heights indicated, or if not indicated, at heights to comply with applicable regulations of governing authorities.

B. Securely fasten mounting brackets to structure, square and plumb, to comply with manufacturer's instructions.

C. 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 in all Kitchens and within 20 feet of all Mechanical Rooms and exits. Wall/surface mounted (no cabinet) in to be provided in open sheds.

D. Check all cabinets for scratched, nicked, and other surface defects. Cabinets with these conditions shall be repaired or replaced.

END OF SECTION

SECTION 10 56 13 METAL STORAGE SHELVING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Work Benches, Work Tables, Metal Shelving and Safety Cabinets as show on the Drawings.

1.02 SUBMITTALS

A. Submit manufacturer's technical data and installation instructions for each material and component part, including data substantiating that materials comply with requirements.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Equivalent products by the following manufacturers are acceptable:

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 shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures.

2.02 STORAGE SHELVING, MODULAR WORK BENCHES AND OPEN WORK BENCHES

A. Storage Shelving: Equal to Penco Products Open Clipper Heavy Duty Steel Shelving Unit Model No. 1H7026, 36 inches wide, 18 inches deep, and 87 inches high with 6 shelves. Quantity: 72, Locations: In Mezzanine, Secured Storage, Work Area H103 as shown on Drawings.

B. Work Tables shown on Drawings are to be constructed as detailed, located where shown, and secured to the floor and adjacent wall.

C. Modular Work Bench: Equal to Penco Products Model No. 32038, Tuff Top™ (Resin Board) top bench, 72 inches wide, 28 inches deep, and 34 inches high with 2 cabinet pedestals and 2 bases. Cabinet pedestals, 15-3/4 inches wide, 20 inches deep and 27 inches high with one adjustable shelf and locking handle with 2 keys.

D. Open Work Bench: Equal to Penco Products Model No. 34532, Tuff Top™ (Resin Board) top fixed bench, 72 inches wide, 28 inches deep, and 34 inches high.

E. Color: Color to 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 shown.

B. Securely attach all components together in accordance with manufacturer's installation instructions.

C. Securely attach units to adjacent units and to wall as required to not move or fall.

3.02 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 10 56 30 PALLET STORAGE SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Metal pallet storage system as shown on the Drawings.

1.02 RELATED SECTIONS

A. Section 09 05 15 – Color Design.

1.03 SUBMITTALS

A. Submit manufacturer's technical product data, color chart and installation instructions.

PART 2 - PRODUCTS

2.01 ACCEPTABLE 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. Penco Products, Oaks, PA. Tel. (610) 666-0500.
2. Wireway / Husky, Denver, NC. Tel. (800) 438-5629.
3. C&H Distributors, LLC, Milwaukee, WI Tel. (800) 558-9966.

C. Substitutions shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures.

2.02 PALLET STORAGE SYSTEM

A. Pallet Rack Upright: Pre-finished metal columns and braces complete with required accessories and hardware, 16,700 lb capacity, 120 inches high x 42 inches deep.

B. Pallet Rack Beam: Pre-finished metal beams complete with required accessories and hardware, 5600 lb capacity, 4 inches x 96 inches.

C. Welded Wire Decking: Galvanized metal welded wire decking complete with required accessories and hardware, 3100 lb capacity, 42 inches x 46 inches.

D. Color: Pre-finished colors to be selected by MDOT Architect from manufacturer's full range of standard colors.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install units plumb and level, in locations and with mountings as shown or as directed by the Project Engineer.

B. Securely attach all components together in accordance with manufacturer's installation instructions.

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.

D. Securely attach units to adjacent units and to wall or floor as required to not move or fall.

3.02 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 10 57 13 HAT AND COAT RACKS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Wall mounted tubular steel coat racks.

1.02 RELATED SECTIONS

A. Section 06 10 00 – Rough Carpentry.

1.03 SUBMITTALS

A. Submit manufacturer's product data and installation instructions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Drawings and specifications are based on products manufactured by Raymond Engineering, Inc., 704 Vandalia Street, St. Paul, MN 55114. Tel. (800) 365-5770.

B. Equivalent products by the following manufacturers are acceptable:

1. A.J. Binns Ltd., South Burlington, VT. Tel: (802) 655-7502.
2. Magnuson Group Inc., Woodridge, IL. Tel: (800) 342-5725.

C. Substitutions shall fully comply with specified requirements and Section 01 62 14- Product Options and Substitution Procedures.

2.02 COAT RACK

A. Equal to Rigid – Rak Model 315.

2.03 MATERIALS

A. Brackets (3 req'd per rack) are 1-1/8 inch sq. tubing with mitered angle and hidden weld.

B. Shelf tubes (3 required per rack) are 3 /4 inch round steel tube.

C. Accessories: Model 913 hooks (12 required per rack) mounted on alternate tubes.

D. Finish: Bright commercial nickel chrome.

E. Size: 5 feet long by 12 -1/4 inches deep.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install unit(s) plumb and level, at location(s) shown on Drawings or if not shown, as directed by the Project Engineer. A minimum of one unit is required. Securely attach to supporting structure, 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. Protect units from damage.

END OF SECTION

SECTION 11 31 00 RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Residential appliances as shown on the Drawings and as specified herein.

1.02 SUBMITTALS

A. Submit 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.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Equivalent products by the following manufacturers are acceptable:

1. GE Appliances, Louisville, KY. Tel. (800) 626-2000.
2. Magic Chef Co., Cleveland, TN. Tel. (423) 472-3371.
3. Sears Contract Sales, Hoffman Estates, IL. Tel. (847) 286-2994.

B. Substitutions shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures.

2.02 APPLIANCES

A. Refrigerator: 25.3 cu. ft. capacity Side-By-Side with Dispenser equal to GE Model GSH25JGDCC with factory-installed icemaker, Bisque.

B. Microwave: 2.0 cu. ft. oven cavity, 1200 watts, countertop microwave oven, equal to GE Model PEB2060DMCC with Built-in Kit Model JX2030DMCC, Bisque.

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

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.

3.03 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 SECTION INCLUDES

A. Horizontal louver blinds at exterior windows.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for each type of blind unit required. Include methods of installation for each type of opening and supporting structure. Transmit copy of instructions and recommendations to the installer.

B. Samples: Submit samples of each exposed metal finish, cords, tapes and tassels required. Architect's review of samples will be for design, color, and finish only. Compliance with all other requirements is the exclusive responsibility of the Contractor.

1.03 QUALITY ASSURANCE

A. Provide each blind as a complete unit produced by one manufacturer, including hardware, accessory items, mounting brackets, and fastenings. 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 MANUFACTURER

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. Other Acceptable manufacturers offering equivalent products:

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 62 14-Product Options and Substitution Procedures.

2.02 PRODUCTS

A. Hunter Douglas Commercial Lightlines Aluminum Blinds 1” de-Light Model DL88. Color to be selected by the Project Engineer / MDOT Architect from manufacturers’ full line of standard colors. Refer to Section 09 05 15 – Color Design for color selected.

2.03 MATERIALS AND COMPONENTS

A. Manufacturer's standard head rail, channel-shaped section fabricated from minimum 0.040 inch thick aluminum. Increase metal thickness as recommended by the manufacturer for large blind units. Cross-brace for extra rigidity. 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.

B. Bottom Rail: Manufacturer's standard tubular steel bottom rail designed to withstand twisting or sagging. Contour top surface to match slat curvature, with flat or slightly curved bottom. Close ends with manufacturer's standard metal or plastic end caps of the same color as rail. Finish rails the same color as slats, unless otherwise indicated.

C. Slats: Manufacturer's standard, spring tempered aluminum slats not less than 0.008 inches thick. Provide l inch narrow slats, with other components sized to suit.

D. Braided Ladders: Manufacturer's standard polyester support cords with integrally braided ladder rungs. Provide cord size and rung spacing as required for each type of blind shown.

E. Tilter: Manufacturer's standard enclosed, lubricated, tilting mechanism which will tilt and securely hold the tilting rod, slats and bottom rail at any set angle. Furnish wand (or rod) type tilter consisting of standard tilter mechanism adopted for rotating wand operation. Furnish manufacturer's standard plastic or aluminum rod of proper length to suit blind installation.

F. Cords: Manufacturer's 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.

G. Hardware: Furnish manufacturer's standard brackets, supports and internal reinforcement as required to suit blind type and size. Finish exposed hardware and accessories to match rail color.

H. Finish: Prime aluminum slats with chromate conversion coating, followed by manufacturer's standard glass-smooth, baked-on synthetic resin enamel finish.

2.04 FABRICATION AND OPERATION

A. Prior to fabrication, verify actual opening dimensions by accurate site measurements. Adjust blind dimensions for proper fit in all openings. 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. Space supporting tapes or cords in accordance with manufacturer's standards, unless otherwise indicated. 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 l80 degrees. 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. Place pull cords on right-hand side of blind units.

PART 3 - EXECUTION

3.01 INSPECTION

A. Installer must examine the substrates and conditions under which the horizontal venetian blinds are to be installed 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 Installer.

3.02 INSTALLATION

A. Install horizontal venetian blinds at each window and in accordance with the manufacturer's instructions unless noted otherwise. Provide intermediate supports at intervals to permit easy entrance and removal of head, and to ensure level head and slat position.

END OF SECTION

SECTION 12 48 43 FLOOR MATS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Metal-rails, tapered vinyl-frame, surfaced mounted, removable, carpeted floor mats for Building Entrances.

1.02 RELATED SECTIONS

A. Section 09 05 15 – Color Design.

1.03 SUBMITTALS

A. Product Data: Submit manufacturers' product and technical data indicating compliance with these specifications and recommended maintenance practices.

B. Shop Drawings: Submit materials description, component dimensions and details. Show plan view that clearly indicates traffic direction and size of mat.

C. Colors: Submit samples of manufacturer's full range of available colors (minimum 20 for carpet) and finishes for materials exposed to view.

1.04 QUALITY ASSURANCE

A. Single Source: All floor mats required by this Section shall be products of only one manufacturer.

B. Manufacturer : Company regularly engaged in producing types of floor mats required by this Section and with minimum 10 years documented satisfactory experience

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Drawings and specifications are based on products manufactured by Construction Specialties, Inc. P.O. Box 380, Muncy, PA 17756. Tel. (888) 834-4455.

B. Other acceptable manufacturers offering equivalent products:

1. Arden Architectural Specialties, Inc., Saint Paul, MN. Tel. (651) 631-1607.
2. J.L. Industries, Inc., Bloomington, MN. Tel. (612) 835-6850.
3. R. C. Musson Rubber Co., Akron, OH. Tel. (330) 773-7651.

C. Substitutions shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures.

2.02 FLOOR MATS

A. Equal to C/S "Pedimat" Surface-Mounted Floor Mat, Model M1-D-HD-SM.

B. Size: 6 feet wide by 4 feet deep (traffic direction) at double doors; 4 feet wide by 4 feet deep (traffic direction) at single doors.

C. Carpet Color: As selected by Project Engineer / MDOT Architect from full range of manufacturer's 25 standard colors.

D. Rails: Extruded aluminum 6063-T52 as selected by Project Engineer / MDOT Architect from full range of manufacturer's 7 optional anodized colors.

E. Carpet tread: Colorfast, solution dyed nylon tread, in color selected by Project Engineer / MDOT Architect, fusion bonded to rigid two-ply backing supplied in continuous splice-free lengths. Anti-static carpet fiber shall contain an antimicrobial additive and "Scotchgard" soil reducing treatment.

F. Frame: Tapered vinyl with mitered corners. Color as selected by Project Engineer / MDOT Architect from full range of manufacturer's six standard colors (match rail color).

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install unit(s) level, in locations as shown or described. Install mats after Final Cleaning of Project Floor.

3.02 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 13 34 17 PRE-ENGINEERED BUILDINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Equipment Shed - Building “K”.
2. Building Type: The buildings are single-story, single-span, rigid-frame-type pre-engineered metal buildings of the nominal length, width eave height, and roof pitch indicated.
3. Exterior Walls: Field assembled, un-insulated panels attached to framing.
4. Roof system: Standard metal building ribbed-type roof system with exposed fasteners and field installed mastic.
5. 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. Section 09 05 15 – Color Design.
2. Section 09 90 00 – Painting and Coating (Painting for ferrous metal exposed to view.)

1.02 STRUCTURAL FRAMING AND ROOF PANELS

A. Design Loads: 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 warranties and product information for building components, accessories and color chart.

B. Shop Drawings: Submit shop drawings for anchor bolts, structural framing system, roofing components and accessories not fully detailed or dimensioned in manufacturer's product data.

1. Structural Framing: Submit erection drawings. Include fabrication and assembly details. Show anchor bolts settings and sidewall, end-wall, and roof framing.
2. Sheet Metal Accessories and Roofing: Submit 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.
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: Submit 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 2009, 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.

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. Installer: The Installer shall provide a 5 year watertight warranty on the roof system.

B. Manufacturer:

1. The manufacturer shall provide a three- year warranty against failures caused by faulty or substandard materials.

2. The manufacturer shall provide a twenty-year Premium Paint warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Drawings and specifications are based on products manufactured by Ceco Buildings 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. Gulf States, Starkville, MS. Tel.: (662) 323-8021.
3. Nucor, Terrell, TX. (972) 524-5407.
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: Nonstaining saturated vinyl polymer as recommended by panel manufacturer for sealing laps.

2.03 PAINT MATERIALS

A. Shop Primer for Ferrous Metal: Fast-curing, lead-free, universal primer. Comply with Federal Specifications TT-P-645.

B. Shop Primer for Galvanized Metal Surfaces: Zinc dust- zinc oxide primer. Comply with Federal Specifications TT-P-641.

C. 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.

D. 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 - GENERAL

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.

2.05 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 tapered columns with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide length of span and spacing indicated.

B. Primary Endwall Framing: Provide the following frame members fabricated for field-bolted assembly.

1. Endwall Columns: Shop-painted, built-up factory-welded "I"-shape or cold-formed "C" sections, fabricated from 14 gage (0.0747-inch) steel.
2. Endwall 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: 16 gage (0.598 inch) shop-painted roll-formed steel "C" or "Z" sections. Fabricate purlin spacers from 14 gage (0.0747-inch) cold-formed galvanized steel sections. Purlins to be 8 inches deep.
2. Eave Struts: Unequal flanges 16 gage (0.0598 inch) shop-painted roll-formed steel "C" sections formed to provide adequate backup for 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 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.

2.06 ROOFING AND SIDING PANELS

A. Roof Panel: Equal to MAP Ribbed-type panel, 1-1/2 inches high with 36 inches wide coverage and rib spacing at 12 inches on center, 26-gage, Galvalume without color coating. Panels, 40 feet and less, shall be in one continuous length.

B. Wall Panel: Equal to MAP Ribbed-type panel, 1-1/2 inches deep with 36 inches wide coverage and rib spacing at 12 inches on center, 26-gage, Galvalume with Kynar 500 (70 percent PVDF) finish. Standard colors from manufacturer’s full range of colors to be selected by Project Engineer / MDOT Architect.

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. Flashing and trim shall be formed in maximum lengths to minimize joints, from 26 gage, galvanized steel, ASTM A653 with G90 coating and Kynar 500 (70 percent PVDF) finish. Standard colors from manufacturer’s full range of colors to be selected by Project Engineer / MDOT Architect.

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 to match roof fascia and rake. Gutters are box-shaped with face profile shaped to match rake trim.

B. Provide downspouts formed full length 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 to match roof fascia and rake. Downspouts are rectangular-shaped and shall have a 45-degree 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.

2.09 FASTENERS

A. Wall fasteners shall be No. 14 self-taping, carbon steel screws with an integral, hex-washer head, and without a sealing washer. Minimum length of fasteners shall be 1 inch.

B. Roof fasteners shall be No. 12 self-tapping carbon steel screws with an extended life hexagon head that is compatible with Galvalume panels. A sealing washer shall be provided. Minimum length of fasteners shall be 1 inch.

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: Use rake or gable purlins with tight-fitting closure channels and fascias. Secure purlins to structural framing and hold rigidly to straight line by sag rods.

C. Bracing: Use diagonal angle bracing in roof. Use movement-resisting frames in lieu of sidewall rod bracing.

D. Framed Openings: Provide shapes of design and size to reinforce openings and carry loads imposed, including equipment furnished under 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. 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.
3. 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. Minimums of 3 straps are required at each downspout, with maximum spacing at 6 feet on center.

I. Roofing 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 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 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 sealant for preformed roofing panels as specified on approved 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 13 34 18 METAL BUILDING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Warehouse – Building “J”.
2. 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.
3. Exterior Walls: Field assembled, un-insulated panels attached to framing with thermal insulation blankets.
4. Roof system: Standing-seam roof with thermal insulation blankets, concealed clips and factory-applied sealant.
5. Canopies: Flush type mounted below eave line on side or end walls, complete with soffit and trim. Kynar finish with color(s) selected by Architect.
6. Components and Accessories: Manufacturer's standard building components and accessories may be used, provided components, accessories, and complete structure conform to design indicated and specified requirements.

B. Related Sections:

1. Plywood wainscot is specified in Section 06 10 00.
2. Personnel doors and frames are specified in Section 08 11 13
3. Finish hardware is specified in Section 08 71 00.
4. Overhead service doors, including operators, are specified in Section 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.

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 2009, 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. Special Weather Tightness Warranty: 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, (No Dollar Limit) nor have exclusions that identify valleys, curbs, and flashings. Provide written warranty, signed by manufacturer and his authorized installer, agreeing to replace / repair defective materials and workmanship

during the warranty period with NO COST to the Owner. Warranty period begins at the Date of Completion as determined by MDOT.

B. 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).

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. Gulf States, Starkville, MS. Tel.: (662) 323-8021.
3. Nucor, Terrell, TX. (972) 524-5407.
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 THERMAL INSULATION

A. Metal Building Roof and Walls Glass-fiber blanket: Comply with ASTM C 167, 0.8 lb. per cubic foot density, 4 inches thickness, R 13, with UL flame spread classification of 25 or less, and 2-inch wide continuous vapor tight edge tabs.

B. Vapor Barrier: Facing shall be equal to Lamtec Corporation model WMP-50. Facing shall be composed of 0.0015 inch white polypropylene film, 5 by 5 tri-directional scrim reinforcing layer, and 0.0005 inch metallized polyester film backing layer. The facing shall have a water vapor transmission rate of 0.02 US perm (ASTM E96, Procedure A), a beach puncture of 125 scale units and a mullen burst of 120 psi. Tensile strength shall be 65 lbs/inch width in the machine direction and 60 lbs/inch width in the cross-machine direction.

C. Retainer Strips: 26 gage (0.0179-inch) formed galvanized steel retainer clips colored to match insulation facing.

2.04 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.

2.05 STRUCTURAL FRAMING - GENERAL

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.

2.06 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 and Girts to be 8 inches deep minimum.
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.

2.07 ROOFING AND SIDING PANELS

A. Roof Panel: Equal to Double-Lok Standing Seam Panel, 3 inches high with 24 inches wide coverage, 24 gage, Galvalume. Roof shall have a Kynar 500 (70 percent PVDF) color coating finish. Standard colors from manufacturer’s full range of colors to be selected by Project Engineer / MDOT Architect.

B. Wall Panel: Equal to MAP Ribbed-type panel, 1-1/2 inches deep with 36 inches wide coverage and rib spacing at 12 inches on center, 26-gage, Galvalume with Kynar 500 (70 percent PVDF) finish. Standard colors from manufacturer's full range of colors to be selected by Project Engineer / MDOT Architect.

2.08 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.

2.09 CANOPY

A. Roof panel to match building roof panel.

B. Soffit panel to match wall panels, color as selected by Project Engineer / MDOT Architect.

C. Trim and accessories as indicated on Drawings.

2.10 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.

2.11 FASTENERS

A. Wall fasteners shall be No. 14 self-taping, carbon steel screws with an integral, hex-washer head, and without a sealing washer. Minimum length of fasteners shall be 1 inch.

B. Roof fasteners shall be No. 12 self-tapping carbon steel screws with an extended life hexagon head that is compatible with Galvalume panels. A sealing washer shall be provided. Minimum length of fasteners shall be 1 inch.

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. 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.
3. 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. Thermal Insulation: Install insulation concurrently with roof and wall panels in accordance with manufacturer's directions. Install blankets straight and true in one-piece lengths with both sets of tabs sealed to provide a complete vapor barrier. Locate insulation on inside face of wall panels and on underside of roof sheets, extending across top flange of purlin members and held taut and snug to roofing panels with retainer clips. Install retainer strips at each longitudinal joint, straight and taut, nesting with roof / wall rib to hold insulation in place.

J. 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 13 34 19 METAL BUILDING SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Relocated Shed / Scale Maintenance Addition – Building “H”
2. 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.
3. Exterior Walls (Scale Maintenance Addition): Insulated panels with vapor seal cavity and concealed clips attached to framing.
4. Exterior Walls: (Relocated Shed) Field assembled, un-insulated panels attached to framing. (Remove existing wall panels and re-install.)
5. Roof system (Scale Maintenance Addition): Standing-seam roof with insulated panels, and concealed clips.
6. Roof system: (Relocated Shed) Standing-seam roof (no thermal insulation) with concealed clips and factory-applied sealant. (Remove existing roof panels, gutters and downspouts and replace with new.)
7. Canopies: Flush type mounted below eave line on side or end walls, complete with soffit and trim. Kynar finish with color(s) selected by Architect.
8. 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 are specified in Section 08 11 13.
4. Finish hardware is specified in Section 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.
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 2009), 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. Gulf States, Starkville, MS. Tel.: (662) 323-8021.
3. Nucor, Terrell, TX. (972) 524-5407.
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.

2.04 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.

2.05 STRUCTURAL FRAMING - GENERAL

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.

2.06 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 tapered 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.

2.06 INSULATED ROOFING AND SIDING PANELS

A. Roof Panel (Scale Maintenance Addition): Equal to Ceco IBL (Straight Rib Architectural 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 polyisocyanurate foam cured to achieve a minimum density of 2.2 pounds
6. Joint Configuration: Concealed Clips
7. Panel Exterior: 24 gage Galvalume®
8. Panel Interior: 26 gage Galvalume®

9. Coatings: Kynar 500® / Hylar 5000®
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 (Scale Maintenance Addition): Equal to Ceco ESP II 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 polyisocyanurate foam cured to achieve a minimum density of 2.2 pounds
6. Joint Configuration: Concealed Clips
7. Panel Exterior: 26 gage Galvalume®
8. Panel Interior: 26 gage Galvalume®
9. Coatings: Kynar 500® / Hylar 5000®
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 and flashing as required for a complete system.

2.07 ROOFING AND SIDING PANELS

A. Roof Panel (Relocated Shed): Equal to Ceco Double-Lok Standing Seam Panel, 3 inches high with 24 inches wide coverage, 24 gage, Galvalume. Roof shall have a Kynar 500 (70 percent PVDF) color coating finish. Standard colors from manufacturer's full range of colors to be selected by Project Engineer / MDOT Architect.

B. Wall Panel (Relocated Shed): Reuse existing.

2.09 CANOPY

A. Roof panel to match building roof panel (Relocated Shed).

B. Soffit panel to match wall panels (Relocated Shed), color as selected by Project Engineer / MDOT Architect.

C. Trim and accessories as indicated on Drawings.

2.10 FLASHING AND TRIM

A. Flashing and trim shall be furnished at eaves, rake, corners, base, canopies, 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.

2.11 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, if required) 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

2.12 FASTENERS

A. Wall and roof fasteners shall comply with manufacturer's recommendations for proper application and wind loads as indicated on Structural Drawings and 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. Provide metal flashing.

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, flashing 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 21 13 13 FIRE PROTECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Refer to the following sections for related work in connection with fire protection piping system:

1. 23 0500 Mechanical General
2. 23 0511 Submittals
3. 23 0553 Identification

1.02 SUMMARY

A. The extent of the fire protection work required is indicated on the Drawings and schedules and by the requirements of this Specification section.

B. Fire protection work shall include but not be limited to the following:

1. Automatic sprinkler systems.
2. Underground feed main to connection provided outside building by utility contractor.
3. Installation of water flow switches and valve supervisory switches.
4. Painting of piping.

C. The following is not considered part of this section:

1. Wiring of water flow switches and valve supervisory switches.
2. Fire extinguishers and cabinets.

1.03 DESIGN CRITERIA:

A. Provide a complete automatic sprinkler system, hydraulically designed to provide the following sprinkler protection:

BUILDING AREA	HAZARD	DESIGN DENSITY GPM/SF	REMOTE AREA OF APPLICATION	MAXIMUM SP. HEAD SPACING	INTERIOR HOSE STREAM
Offices, Toilet Rooms, Conference Room	Light	0.10	1500 SF	225 SF	100
Work Bays, Parts Storage, Storage Areas	ORD. GP.1	0.12	3000 SF	130 SF	250

B. All areas of the building shall be completely sprinklered including the following areas:

1. Electrical Equipment Room
2. Communication Room

1.04 QUALITY ASSURANCE:

A. Manufacturing firms shall be regularly engaged in the manufacture of fire protection products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.

B. Fire Protection System Installation firms with at least five (5) years of successful installation experience on projects with fire protection work similar to that required for the project.

1.05 CODES AND STANDARDS:

A. Install fire protection systems in accordance with the latest edition of the following National Fire Protection Association Standards:

1. NFPA 13 "Installation of Sprinkler Systems",2010.
2. NFPA 24 "Installation of Private Fire Mains", 2010.

B. Provide fire protection products which have U.L. Listing or are listed in the latest edition of the "Factory Mutual Approval Guide."

C. Comply with local Fire Department regulations for sizes, hose threads and arrangement of connections for fire department equipment to siamese fire department connection.

1.06 SUBMITTALS:

A. Submit manufacturer's technical product data and installation instructions for fire protection materials and products.

B. Prepare one eighth (1/8") minimum scale shop drawings for fire protection systems indicating pipe and fittings, cutting lengths, hydraulic calculations and node points, pipe sizes, locations, elevations, hangers, wall and floor penetrations and connections as well as all ceiling components noted previously. Include all information as required by NFPA 13, Item 14.1.3.

C. Submit shop drawings to the Design Engineer, Owners' Underwriter/Insurance Agency and to the local authority having jurisdiction for approval. Submit two (2) approved copies, bearing stamp and/or signature of the Fire Protection Engineer, Owners' Underwriter/Insurance Agency and of the local authority having jurisdiction before proceeding with fabrication and installation.

D. Submit "Contractor's Material and Test Certificates" upon completion of fire protection piping for all portions of work, which indicates that work has been installed and tested in accordance with all applicable sections of NFPA, and also that system is operational, complete, and has no defects.

E. At project closeout, submit record drawings of installed fire protection piping and products, in accordance with requirements of Section 23 0500, “Mechanical General”.

F. Submit maintenance data and parts list for fire protection materials and products. Include this data, all product data, shop drawings, approval drawings, approved calculations, certificate of installation, and record drawings in the Maintenance Manuals, and submit in accordance with the requirements of Section 23 0500, “Mechanical General”.

1.07 WATER SUPPLY:

A. For initial hydraulic calculation, refer to the water flow test data as shown on the Drawings. Upon award of Contract, Contractor shall verify the water flow test information by conducting a flow test as near as possible to site. A minimum of 5 psig must be accounted for as a safety factor for future fall off in the water supply.

B. In addition to the water flow test, a 24 hour chart recorder must be installed to a fire hydrant, or other water supply connection on site. All fluctuations in water pressure over a 24 hour period are to be recorded. The lowest recorded pressure shall be utilized as the maximum static pressure available for hydraulic calculations along with the appropriate safety factor being applied.

1.08 COORDINATION

A. Coordinate layout and installation of sprinklers with other construction, including light fixtures, HVAC equipment, and partition assemblies, access platforms, etc. Coordinate routing of piping with structure and all other work.

1.09 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Sprinkler Cabinets: Finished, wall mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.
2. Locate sprinkler cabinet where shown on Drawings or as directed by Owner.

PART 2 - PRODUCTS

2.01 MATERIALS AND PRODUCTS

A. Provide piping materials and factory fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match piping materials used in fire protection systems.

B. Where more than one type of material or product is indicated, selection is Installer's option, however, systems of piping must remain consistent in the type of materials and fittings utilized.

C. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.02 UNDERGROUND PIPE AND FITTINGS

A. Pipe: Class 52 ductile iron, ANSI A21.51

B. Fittings: Ductile iron mechanical joint, 250 lb., ANSI A21.10

C. Lining: Cement mortar lining for pipe and fittings, ANSI A21.4

D. Coating: Bituminous seal coating.

E. Joints: Push on gasketed joints ANSI A21.11 with neoprene gasket

2.03 STEEL PIPE AND FITTINGS

A. Schedule 10, Black Steel Pipe: ASTM A 135 or ASTM A 795/A 795M, Schedule 10 in NPS 5 and smaller; and NFPA 13 specified wall thickness in NPS 6 to NPS 10, plain end.

B. Nonstandard OD, Thinwall Black Steel Pipe: ASTM A 135 or ASTM A 795/A 795M, thinwall, with plain ends and wall thickness less than Schedule 10.

C. Malleable or Ductile Iron Unions: UL 860.

D. Cast Iron Flanges and Flanged Fittings: ASME B16.1, Class 125.

E. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.

F. Grooved Joint, Steel Pipe Appurtenances:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Anvil International, Inc.
   b. Shurjoint Piping Products.
   c. Tyco Fire & Building Products LP.
   d. Victaulic Company.
2. Pressure Rating: 250 psig minimum.
3. Galvanized and Uncoated, Grooved End Fittings for Steel Piping: ASTM A 47/A 47M, malleable iron casting or ASTM A 536, ductile iron casting; with dimensions matching steel pipe. Include ferrous housing sections, EPDM rubber gasket, and bolts and nuts.
4. Grooved End Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

G. Plain End Pipe Fittings: UL 213, ductile iron body with retainer lugs that require one quarter turn or screwed retainer pin to secure pipe in fitting.

1. 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:
   a. Anvil International, Inc.
   b. Shurjoint Piping Products.
   c. Victaulic Company
   d. Tyco Fire & Building Products LP

2.04 PIPING JOINING MATERIALS

A. Pipe Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free.

1. Class 125, Cast Iron and Class 150, Bronze Flat Face Flanges: Full face gaskets.
2. Class 250, Cast Iron and Class 300, Raised-Face Flanges: Ring type gaskets.

B. Metal, Pipe Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

2.05 LISTED FIRE PROTECTION VALVES

A. General Requirements:

1. Valves shall be UL listed or FM approved.
2. Minimum Pressure Rating for Standard Pressure Piping: 175 psig.

B. Ball Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Anvil International, Inc.
   b. Victaulic Company.
2. Standard: UL 1091 except with ball instead of disc.
3. Valves NPS 1-1/2 and Smaller: Bronze body with threaded ends.
4. Valves NPS 2 and NPS 2-1/2: Bronze body with threaded ends or ductile-iron body with grooved ends.
5. Valves NPS 3: Ductile iron body with grooved ends.

C. Check Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. American Cast Iron Pipe Company; Waterous Company Subsidiary.
   b. Anvil International, Inc.
   c. Clow Valve Company; a division of McWane, Inc.
   d. Crane Co.; Crane Valve Group; Crane Valves.
   e. Crane Co.; Crane Valve Group; Jenkins Valves.
   f. Crane Co.; Crane Valve Group; Stockham Division.

g. Fire-End & Croker Corporation.
h. Globe Fire Sprinkler Corporation.
i. Kennedy Valve; a division of McWane, Inc.
j. Metraflex, Inc.
k. Milwaukee Valve Company.
l. Mueller Co.; Water Products Division.
m. NIBCO INC.
n. Potter Roemer.
o. Reliable Automatic Sprinkler Co., Inc.
p. Shurjoint Piping Products.
q. Tyco Fire & Building Products LP.
r. Victaulic Company.
s. Viking Corporation.
t. Watts Water Technologies, Inc.

2. Standard: UL 312
3. Pressure Rating: 300 psig.
4. Type: Swing check.
5. Body Material: Cast iron.
6. End Connections: Flanged or grooved.

D. NRS Gate Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. American Cast Iron Pipe Company; Waterous Company Subsidiary.
   b. American Valve, Inc.
   c. Clow Valve Company; a division of McWane, Inc.
   d. Crane Co.; Crane Valve Group; Stockham Division.
   e. Kennedy Valve; a division of McWane, Inc.
   f. Mueller Co.; Water Products Division.
   g. NIBCO INC.
   h. Tyco Fire & Building Products LP.
2. Standard: UL 262.
3. Pressure Rating: 300 psig.
4. Body Material: Cast iron with indicator post flange.
5. Stem: Nonrising.
6. End Connections: Flanged or grooved.

E. Wall Indicator:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. American Cast Iron Pipe Company; Waterous Company Subsidiary.
   b. American Valve, Inc.
   c. Clow Valve Company; a division of McWane, Inc.
   d. Crane Co.; Crane Valve Group; Stockham Division.
   e. Kennedy Valve; a division of McWane, Inc.
   f. Mueller Co.; Water Products Division.
   g. NIBCO INC.
   h. Tyco Fire & Building Products LP.
2. Standard: UL 789.
3. Type: Wall post for mounting to riser valve.

4. Body Material: Cast iron.
5. Operation: Handwheel.

2.06 TRIM AND DRAIN VALVES

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating: 175 psig minimum.

B. Angle Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Fire Protection Products, Inc.
   b. United Brass Works, Inc.
   c. Hammond Valve.

C. Ball Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Anvil International, Inc.
   b. Conbraco Industries, Inc.; Apollo Valves.
   c. Croker Corporation.
   d. Jomar International, Ltd.
   e. Kennedy Valve; a division of McWane, Inc.
   f. Kitz Corporation.
   g. Milwaukee Valve Company.
   h. NIBCO INC.
   i. Potter Roemer.
   j. Red-White Valve Corporation.
   k. Tyco Fire & Building Products LP.
   l. Victaulic Company.
   m. Watts Water Technologies, Inc.

D. Globe Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. United Brass Works, Inc.
   b. Crane Co.; Crane Valve Group; Crane Valves.
   c. Milwaukee Valve Company.

E. Plug Valves:

1. 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:
   a. Southern Manufacturing Group.
   b. Homestead Valve; a division of Olson Technologies, Inc.
   c. Milliken Valve Company.

F. Automatic (Ball Drip) Drain Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. AFAC Inc.
   b. Reliable Automatic Sprinkler Co., Inc.
   c. Tyco Fire & Building Products LP.
2. Standard: UL 1726.
3. Pressure Rating: 175 psig minimum.
4. Type: Automatic draining, ball check.
5. Size: NPS 3/4.
6. End Connections: Threaded.

2.07 FIRE DEPARTMENT CONNECTIONS

A. Flush Type, Fire Department Connection:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Croker
   b. Elkhart Brass Mfg. Company, Inc.
   c. Guardian Fire Equipment, Inc.
   d. Potter Roemer.
2. Standard: UL 405.
3. Type: Flush, for wall mounting.
4. Pressure Rating: 175 psig minimum.
5. Body Material: Corrosion resistant metal.
6. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
7. Caps: Brass, lugged type, with gasket and chain.
8. Escutcheon Plate: Rectangular, brass, wall type.
9. Outlet: With pipe threads.
10. Body Style: Horizontal.
11. Number of Inlets: Two.
12. Outlet Location: Back
13. Escutcheon Plate Marking: Similar to Auto Spkr & Standpipe
14. Finish: Polished chrome plated.
15. Outlet Size: NPS 3.

2.08 SPRINKLER SPECIALTY PIPE FITTINGS

A. Branch Outlet Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Anvil International, Inc.
   b. Shurjoint Piping Products.
   c. Tyco Fire & Building Products LP.
   d. Victaulic Company.
2. Standard: UL 213.
3. Pressure Rating: 175 psig minimum.
4. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
5. Type: Mechanical tee and cross fittings.
6. Configurations: Snap on and strapless, ductile-iron housing with branch outlets.
7. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
8. Branch Outlets: Grooved, plain-end pipe, or threaded.

B. Sprinkler Inspector's Test Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. AGF Manufacturing Inc.
   b. Triple R Specialty.
   c. Tyco Fire & Building Products LP.
   d. Victaulic Company.
   e. Viking Corporation.
2. Standard: UL's "Fire Protection Equipment Directory" listing or Factory Mutual "Approval Guide," listing.
3. Pressure Rating: 175 psig minimum.
4. Body Material: Cast or ductile iron housing with sight glass.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

C. Adjustable Drop Nipples:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. CECA, LLC.
   b. Corcoran Piping System Co.
   c. Merit Manufacturing; a division of Anvil International, Inc.
2. Standard: UL 1474.
3. Pressure Rating: 250 psig minimum.
4. Body Material: Steel pipe with EPDM O-ring seals.
5. Size: Same as connected piping.
6. Length: Adjustable.
7. Inlet and Outlet: Threaded.

2.09 AUTOMATIC SPRINKLERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:

1. Globe Fire Sprinkler Corporation.
2. Reliable Automatic Sprinkler Co., Inc.
3. Tyco Fire & Building Products LP.
4. Victaulic Company.
5. Viking Corporation.

B. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating for Automatic Sprinklers: 175 psig minimum.

C. Pendant type sprinkler heads located in offices and other spaces with ceilings shall be pendant type sprinkler.

D. Upright type rough brass heads shall be installed in areas without ceilings including all shell spaces.

E. Temperature rating of heads shall be selected in accordance with NFPA, the ambient room temperature and heat producing equipment.

F. Sprinkler Guards:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Reliable Automatic Sprinkler Co., Inc.
   b. Tyco Fire & Building Products LP.
   c. Victaulic Company.
   d. Viking Corporation.
2. Standard: UL 199.
3. Type: Wire cage with fastening device for attaching to sprinkler.

2.10 ALARM DEVICES

A. Alarm device types shall match piping and equipment connections.

B. Electrically Operated Alarm Bell:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Fire Lite Alarms; a Honeywell company.
   b. Notifier; a Honeywell company.
   c. Potter Electric Signal Company.
2. Standard: UL 464.
3. Type: Vibrating, metal alarm bell.
4. Size: 6 inch minimum diameter.
5. Finish: Red enamel factory finish, suitable for outdoor use.

C. Water Flow Indicators:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. ADT Security Services, Inc.
   b. Grinnell
   c. McDonnell & Miller; ITT Industries.
   d. Potter Electric Signal Company.
   e. System Sensor; a Honeywell Company
   f. Viking Corporation.
   g. Watts Industries (Canada) Inc.
2. Standard: UL 346 and FM Approved.
3. Water Flow Detector: Electrically supervised.
4. Components: Two single pole, double throw circuit switches for isolated alarm and auxiliary contacts, 7A, 125-V ac and 0.25 A, 24-Vdc; complete with factory set, field adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
5. Type: Paddle operated.
6. Pressure Rating: 250 psig
7. Design Installation: Horizontal or Vertical

D. Valve Supervisory Switches:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Fire Lite Alarms; a Honeywell company.
   b. Grinnell
   c. Kennedy Valve; a division of McWane, Inc.
   d. Potter Electric Signal Company.
   e. System Sensor; a Honeywell company.
2. Standard: UL 346 and FM approved.
3. Type: Electrically supervised.
4. Components: Two sets of single pole, double throw switches with normally closed contacts, for AC or DC operation, with tamper proof cover, bracket and J-bolts.
5. Design: Signals that controlled valve is in other than fully open position.

2.11 PRESSURE GAGES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:

1. AMETEK, Inc.; U.S. Gauge Division.
2. Ashcroft, Inc.
3. Brecco Corporation.
4. Drwyer
5. Weiss

B. Standard: UL 393.

C. Dial Size: 3-1/2- to 4-1/2-inch diameter.

D. Pressure Gage Range: 0 to 300 psig.

2.12 ANCHORAGES

A. Clamps, Straps and Washers: Steel, ASTM A-506.

B. Rods: Steel, ASTM A-575.

C. Rod Couplings: Malleable iron, ASTM A-197.

D. Bolts: Steel, ASTM A-307.

E. Cast Iron Washers: ASTM A-126, Class A.

F. Thrust Blocks: 2500 psi concrete.

PART 3 - EXECUTION

3.01 SERVICE ENTRANCE PIPING

A. Connect sprinkler piping to water service piping for service entrance to building.

3.02 SPRINKLER HEADS

A. Unless otherwise noted on Drawings, sprinkler heads shall be rated for 155 or 165 degrees F.

B. Provide basket type guards over sprinkler heads in all areas where head is less than 7'-0" above finished floor, to protect them from damage.

C. Sprinkler heads shall be provided below all ductwork, suspended piping and equipment, platforms and all other obstructions greater than 4'-0" in width.

D. All sprinkler heads shall be centered in acoustical ceiling tiles.

E. Provide shields on all sprinklers located near electric panels to limit the sprinkler discharge on the panels.

F. Install sprinkler heads so that heads are located no closer than 1' – 0" to lights, diffusers, or other obstructions.

G. Provide to the representative of the Owner a reserve supply of sprinkler heads minimum and the tools for removing and replacing the heads. Types of heads shall include a minimum of six (6) of each. The heads and tools shall be contained in a metal carrying case.

3.03 PIPING INSTALLATION

A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.

1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.

B. The fire protection system shall include all NFPA specified accessories including signs, test connections and drains.

C. Comply with requirements of NFPA 13 for installation of fire protection piping materials. Install piping products where indicated, in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that piping systems comply with requirements and serve intended purposes.

D. Coordinate with other work, including ductwork and HVAC and plumbing piping, as necessary to interface components of fire protection piping properly with other work.

E. Fire mains, crossmains, and branch piping shall not be installed inside or above the ceiling of Electrical Equipment Rooms, Communication Rooms or other rooms of similar usage. Only sprinkler branch piping which serves sprinklers located inside such rooms shall be permitted to be installed within room. Do not run piping directly above electrical panels and equipment.

F. Coordinate the quantity and the location of all supervised valves and waterflow switches with the Fire Alarm Installer. Insure that all valve switches and waterflow switches not shown on Drawings, but required by the local authority having jurisdiction, have been located and wired to the alarm panel by the Fire Alarm Installer.

G. Waterflow indicators shall be mounted horizontally or vertically on top of pipe. Adjust retard to provide maximum of 30 second delay. Schedule 40 pipe must be provided for waterflow indicator.

H. O.S & Y. valve stem shall be carefully filed to accommodate stem of valve switch.

I. All areas which have ceilings shall have sprinkler piping concealed above ceilings.

J. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

3.04 DRAINS

A. Install sprinkler piping with drains for complete system drainage.

B. All trapped sprinkler piping shall be provided with drain valves and shall be routed to and discharged over the nearest suitable floor drain, hub drain or service sink unless shown or noted otherwise on Drawings. Drain valve shall be located at the point of discharge.

C. Install automatic ball drip drain valve to drain the piping between the check valve and the fire department connection. Drain to floor drain or to outside of building.

D. Where floor drains or service sinks are not available or suitable for the discharge of the sprinkler drains, the drain shall be routed to the exterior and discharged on grade. Location of the drain must be approved by Architect.

E. The location of all drains, routings and terminations shall be shown on the shop drawings.

F. All drains and inspector's test connections located on exterior walls shall be painted to match exterior and penetration shall be sealed and provided with chrome plated escutcheon secured to wall. Paint escutcheon at the direction of the Architect.

3.05 HANGERS AND SUPPORTS

A. The installation of all hangers and supports shall comply with NFPA 13.

B. All sprinkler piping shall be independently supported from other piping and duct systems. All piping, including drain piping shall be rigidly supported.

C. Where grooved couplings and / or other systems of mechanical fittings and couplings are utilized for fastening, sufficient number of hangers must be provided to prevent any sagging or misalignment of piping.

3.03 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Install unions adjacent to each valve in pipes NPS 2 and smaller.

C. Install flanges, flange adapters, or couplings for grooved end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.

G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

H. Twist Locked Joints: Insert plain end of steel pipe into plain end pipe fitting. Rotate retainer lugs one quarter turn or tighten retainer pin.

I. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized steel pipe.

J. Steel Piping, Cut-Grooved Joints: Cut square edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.

K. Steel Piping, Roll Grooved Joints: Roll rounded edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel pipe grooved joints.

3.04 VALVE AND SPECIALTIES INSTALLATION

A. Install listed fire protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

B. Install listed fire protection shutoff valves supervised open, located to control sources of water supply except from fire department connections. Install permanent identification signs indicating portion of system controlled by each valve.

3.05 FIRE DEPARTMENT CONNECTION INSTALLATION

A. Install wall type, fire department connections.

B. Install automatic ball drip drain valve at each check valve for fire department connection.

3.06 WET PIPE SPRINKLER RISER

A. Provide wet pipe sprinkler control valve at all wet pipe sprinkler riser at the location indicated on the Contract Drawings.

B. Provide sprinkler control valve with alarm check valve, supervisory tamper switch, waterflow switch, inspector’s test and drain valve, pressure gauges, retard chamber, water motor alarm gong and all standard trim.

3.07 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping including control valves, sectional valves, alarm valves, dry pipe valves, inspectors test connections, auxiliary drains, drain valves, etc. according to requirements in NFPA 13 and Section 23 0553 “Identification”.

B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 16 Section "Electrical Identification."

C. Access panels provided for valves concealed above ceilings or inside partitions must be provided with permanently attached signs identifying control valve or drain.

3.08 ANCHORAGES

A. General: Provide concrete thrust block anchorages for underground tees, plugs, caps and bends in accordance with NFPA No. 24. Provide rods and clamps on fittings located underground inside building as shown on Drawings.

B. After installation, apply a full coat of asphalt or other acceptable corrosion retarding material to surfaces of rods and clamps.

3.09 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Hydrostatic Testing: After flushing system, test fire sprinkler piping hydrostatically, for a period of 2 hours, at not less than 200 psi. Check system for leakage at joints. Measure hydrostatic pressure at low point of each system or zone being tested. Any drop in pressure will not be permitted.
2. Repair or replace piping systems as required to eliminate leakage in accordance with NFPA standards and retest as specified to demonstrate compliance and to satisfaction of the Engineer and Owner.
3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
4. Sprinkler Piping Flushing: Prior to connecting sprinkler piping for flushing, flush water feed mains, lead in connections and control portions of sprinkler piping. After fire sprinkler piping installation has been completed and before piping is placed in service, flush entire sprinkler system as required to remove foreign substances. Continue flushing until water is clear, and check to ensure that debris has not clogged sprinklers. Provide test connections on sprinkler mains, crossmains and large branch piping to permit flushing.
5. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
6. Energize circuits to electrical equipment and devices.
7. Coordinate with fire alarm tests. Operate as required.
8. Verify that equipment hose threads are same as local fire department equipment.

C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.10 CLEANING

A. Remove bags and clean dirt and debris from sprinklers.

B. Remove and replace sprinklers that have received paint other than factory finish.

END OF SECTION

SECTION 22 11 16 DOMESTIC WATER PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:

1. Aboveground domestic water pipes, tubes, fittings, and specialties inside the building.
2. Flexible connectors.
3. Escutcheons.

B. Related Sections include:

1. 23 05 00 Mechanical General
2. 23 05 11 Mechanical Submittals
3. 23 05 29 Hangers and Supports
4. 23 05 53 Identification
5. 23 05 23 Valves
6. 23 07 13 Thermal Insulation for Mechanical Systems

1.03 SUBMITTALS

A. Refer to Section 23 05 11 for required submittals.

B. Field quality-control reports.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.02 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type Land water tube, drawn temper.

1. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

2.03 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free, unless otherwise indicated; full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

D. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.04 SPECIALTY VALVES

A. Comply with requirements in Section 23 0523 " Valves " for general-duty metal valves.

2.05 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.

B. Dielectric Unions:

1. Subject to compliance with requirements, provide products by one of the following:
   a. Capitol Manufacturing Company.
   b. Central Plastics Company.
   c. EPCO Sales, Inc.
   d. Hart Industries International, Inc.
   e. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
   f. Zurn Plumbing Products Group; Wilkins Water Control Products.
2. Description:
   a. Pressure Rating: 150 psig at 180 deg F.
   b. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Couplings:

1. Subject to compliance with requirements, provide products by one of the following:
   a. Calpico, Inc.
   b. Lochinvar Corporation.
   c. Custom Manufacturer.
   d. Johnson Screens.
2. Description:
   a. Galvanized-steel coupling.
   b. Pressure Rating: 300 psig at 225 deg F.
   c. End Connections: Female threaded.
   d. Lining: Inert and noncorrosive, thermoplastic.

D. Dielectric Nipples:

1. Subject to compliance with requirements, provide products by one of the following:
   a. Perfection Corporation; a subsidiary of American Meter Company.
   b. Precision Plumbing Products, Inc.
   c. Victaulic Company.
2. Description:
   a. Electroplated steel nipple complying with ASTM F 1545.
   b. Pressure Rating: 300 psig at 225 deg F
   c. End Connections: Male threaded or grooved.
   d. Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.01 EARTHWORK

A. Comply with requirements in Section 22 0570 "Trench, Excavation and Backfill" for excavating, trenching, and backfilling.

3.02 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install copper tubing according to CDA's "Copper Tube Handbook."

C. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance.

D. Install shutoff valve immediately upstream of each dielectric fitting.

E. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

F. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

G. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

H. Install piping adjacent to equipment and specialties to allow service and maintenance.

I. Install piping to permit valve servicing.

J. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.

K. Install piping free of sags and bends.

L. Install fittings for changes in direction and branch connections.

3.03 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

3.04 VALVE INSTALLATION

A. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball or gate valves for piping NPS 2 and smaller. Use butterfly or gate valves for piping NPS 2-1/2 and larger.

B. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping.

1. Hose-End Drain Valves: At low points in water mains, risers, and branches.
2. Stop-and-Waste Drain Valves: Instead of hose-end drain valves where indicated.

3.05 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:

1. NPS 1-1/2 and Smaller: Fitting-type coupling.
2. NPS 2 and Larger: Sleeve-type coupling.

C. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller: Plastic-to-metal transition fittings or unions.

3.06 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric couplings or nipples.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges, flange kits, and nipples.

D. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

3.07 FLEXIBLE CONNECTOR INSTALLATION

A. Install flexible connectors in suction and discharge piping connections to each domestic water pump and in suction and discharge manifold connections to each domestic water booster pump.

B. Install bronze-hose flexible connectors in copper domestic water tubing.

C. Install stainless-steel-hose flexible connectors in steel domestic water piping.

3.08 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements in Division 15 Section "Hangers and Supports" for pipe hanger and support products and installation.

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:
   a. MSS Type 1, adjustable, steel clevis hangers.

B. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
4. NPS 2-1/2: 108 inches with 1/2-inch rod.

3.09 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment and machines to allow service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
2. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Comply with requirements in Division 15 plumbing fixture Sections for connection sizes.
3. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.10 IDENTIFICATION

A. Identify system components. Comply with requirements in Section 23 0553 "Identification" for identification materials and installation.

3.11 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Piping Inspections:

1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
   a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
   b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

C. Piping Tests:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
4. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
6. Prepare reports for tests and for corrective action required.

D. Domestic water piping will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.12 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.

4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
   a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide flow of hot water in each branch.
   b. Adjust calibrated balancing valves to flows indicated.
5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.13 CLEANING

A. Clean and disinfect potable and non-potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
   a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
   b. Fill and isolate system according to either of the following:
      1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
      2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
   c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
   d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

B. Prepare and submit reports of purging and disinfecting activities.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.14 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Fitting Option: Extruded-tee connections may be used on aboveground copper tubing.

C. Underground domestic water piping shall be the following:

1. Soft copper tube, ASTM B 88, Type L; wrought-copper solder-joint fittings; and brazed joints.

D. Aboveground domestic water piping shall be the following:

1. Hard copper tube, ASTM B 88, Type L copper solder-joint fittings; and brazed joints.

3.15 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball or gate valves for piping.
2. Throttling Duty: Use ball or globe valves.
3. Hot-Water Circulation Piping: Use ball valve.
4. Drain Duty: Hose-end drain valves.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

END OF SECTION

SECTION 22 13 16 SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following for soil, waste, and vent piping inside the building:

1. Pipe, tube, and fittings.

B. Related Sections include:

1. 23 05 00 Mechanical General
2. 23 05 11 Mechanical Submittals
3. 23 05 29 Hangers and Supports
4. 23 05 53 Identification

1.03 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water

1.04 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

1.05 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified..

2.02 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.03 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 74, Service class.

B. Gaskets: ASTM C 564, rubber.

C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.04 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. Shielded Couplings: ASTM C 1277 assembly of metal shield or housing, corrosion-resistant fasteners, and rubber sleeve with integral, center pipe stop.

1. Standard, Shielded, Stainless-Steel Couplings: CISPI 310, with stainless-steel corrugated shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve.
   a. Manufacturers:
      1) ANACO.
      2) Fernco, Inc.
      3) Ideal Div.; Stant Corp.
      4) Mission Rubber Co.
      5) Tyler Pipe; Soil Pipe Div.

2.05 COPPER TUBE AND FITTINGS

A. Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.

1. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.

B. Hard Copper Tube: ASTM B 88, Types L and M, water tube, drawn temper.

1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
2. Copper Flanges: ASME B16.24, Class 150, cast copper with solder-joint end.
3. Copper Unions: MSS SP-123, copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

C. Soft Copper Tube: ASTM B 88, Type L, water tube, annealed temper.

1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Refer to Section 22 0510 "Trench, Excavation and Backfill" for excavating, trenching, and backfilling.

3.02 PIPING APPLICATIONS

A. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.

B. Aboveground, soil and waste and vent piping shall be the following:

1. Hubless cast-iron soil pipe and fittings and sovent stack fittings; and couplings; and hubless-coupling joints.
2. Copper DWV tube, copper drainage fittings, and soldered joints.
3. Dissimilar Pipe-Material Couplings: Flexible, unshielded, nonpressure pipe couplings for joining dissimilar pipe materials with small difference in OD.

C. Underground, soil, waste, and vent piping shall be the following:

1. Service class, cast-iron soil piping; gaskets; and gasketed joints.
2. Dissimilar Pipe-Material Couplings: Flexible, unshielded, nonpressure pipe couplings for joining dissimilar pipe materials with small difference in OD.

3.03 PIPING INSTALLATION

A. Basic piping installation requirements are specified in Section 23 0500 "Mechanical General."

B. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.

C. Install cleanout fitting with closure plug inside the building in sanitary force-main piping.

D. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

E. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

F. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

G. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

H. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.

I. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.04 JOINT CONSTRUCTION

A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.

C. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

3.05 HANGER AND SUPPORT INSTALLATION

A. Pipe hangers and supports are specified in Section 23 0529 "Hangers and Supports." Install the following:

1. Vertical Piping: MSS Type 8 or Type 42, clamps.
2. Install individual, straight, horizontal piping runs according to the following:
   a. MSS Type 1, adjustable, steel clevis hangers.

B. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
2. NPS 3: 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
4. NPS 6: 60 inches with 3/4-inch rod.
5. NPS 8 to NPS 12: 60 inches with 7/8-inch rod.

C. Install supports for vertical cast-iron soil piping every 15 feet.

3.06 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

3.07 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.08 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION

SECTION 22 13 19 DRAINS, CLEANOUTS AND DRAINAGE ACCESSORIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. All work specified in this section is subject to the provisions of Section 23 0500, "Mechanical General."

B. Refer to the following sections for related work in connection with drains, cleanouts and drainage accessories.

1. 23 05 11 Mechanical Submittals
2. 22 13 16 Soil, Waste and Vent Piping

1.02 DESCRIPTION OF WORK:

A. The number, type and size of the drains and cleanouts are indicated on the Drawings and shall include the following:

1. Floor Drains
2. Cleanouts

1.03 QUALITY ASSURANCE:

A. Manufacturing firms shall be regularly engaged in the manufacture of plumbing products of type and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.

B. Subject to compliance with requirements, provide drains, cleanouts & drainage accessories of one of the following manufacturers:

1. Ancon, Inc.
2. Josam Company
3. Jay R. Smith Mfg. Co.
4. Wade Div., Tyler Pipe
5. Zurn Industries, Inc.

PART 2 - PRODUCTS

2.01 FLOOR DRAINS:

A. General: Provide floor drains of size and type as indicated on the Drawings, including features as specified herein. Floor drains and floor sinks located on floors above the ground floor shall be provided with flashing clamps.

B. Floor Drain Type "G": Cast iron body and reversible flashing collar, nickel bronze adjustable with 6 by 6 square or 6 inch diameter secured strainer top, equal to Jay R. Smith 2010-B Series.

C. Floor Drain Type "M": Cast iron deep body with flange and 12 inch diameter heavy duty cast iron tractor grate, equal to Jay R. Smith 2141 Series.

D. Floor Drain Type "MB": Cast iron deep body with flange and 12 inch diameter heavy duty ductile iron grate, loose set sediment bucket, equal to Jay R. Smith 2233 Series.

E. Hub Drains Type "HD": Cast iron pipe hub set in floor with top 1 inch above the finished floor. The indirect waste line run to the hub drain shall stop 2 inch above the top of the hub.

F. All floor drains without trap primer connections shall be provided with deep seal "P" traps.

G. Floor drains where indicated on Drawings shall be provided with trap primer connections.

2.02 CLEANOUTS:

A. Floor Cleanouts shall have a cast iron body with frame, cleanout plug and adjustable top as follows:

1. Nickel-Bronze Top: Manufacturers standard cast unit of the pattern indicated:
   a. Pattern: Exposed round (square) rim type, with recess to receive 1/8 inch thick resilient floor finish, equal to J. R. Smith 4140 (4160).
   b. Pattern: Exposed finish type, standard mill finish to be covered with carpet and located with carpet marker, equal to J. R. Smith 4020-Y.
   c. Pattern: Exposed flush type, standard non-slip scored or abrasive finish, equal to J. R. Smith 4020.
2. Heavy duty, round, cast iron top shall be used for all unfinished areas with concrete slabs, equal to J. R. Smith 4240.
3. Heavy duty, round, cast iron tractor top shall be used for location in Work Bays and exterior locations in pavement, equal to J. R. Smith 4240.

PART 3 - EXECUTION

3.01 EXECUTION:

A. All floor drain strainers shall be securely fastened to drain body.

B. During construction drains shall be kept covered so that traps and sediment buckets are kept free from debris, trash and sediment. All traps and buckets shall be cleaned of all debris prior to acceptance by Owner.

C. All floor drains and cleanouts shall have finishes protected from damage during construction. All tops and surfaces damaged during construction shall be replaced prior to acceptance by Owner.

D. All floor drain and cleanout covers deformed by heavy construction traffic shall be replaced.

END OF SECTION

SECTION 22 33 13 WATER HEATERS - ELECTRIC

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. All work specified in this section is subject to the provisions of Section 23 05 00 “Mechanical General.”

B. Refer to the following sections for related work in connection with electric water heaters:

1. 23 05 11 Mechanical Submittals
2. 23 0 553 Identification

1.02 DESCRIPTION OF WORK

A. The number and size of the electric water heaters are indicated on the Drawings

B. The types of electric water heaters required for the project include:

1. Electric Instantaneous Water Heater

1.03 QUALITY ASSURANCE

A. Manufacturing firms shall be regularly engaged in the manufacture of electric water heaters of type and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.

B. ASME Code Symbol Stamps – Comply with ASME Boiler and Pressure Vessel Code for construction, and stamp with ASME Code Symbol.

C. Provide water heaters which comply with Energy Code and ASHRAE 90A for energy efficiency.

D. U.L. and NEMA Compliances – Provide electrical components required as part of electric water haters, which have been listed and labeled by Underwriters Laboratories and comply with NEMA standards.

E. NEC Compliance – Comply with the National Electric Code as applicable to installation and electrical connections of ancillary electrical components of electric water heaters.

1.04 SUBMITTALS

A. Product Data – Submit manufacturer’s water heater specifications, installation and start-up instructions.

B. Shop Drawings – Submit assembly type shop drawings indicating dimensions, weights, required clearances, and methods of assembly of all components.

C. Wiring Diagrams – Submit ladder type wiring/diagrams for all components, clearly indicating all required field electrical connections.

D. Maintenance Data – Submit maintenance data and parts lists for each item of accessory equipment. Include “trouble-shooting” maintenance guides. Include this data in maintenance manual.

PART 2 - PRODUCTS

2.01 GENERAL

A. Electric water heaters shall be of same manufacturer, unless specifically approved by Engineer. Refer to schedule for heater sizes, capacities, electrical characteristics and element operation.

2.02 ELECTRICAL STORAGE TYPE WATER HEATERS

A. Tank Materials – Tank shall be welded steel construction (conforming to ASME Code and provided with ASME stamp, 150 psi working pressure).

B. Lining – All interior tank surfaces shall be glass lined.

C. Elements – Electric heating elements shall be heavy duty medium watt density with incoloy sheath.

D. Enclosure – Heater shall be insulated in accordance with energy code and provided with steel enclosure with baked enamel finish.

E. Controls – Provide adjustable thermostat, high temperature cut off and low water cut off.

F. Accessories – Provide the following water heater accessories:

1. Magnesium anode
2. ASME combination temperature and pressure relief valve
3. Brass drain valve
4. Thermometer
5. Vacuum relief valve
6. Time clock with seven day, fourteen operations/week.

G. Warranty – Furnish five (5) year limited warranty for tank leakage.

H. Manufacturer – Provide water heaters meeting specification requirements of one of the following manufacturers:

1. A.O. Smith
2. Lochinvar
3. P.V.I.
4. Rheem
5. Ruud
6. State Industries

PART 3 - EXECUTION

3.01 INSTALLATION OF WATER HEATERS

A. Install water heaters as indicated, in accordance with manufacturer's installation instructions, and in compliance with applicable codes. Verify location and clearance requirements.

B. Bolt tanks to concrete housekeeping pads, level and plumb. Provide concrete pad.

C. Connections – Make connections between water heaters and domestic water piping shutoff valves with unions or flanges as indicated. Provide dielectric insulation at all tank connections.

D. Pipe heater drain and relief valve drain, full size to floor drain.

E. Coordinate voltage of water heaters with Electrical Contractor to insure proper installation.

F. Coordinate location of time clock with Electrical Contractor.

G. Identification – Provide sign securely attached to water heater identifying equipment number, service and capacity. Provide valve tags on all valves and provide identification on all piping connections to water heaters.

H. Testing – Upon completion of installation, pressure test water heaters hydrostatically to assure structural integrity and freedom from leaks in accordance with manufacturer's instructions, and comply with applicable health codes.

I. Disinfection and Flushing – Disinfect in accordance with potable water piping requirements and flush water heaters upon completion of installation in accordance with manufacturer's instructions, and comply with applicable health codes.

J. Start Up – Start up, test and adjust electric water heater in accordance with manufacturer's start-up instructions. Check thermostats and all controls to insure proper operation.

END OF SECTION

SECTION 22 42 00 PLUMBING FIXTURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION OF WORK

A. Extent of plumbing fixtures and trim work is indicated by the Drawings and Schedules, and by requirements of this Specification Section.

B. Refer to Division 26 sections for electrical connections to water coolers, emergency safety fixtures, and other plumbing fixtures. These electrical connections are not work of this Section.

1.03 SUBMITTALS

A. Product Data: For each type of plumbing fixture indicated. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.

B. Operation and Maintenance Data: For plumbing fixtures to include in emergency, operation, and maintenance manuals.

C. Warranty: Special warranty specified in this Section.

1.04 QUALITY ASSURANCE

A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.

1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.

B. 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.

C. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.

D. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.

E. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

F. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

G. Comply with the following applicable standards and other requirements specified for plumbing fixtures:

1. Stainless-Steel Residential Sinks: ASME A112.19.3.
2. Vitreous-China Fixtures: ASME A112.19.2M.
3. Water-Closet, Flush Valve, Tank Trim: ASME A112.19.5.

H. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:

1. Faucets: ASME A112.18.1.
2. Supply Fittings: ASME A112.18.1.
3. Brass Waste Fittings: ASME A112.18.2.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver plumbing fixtures individually wrapped in factory-fabricated containers.

B. Handle plumbing fixtures carefully to prevent breakage, chipping and scoring the fixture finish. Do not install damaged plumbing fixtures; replace and return damaged units to equipment manufacturer.

C. Fixtures shall be protected after installation to prevent scratches, dents, surface mar or any other damage during the course of construction. Fixtures that are scratched, chipped, or otherwise marred shall be replaced at the direction of the Architect and at no cost to the Owner.

PART 2 - PRODUCTS

2.01 PLUMBING FIXTURES

A. Provide factory-fabricated fixtures of type, style and material indicated. For each type fixture, provide fixture manufacturer's standard trim, carrier, seats, and valves as indicated by their published product information; either as designed and constructed, or as recommended by the manufacturer, and as required for a complete installation.

B. Where more than one type is indicated, selection is Installer's option; but, all fixtures of same type must be furnished by single manufacturer. Where type is not otherwise indicated, provide fixtures complying with governing regulations.

C. Fixture color shall be white unless noted otherwise.

2.02 MATERIALS

A. Provide materials which have been selected for their surface flatness and smoothness. Exposed surfaces which exhibit pitting, seam marks, roller marks, foundry sand holes, stains, decoloration, or other surface imperfections on finished units are not acceptable.

B. Where fittings, trim and accessories are exposed or semi-exposed, provide bright chrome-plated or polished stainless steel units. Provide copper or brass where not exposed.

2.03 PLUMBING FITTINGS, TRIM AND ACCESSORIES

A. Provide commercial quality faucets, valves, or dispensing devices, of type and size indicated, and as required to operate as indicated. Include manual shutoff valves and connecting stem pipes to permit outlet servicing without shutdown of water supply piping systems.

B. Include removable P-traps where drains are indicated for direct connection to drainage system.

C. Provide cast-iron or steel supports for fixtures of either graphitic gray iron, ductile iron, or malleable iron.

D. Provide manufacturer's standard exposed fixture bolt caps finished to match fixture finish.

E. Where fixture supplies and drains penetrate walls in exposed locations, provide chrome plated cast-brass escutcheons with set screw.

F. Provide aerators on all faucet sets of types approved by the local Health Department having jurisdiction.

G. Comply with additional fixture requirements contained in "Plumbing Fixture Schedule" located on the Contract Drawings.

2.04 MANUFACTURERS

A. Subject to compliance with requirements of the Specifications, provide plumbing fixtures and trim of one of the following manufacturers:

1. Plumbing Fixtures – Water Closets, Urinals, Lavatories, Sinks, Bathtubs
   a. American Standard
   b. Kohler Company
   c. Mansfield Plumbing Products
   d. Sloan
   e. Toto
   f. Zurn Industries
2. Plumbing Faucets:
   a. American Standard
   b. Chicago Faucet Company
   c. Delta
   d. Elkay
   e. Encore
   f. Just
   g. Kohler Company
   h. Moen Incorporated
   i. Symmons
   j. Speakman Company
   k. Toto

l. T & S Brass and Bronze Works, Inc.
m. Zurn Industries, Hydromechanics Division

3. Plumbing Trim
   a. American Standard
   b. Chicago Faucet Company
   c. Delta
   d. EBC - (Engineered Brass Co.)
   e. Eastman Brasscraft
   f. Elkay
   g. Encore
   h. Just
   i. Kohler Company
   j. McGuire Manufacturing Co.
   k. Moen Incorporated
   l. Sanitary Dash Manufacturing Co.
   m. Symmons
   n. Speakman Company
   o. Toto
   p. T & S Brass and Bronze Works, Inc.
   q. Watts Drainage Products
   r. Zurn Industries, Hydromechanics Division
4. Flush Valves
   a. American Standard
   b. Coyne & Delany Company
   c. Kohler Company
   d. Sloan Valve Company
   e. Toto
   f. Zurn Industries, Hydromechanics Division
5. Fixture Seats
   a. American Standard
   b. Bemis Mfg. Co.
   c. Beneke Corp., Div. of Beatrice Foods
   d. Centoco
   e. Church Seats
   f. Comfort Seats
   g. Kohler Company
   h. Olsonite Corp., Olsonite Seats
   i. Toto
   j. Zurn Industries, Hydromechanics Division
6. Drinking Fountains / Water Coolers
   a. Acorn – Aqua
   b. Elkay Mfg. Co.
   c. Filtrine Manufacturing Co.
   d. Halsey Taylor Div.
   e. Haws Corporation
   f. Oasis

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.

B. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.

B. Install counter-mounting fixtures in and attached to casework.

C. Install fixtures level and plumb according to roughing-in drawings.

D. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.

1. Exception: Use ball, gate, or globe valves if supply stops are not specified with fixture. Valves are specified in Section 23 0523 “Valves”.

E. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.

F. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.

G. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.

H. Install toilet seats on water closets.

I. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

J. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.

K. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

L. Install shower flow-control fittings with specified maximum flow rates in shower arms.

M. Install traps on fixture outlets.

1. Exception: Omit trap on fixtures with integral traps.
2. Exception: Omit trap on indirect wastes, unless otherwise indicated.

N. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Section 23 0500 “Mechanical General”.

O. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color.

3.03 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

3.04 FIELD QUALITY CONTROL

A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.

B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.

C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.

D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

3.05 ADJUSTING

A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.

B. Adjust water pressure at faucets and flushometer valves to produce proper flow and stream.

C. Replace washers and seals of leaking and dripping faucets and stops.

3.06 CLEANING

A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:

1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
2. Remove sediment and debris from drains.

B. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

3.07 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

PLUMBING FIXTURE SCHEDULE

	Fixture Description	Acceptable Manufacturers		
P1	WATER CLOSET: High efficiency, floor mounted, 1.28 gallon exposed flush valve, vitreous china, siphon jet elongated bowl, 1-1/2 inch top spud, bolt caps, white.	American Std. 3353.128	Kohler K-4325	Toto CT708E
	SEAT: Heavy duty solid plastic, elongated open front, stainless steel check hinge, white.	American Std 5901.110	Kohler 4670-SC Beneke 523-SS	Toto SC534 Bemis 1955 - C
	FLUSH VALVE: 1.28 gallon flush, externally adjustable flush valve, 1-1/2 inch top spud coupling, wall and spud flanges, vandal proof trim, chrome plated.	Delany 402-1.5	Sloan 111-YB	Zurn Z6000-WS-1
P2	LAVATORY: 20 inches by 17 inches self rimming countertop, vitreous china, 4 inch centers, front overflow, white.	American Std. 0476.028	Kohler K-2195	Toto LT501.4
	FAUCET: Single lever handle, 4 inch centers, 0.5 GPM flow restrictor, pop-up drain, replaceable ceramic disc cartridge, aerator, 1-1/4 inch tailpiece, chrome finish.	American Std. 2000.100	Kohler K-15592-5	Zurn Z7440

	SUPPLY: 1/2 inches I.P.S. by 3/8 inches O.D. angle supply, loose key stop, wall flange, chrome plated.	Brasscraft SR1712A	Kohler K-7676	McGuire 2165CCLK
	DRAIN: 1-1/4 inches, 17 gallon open grid strainer and tailpiece, chrome plated.	Kohler K-7715	McGuire 155-A	Sanitary Dash R7304
	TRAP: 1-1/4 inches by 1-1/2 inches, 17 gallon, adjustable P-trap with cleanout and wall flange, chrome finish.	Kohler K-8999	McGuire 8902	Sanitary Dash R870
P7B	SINK - BREAKROOM: 15 inches by 17-1/2 inches single compartment, 12 inches by 12 inches by 7-1/4 inches bowl, 20 gauge. Type 304, 18-8 stainless steel, self-rimming, underside fully undercoated, polished satin finish.	Elkay PSR-1517	Just SL-1815-B-GR	Kraus
	FAUCET: Deck mount washerless kitchen faucet with lever handles and fixed gooseneck spout, flex connectors and chrome finish.	Elkay	Kohler K-15850-4M	Zurn
	DRAIN: Brass adjustable crumb strainer, 1-1/2 inch tail piece chrome finish.	American Standard 4331-013	Kohler K-8801	Sanitary Dash
	SUPPLY: ½ inches I.P.S. by 3/8 inches O.D. angle stop, wheel handle, wall flange, chrome plated	Brasscraft OR1712DL	Kohler K-7663	McGuire 2166

TRAP: 1-1/2 inch 17 gauge adjustable with cleanout and wall flange, chrome finish	McGuire 8912	Kohler K-9000	Sanitary Dash

END OF SECTION

SECTION 23 05 00 MECHANICAL GENERAL

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Division and the accompanying Drawings cover furnishing of all labor, equipment, appliances, and materials and performing all operations in connection with the installation of complete air conditioning, ventilating, heating, plumbing and fire protection systems as specified herein and as shown on the Drawings.

B. The general provisions of the Contract including the Conditions of the Contract (General, Supplementary and other conditions) and other divisions as appropriate, apply to work specified in this division.

C. All work done under this Contract shall comply with all state and local codes having jurisdiction and with the requirements of the Utility Companies whose services may be used. All modifications required by these codes shall be made by the Contractor without additional charges. Any conflict between these documents and the governing codes shall be immediately brought to the attention of the Engineer of Record. Where code requirements are less than those shown on the Plans or in the Specifications, the Plans and Specifications shall be followed.

D. The Contractor shall obtain all permits, inspections, and approvals as required by all authorities having jurisdiction, and deliver certificates of approval to the Architect. All fees and costs of any nature whatsoever incidental to these permits, inspections and approvals must be assumed and paid by the Contractor.

E. The Contractor shall comply with all applicable provisions of the William-Steiger Occupational Safety and Health Act (O.S.H.A.).

F. The products of particular manufacturers have been used as the basis of design in preparation of these documents. Any modifications to the mechanical systems and their components, the electrical systems, the building structure and architecture, or any other portion of the building that result from the use of any other than the basis of design equipment shall be coordinated with all other trades. Such coordination shall occur before delivery of products from the manufacturer (before shop drawing submittals) and shall be clearly indicated on the shop drawings. All related modifications shall be borne by the Contractor and performed without any additional cost to the Contract.

G. All products shall be new and bear the Underwriter's Laboratories, Inc. (UL) label unless specifically indicated otherwise.

1.02 CODES AND REGULATIONS:

A. All heating, ventilating and air conditioning materials and workmanship shall comply with the following codes and standards as applicable:

1. The International Building Code
2. The International Mechanical Code
3. The National Electrical Code
4. All local amendments

B. All plumbing materials and workmanship shall comply with the following codes and standards as applicable:

1. The International Building Code
2. The International Plumbing Code
3. The International Gas Code
4. The National Electrical Code
5. All local amendments

C. All fire protection materials and workmanship shall comply with the following codes and standards as applicable:

1. The International Building Code
2. The International Fire Code
3. The International Fire Standards
4. The National Fire Protection Association Codes and Standards (latest edition)
5. The National Electrical Code
6. All local amendments

1.03 APPLICABLE PUBLICATIONS:

A. The publications listed below form a part of this Specification to the extent referenced and are referred to in the text by the basic designation only.

1. Air-Conditioning and Refrigeration Institute Standards (ARI)
2. American National Standards Institute, Inc. Standards (ANSI)
3. American Society for Testing and Materials Publications (ASTM)
4. American Gas Association Inc. Laboratories (AGA)
5. American Society of Mechanical Engineers Code (ASME)
6. Factory Mutual Underwriters (FM)
7. National Fire Protection Association Standards (latest edition)
8. Sheet Metal and Air Conditioning Contractors' National Association Inc. (SMACNA)
9. Underwriters Laboratories, Inc. (UL)

1.04 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.05 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:

1. CPVC: Chlorinated polyvinyl chloride plastic.
2. PE: Polyethylene plastic.
3. PVC: Polyvinyl chloride plastic.
4. ABS: Acrylonitrile-butadiene-styrene plastic.

G. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

1.06 PERFORMANCE REQUIREMENTS

A. General Performance of all materials and/or products shall withstand installation and performance without failure due to defective manufacture, fabrication, installation, or other defects in construction. Materials shall remain watertight and airtight when subjected to those conditions.

B. Structural Performance of all materials and/or products shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to SEI/ASCE 7.

C. Seismic Performance of all materials and/or products shall withstand the effects of earthquake motions determined according to SEI/ASCE 7. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

D. All materials and/or products shall allow for thermal movements from ambient and surface temperature changes. Temperature Change (Range) shall be considered unless otherwise noted, 120°F, ambient to 180°F measured at the material surfaces.

1.07 SUBMITTALS

A. Submittal requirements are more fully defined under Section 15051 in these Specifications.

B. Specific emphasis is brought onto the subject of Coordination Drawings that are required under the Submittals section. They shall be drawn to scale and the following items are to be shown and coordinated with each other, using input from Installers of the items involved:

1. Mechanical piping
2. Ductwork system (including diffusers)
3. Plumbing Piping
4. Electrical conduits (over 4 inches)
5. Lighting fixtures
6. Architectural and Reflected ceiling elements
7. Structural components.

C. Seismic Qualification Certificates: For ALL accessories and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.08 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

C. Testing Agency Qualifications: Qualified according to ASTM C 1021 or ASTM C 1093 for testing indicated.

D. Testing Agency Qualifications: Member companies of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

E. Obtain each color, grade, finish, type, and variety of materials or products from one source with resources to provide consistent quality in appearance and physical properties.

F. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code –Steel; D1.2/D1.2M, "Structural Welding Code – Aluminum; D1.3, "Structural Welding Code - Sheet Steel; or D1.4, "Structural Welding Code - Reinforcing Steel."

G. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

H. 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.

I. Fire-Resistance Ratings: Where indicated, provide products or materials identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
2. Combustion Characteristics: ASTM E 136.

J. 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.

K. ASME Compliance: Equipment indicated to be fabricated and labeled to comply with ASME Boiler and Pressure Vessel Code.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.10 PROJECT CONDITIONS

A. Do not install any materials or components that are wet, moisture damaged, or mold damaged.

B. Do not deliver or install any materials or components until spaces are enclosed and weather tight, wet work in spaces is complete and dry and any required temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

C. Proceed with installation only when existing and forecasted weather conditions permit materials or components to be performed according to manufacturer's written instructions and warranty requirements.

D. Contractor shall verify actual dimensions of any openings or construction contiguous with any materials or components by field measurements before fabrication.

1.11 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for HVAC installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for HVAC items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "Access Doors and Frames."

1.12 WARRANTY

A. Contractor shall supply the manufacturer's standard form in which manufacturer agrees to repair or replace any materials or components that fail(s) in materials or workmanship within the one year specified warranty period from Substantial Completion.

1.13 SOFTWARE SERVICE AGREEMENT

A. Technical Support shall be defined as beginning with Substantial Completion; software support shall be supplied for two years.

B. Update any required software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.

1. Provide 30 days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

1.14 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers listed shall be subject to compliance with requirements. It should be noted that not all manufacturers of a particular product may be listed. Any manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified. Contractor requested manufacturers to be added to list shall follow the Substitution process defined under the Architect's Contract Specification Division 1.

2.02 MOTORS

A. Contractor shall comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23.

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 26 Sections.

2.03 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 23 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.04 JOINING MATERIALS

A. Refer to individual Division 23 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
   a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
   b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H. Solvent Cements for Joining Plastic Piping:

1. CPVC Piping: ASTM F 493.
2. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
3. ABS Piping: ASTM D 2235
4. PVC to ABS Piping Transition: ASTM D 3138.

I. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

2.05 TRANSITION FITTINGS

A. Plastic-to-Metal Transition Fittings: CPVC and PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.

1. Eslon Thermoplastics.
2. NIBCO INC.
3. Thompson Plastics, Inc.

B. Plastic-to-Metal Transition Adaptors: One-piece fitting with manufacturer's SDR 11 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.

1. Thompson Plastics, Inc.
2. Eslon Thermoplastics.
3. NIBCO INC.

C. Plastic-to-Metal Transition Unions: MSS SP-107, CPVC and PVC four-part union. Include brass end, solvent-cement-joint end, rubber O-ring, and union nut.

1. NIBCO INC.
2. NIBCO, Inc.; Chemtrol Div.
3. Thompson Plastics, Inc.

D. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined. Underground Piping NPS 1-1/2 and Smaller: Manufactured fitting or coupling. Underground Piping NPS 2 and Larger: AWWA C219, metal sleeve-type coupling.

1. Cascade Waterworks Mfg. Co.
2. Dresser Industries, Inc.; DMD Div.
3. Ford Meter Box Company, Incorporated (The); Pipe Products Div.
4. JCM Industries.
5. Smith-Blair, Inc.
6. Viking Johnson.

E. Flexible Transition Couplings for Underground Nonpressure Drainage Piping: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.

1. Cascade Waterworks Mfg. Co.
2. Fernco, Inc.
3. Mission Rubber Company.
4. Plastic Oddities, Inc.

2.06 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

1. Coordinate subparagraph and associated subparagraphs below with Part 2 "Manufacturers" Article. Retain "Available" for nonproprietary and delete for semiproprietary specifications.
2. Capitol Manufacturing Co.
3. Central Plastics Company.
4. Eclipse, Inc.
5. Epco Sales, Inc.
6. Hart Industries, International, Inc.
7. Watts Industries, Inc.; Water Products Div.
8. Zurn Industries, Inc.; Wilkins Div.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

1. Coordinate subparagraph and associated subparagraphs below with Part 2 "Manufacturers" Article. Retain "Available" for nonproprietary and delete for semiproprietary specifications.

2. Capitol Manufacturing Co.
3. Central Plastics Company.
4. Epco Sales, Inc.
5. Watts Industries, Inc.; Water Products Div.

E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers. Separate companion flanges and steel bolts and nuts shall have 150 psig or 300 psig minimum working pressure where required to suit system pressures.

1. Coordinate first subparagraph and associated subparagraphs below with Part 2 "Manufacturers" Article. Retain "Available" for nonproprietary and delete for semiproprietary specifications.
2. Advance Products & Systems, Inc.
3. Calpico, Inc.
4. Central Plastics Company.
5. Pipeline Seal and Insulator, Inc.

F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225°F.

a. Calpico, Inc.
b. Lochinvar Corp.

G. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225°F.

a. Perfection Corp.
b. Precision Plumbing Products, Inc.
c. Sioux Chief Manufacturing Co., Inc.
d. Victaulic Co. of America

2.07 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Metraflex Co.
d. Pipeline Seal and Insulator, Inc.

B. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

C. Pressure Plates: Stainless steel. Include two for each sealing element.

D. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.08 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.

F. PVC Pipe: ASTM D 1785, Schedule 40.

G. Molded PE: Reusable, PE, tapered-cup shaped and smooth-outer surface with nailing flange for attaching to wooden forms.

2.09 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Type: With set screw.

1. Finish: Polished chrome-plated.

D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

1. Finish: Rough brass.

E. One-Piece, Stamped-Steel Type: With set screw or spring clips and chrome-plated finish.

F. Split-Plate, Stamped-Steel Type: With concealed hinge, set screw or spring clips, and chrome-plated finish.

G. One-Piece, Floor-Plate Type: Cast-iron floor plate.

H. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.10 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, non-staining, noncorrosive, nongaseous and recommended for interior and exterior applications.
2. Design Mix: 5000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.01 GENERAL

A. The Mechanical, Plumbing and Fire suppression plans do not give exact elevations or locations of lines, nor do they show all the offsets, control lines, or 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 and coordinated installation operating at optimum performance.

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. All related costs incurred shall be borne by the Contractor and performed without any additional cost to the contract.

C. The Contractor shall be responsible for the proper location and size of all slots, holes or openings in the building structure pertaining to his work, and for the correct location of sleeves, inserts and cores.

D. The Contractor shall coordinate the work of the several various trades so that it may be installed in the most direct and workmanlike manner without hindering or handicapping 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.

E. All piping and ductwork in kitchens and finished areas shall be installed in chases, furred spaces, or above ceilings. Pipes and ducts shall be installed as high as possible. Valves in piping systems shall be offset down to within one (1) foot of access point. Runs of piping shall be grouped whenever it is feasible to do so.

F. Piping, equipment, or ductwork shall not be installed in electrical equipment rooms, elevator machine rooms or computer rooms except as serving only those rooms. In 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 inches in front (and rear if free standing) of equipment; or
2. Within 36 inches of sides of equipment.
3. Clearances apply vertically from floor to structure.

G. Provide access to equipment and apparatus requiring operation, service or maintenance within the life of the system. Devices include but are not limited to are: motors, valves, filters, dampers, and shock absorbers. Equipment located above lay-in type ceilings is considered accessible.

H. Locate required terminal boxes, valves and dampers in areas accessible for maintenance. Note that no access panels are permitted in public spaces unless specifically noted on Contract Documents.

3.02 ELECTRICAL WORK

A. Locate required junction boxes, terminal points and access points in areas accessible for maintenance. Note that no access panels are permitted in public spaces unless specifically noted on Contract Documents.

B. All electrical equipment provided under this Division shall comply with the electrical system characteristics indicated on the Electrical Drawings and specified in Division 26.

C. Air handling unit motor speed controls, starters for chillers, boiler control package and packaged pump systems shall be furnished complete as a part of the motor apparatus which it operates. All other motor starters for HVAC and Plumbing equipment shall be furnished under Division 26. All components shall be in conformance with the requirements of the National Electrical Code and Division 26.

D. All power wiring and final power connections to the system shall be provided under Division 26.

E. Control wiring (120V and less) shall be provided under Division 23 and extended from the 120 volt power circuits indicated in the Electrical Drawings. All wiring for voltages higher than 30 volts shall be done by a licensed electrician.

F. All electrical characteristics shall be taken from the Electrical Drawings and Specifications and coordinated with the Electrical Contractor prior to equipment being ordered or shop drawings submitted.

3.03 MOTORS

A. Unless specifically noted otherwise in other sections of this Specification, all motors and motor controllers shall meet the requirements specified in this Section. All motors shall be built in accordance with the current applicable IEEE and NEMA standards, and shall have voltage, phase, frequency and service as scheduled in the Electrical Documents.

B. Each motor shall be of the premium efficiency type, rated for use with a variable frequency drive. They shall be suitable for the required brake horsepower of the driven unit, rated with 1.15 minimum service factor, and shall be NEMA Design B. The minimum ambient temperature rating that the motor shall be suitable for operation in shall not be less than 40°C for drip proof and totally enclosed fan cooled motors. The motor shall be capable of operating continuously at such temperature with minimum deterioration, and shall be capable of withstanding momentary overloads of 10% without injurious overheating.

C. Each item of motor driven equipment shall be furnished complete with the motors and drives as required to perform the specific function for which it is intended, scheduled and specified.

D. Motors shall be ball bearing type selected for quiet operation and shall be manufactured for general purpose duty unless otherwise indicated. Each bearing shall be accessible for lubrication and designed for the load imposed by the V-belt drive or the driven apparatus. Direct drive motors shall be designed for the specific application with all necessary thrust bearings, and shaft capacities.

E. Motors larger than one-half (1/2) horsepower shall have bearings with pressure grease lubrication fittings.

F. Motors connected to drive equipment by belt shall be furnished with screw adjustable slide rail or pivoting type bases except that fractional horsepower motors may have slotted bases. Motor leads shall be permanently identified and supplied with connectors.

G. Each motor to be installed outdoors shall be of the totally enclosed fan cooled type, or housed in a weatherproof housing that is an integral part of the driven equipment.

H. Unless otherwise indicated, motors smaller than one-half (1/2) horsepower shall be capacitor start or split phase type designed for 120 volt, single phase, 60 cycle alternating current. Shaded pole motors are not acceptable except 35 watts and smaller. Motors one-half (1/2) horsepower and larger shall be squirrel cage induction type, 3 phase, 60 cycle alternating current.

I. Multi-speed motors shall, except as noted, be consequent pole, variable torque, single winding. When the speed ratios or the load characteristic dictates, the multi-speed motors shall be separate winding types.

J. Variable speed motors operating over an adjustable range of speeds shall be motors specifically designed and rated for this duty.

K. If the Contractor proposes to furnish motors varying in horsepower and/or characteristics from those specified, he shall first inform the Architect of the change by clearly identifying it on the shop drawing or submittal and shall then coordinate the change with all associated trades effected and shall bear all additional charges in connection with the change.

3.04 PROTECTION OF EQUIPMENT

A. Store all equipment, including pipe and valves, off the ground and under cover. For storage outdoors, minimum four (4) mil thick plastic sheets shall be securely fitted over equipment to withstand splattering, ground water, precipitation and wind.

B. Protect air handling unit coils by use of protective sheet metal panels or plywood.

C. Plug ends of pipe when work is stopped and close ends of ducts with four (4) mil thick plastic sheets taped in place until work resumes. Duct tape without plastic sheets is not an acceptable substitute.

D. Damaged equipment shall be repaired or replaced at the option of the Engineer.

3.05 PAINTING

A. Any factory painted equipment that has been scratched, damaged or marred during Contractor handling, installation or commissioning shall be repainted to match the original factory supplied color and finish.

B. All uninsulated black ferrous metal items exposed to sight inside the building, (such as condenser water piping, standpipes, equipment hangers and supports, miscellaneous metals) shall be cleaned and painted with one (1) coat of zinc chromate primer. In addition, such items in finished spaces shall also be painted with two (2) coats of finish paint in a color to match adjacent surfaces or as otherwise selected by the Architect.

C. Black ferrous metal, cast iron and copper items exposed outside the building, (such as cooling tower support beams, uninsulated pipe and pipe supports, miscellaneous metals) shall be cleaned and painted with one (1) coat of rust inhibiting primer and two (2) coats of an asphaltic base aluminum paint. Insulated pipes outside the building shall be cleaned and painted with one (1) coat of rust inhibiting primer before installing insulation.

D. In lieu of painting hanger rods, cadmium plated or galvanized rods may be furnished.

E. No nameplates or equipment shall be painted, and suitable protection shall be afforded to the plates to prevent their being rendered illegible during the painting operation.

F. Any galvanizing broken or damaged during Contractor handling, installation or related construction activities shall be re-coated with cold galvanizing compound.

G. All ductwork, piping, insulation, conduit, miscellaneous metals or other appurtenances visible through grilles and diffusers shall be painted flat black.

3.06 PROTECTION OF EXISTING UTILITIES

A. The Contractor shall use extreme caution during excavation operations not to damage or otherwise interrupt the operations of existing utilities. The Contractor shall be responsible for the continuous operation of these lines and shall provide bypasses or install such shoring, bracing, or underpinning as may be required for proper protection.

B. Work shall be scheduled and coordinated so that existing systems of all types will not be interrupted when they are required for normal usage [of the existing building]. The Owner's Representative and the Architect shall be informed, and approval obtained from the Utility Authority involved at least seven (7) days prior to any utility interruption or connection.

3.07 CUTTING AND PATCHING

A. The Contractor shall assume all cost of, and be responsible for, arranging for all cutting and patching required to complete the installation of his portion of the Work. All cutting shall be carefully and neatly done so as not to damage or cut away more than is necessary of any existing portions of the structure. Cutting of or welding on any portion of the building structure shall be done only with the express consent of the structural engineer.

B. All affected surfaces shall be reinstated to the condition of the adjacent surfaces.

C. The Contractor shall make suitable provisions for adequately water-proofing any floor or roof penetrations necessary for the installation of the mechanical, plumbing and fire suppression systems. This shall include, but not be limited to, floor drains, floor sinks, open sight drains, hub drains, cleanouts, and sleeves for the various piping and ductwork systems.

3.08 SLEEVES, FLOOR AND CEILING PLATES

A. The Contractor shall install in concrete, carpentry or masonry construction, all necessary hangers, sleeves, expansion bolts, inserts and other fixtures and appurtenances necessary for the support of all pipe, duct, equipment and devices furnished under each section of the Specification.

B. Cutting of openings and installation of sleeves or frames through walls and surfaces shall be done in a neat workmanlike manner. Openings shall be cut only as large as required for the installation; sleeves, and/or frames shall be installed flush with finished surfaces and grouted in place unless otherwise indicated. Surfaces around openings shall be left smooth and finished to match surrounding surface.

C. Where pipes pass through floor slabs, sleeves shall be standard weight black steel pipe with top of sleeve three (3) inches above finished floor. Where pipes pass through walls, sleeves shall be standard weight black steel pipe or 20 galvanized sheet metal with ends flush with wall surfaces.

D. Each pipe or duct passing through walls, floors, ceilings or partitions shall be provided with sleeves having internal diameters one (1) inch larger than the outside dimensions of insulated pipes or ducts.

E. All pipe sleeves through existing floors, roofs and masonry walls shall be built in place as the affected walls, floors and roof are constructed.

F. All penetrations through rated floors and walls shall have their sleeved opening packed with mineral wool and capped off with a fire rated sealant as manufactured by Hilti, 3M or Dow. Materials shall meet or exceed UL 1479 or ASTM E814 requirements.

G. Sleeves through exterior walls shall be steel or cast iron pipe, flush with the exterior surfaces, and with the space between the pipe and the sleeves caulked watertight.

H. Inserts shall be individual type (cast iron) or (galvanized steel), with accommodations for removable nuts and threaded rods up to 3/4 inch diameter, and permitting lateral adjustment. Reference Specification Section 15060 “Hangers and Supports” for additional details.

3.09 ESCUTCHEONS

A. Escutcheons shall be installed on all pipes where they pass through floors, ceilings, walls, or partitions in exposed construction areas.

B. The interior of closets, adjacent to finished areas, shall be considered as finished for the intent of these Specifications.

C. Escutcheons shall be split, hinged, chrome plated, stamped brass type, designed to fit the pipe, and to cover the terminating pipe sleeve. Escutcheons shall have a positive securing device to hold the escutcheon tight to the pipe and the wall or floor.

D. Sufficient spacing between parallel pipe runs shall be allowed to insure that the installation of the escutcheons can be done without modification to or overlapping of the escutcheons is necessary. The escutcheons shall not be altered or overlapped in any manner to allow for their installation.

3.10 CLEANING

A. Sterilize the domestic water supply and distribution system in accordance with the local codes having jurisdiction. Furnish three copies of a Certificate of Performance of Complete Sterilization to the Architect before final inspection of the work, all work shall be certified by a State approved testing laboratory.

B. Flush new water piping systems until water runs clear. Mild chemical cleaning may be required. If so, flush all cleaning chemicals out of the piping system before recharging with water.

C. Remove all stickers, rust, stains, labels, and temporary covers from all items of mechanical, plumbing and fire protection equipment and appurtenances before final acceptance.

D. The exterior surfaces of all mechanical equipment, piping, and ducts, shall be cleaned of all grease, oil, paint, dust and other construction debris.

E. The interior of all air handling units, fans, fan coils, blowers, ducts, plenums and casings shall be cleaned of all debris and blown free of all particles of dirt, rubbish and dust before installing any air distribution devices.

F. Bearings that require lubrication shall be lubricated in accordance with the manufacturer's recommendations. Provide two copies of the certification of lubrication.

G. Equipment rooms shall be left broom clean.

H. Any fans operated during construction shall have temporary filters. Temporary filters shall be changed regularly to prevent contamination of the equipment and duct systems. New and unused permanent filters shall be installed one week or less prior to final inspection.

I. Clean and polish identification plates.

3.11 EQUIPMENT, MATERIALS AND BID BASIS

A. It is the intention of these Specifications to indicate a standard of quality for all material and equipment that will be incorporated into this project. Manufacturer's names are used to designate the item of equipment or material as a means of establishing grade and quality. Where several manufacturers are named, only these manufacturers' products will be considered and the Contractor's bid shall be based on their products. Other unnamed manufacturers, although acceptable as manufacturers, must prove their product will perform satisfactorily and will meet space requirements, and they shall obtain pre-approval of their equipment, before submitting bids and/or shop drawings.

B. Where only one manufacturer is named, manufacturers of similar quality products will not be considered unless the Contract Specifications state otherwise. When stated otherwise, such unnamed manufacturer's products will, however, be considered as substitutions but shall not be used as a basis for bidding. In the event the Contractor wishes to submit substitutions to the Architect for review prior to bid, he shall furnish descriptive catalog material, test data, and samples, as well as any other pertinent data necessary to demonstrate that the proposed substitutions are acceptable to the specified product. No substitutions shall be made without the written consent of the Architect.

C. The use of a named manufacturer in any equipment schedule on the Drawings is for guide purposes only. The provisions of these paragraphs will govern in the selection of products to be used.

3.12 WARRANTY

A. All systems and components shall be provided with a one year warranty from the time of final acceptance unless otherwise noted in the Contract Documents. The warranty shall cover all materials and workmanship. During this warranty period, all defects in materials and workmanship shall be corrected by repair or replacement without incurring any additional cost to the Contract.

B. All reciprocating air conditioning compressors shall be warranted for an additional four (4) years. This additional warranty shall include parts only.

3.13 FOUNDATIONS

A. Concrete foundations are required for all equipment furnished under Division 23. Unless otherwise noted, foundations shall be six inches high.

B. All concrete work performed shall conform entirely to the requirements of the General Specifications which describe this class of work. They shall be constructed in conformance with the recommendations of the manufacturer of the respective equipment that will actually be supplied, and with the approval of the Architect. All corners of the foundations shall be neatly chamfered.

C. Foundation bolts shall be placed in the forms when the concrete is poured. Allow one inch below the equipment bases for alignment, leveling and grouting with non-shrinking grout. Grouting shall be done after the equipment is leveled in place. After the grout has hardened, the foundation bolts shall be pulled up tight and the equipment shimmed and re-aligned, if necessary. After removal of the forms, the surface of the foundation shall be rubbed.

3.14 RECORDS AND INSTRUCTIONS FOR OWNER

A. The Contractor shall accumulate during the job's progress the following data electronically to be stored on a CD, memory drive or other accessible media and turned over to the Architect /Engineer for checking and subsequent delivery to the Owner:

1. All warranties, guarantees and manufacturer's directions on equipment and material covered by the Contractor.
2. Approved fixture brochures, wiring diagrams, and control diagrams.
3. Copies of approved shop drawings.
4. Operating instructions for heating, cooling and other mechanical systems. Operating instructions shall also include recommended periodic maintenance and seasonal changeover procedures, and suggested procedures in the 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 and devices by mark and number from the 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.
5. Any and all other data and/or drawings required during construction.
6. Repair parts lists of all major items and equipment including name, address, and telephone number of local supplier or agent.
7. Valve tag charts and diagrams as specified elsewhere herein.

B. A copy of the above data shall be submitted to the Architect/Engineer for approval at such time as the Contractor asks for his last inspection prior to the final inspection, but in no case, less than two weeks before final inspection.

C. The Contractor shall also give not less than three days of operating instructions, during the adjustment and testing period, to the Owner's operating personnel in order to familiarize them with the proper care and operation of the equipment. The twenty-four hours shall be broken into a series of 6 four hour sessions. The written operating instructions referred to in the paragraph above shall be used as a basis for this on-the-job instruction.

D. A competent technician employed by the Temperature Control Subcontractor will be required to instruct the Owner’s personnel in the proper operating procedures and shall explain the significance of the temperature control literature filed in the maintenance manual over a period of two days while the system is in continuous operation.

E. Contractor shall submit the name and qualifications of the temperature controls instructor(s) with a list of five previous projects and client contacts for reference. The Owner reserves the right to change instructor(s) upon verification of references.

3.15 RECORD DRAWINGS

A. The Contractor shall maintain on a daily basis at the project site a complete set of "Record Drawings", reflecting an accurate dimensional record of all new buried or concealed work. The "Record Drawings" shall be marked to show the precise location of concealed work and equipment, including concealed or embedded piping and valves and all changes and deviations in the Mechanical work from that shown on the Contract Documents. This requirement shall not be construed as authorization for the Contractor to make changes in the layout or work without definite instructions from the Architect.

B. The Contract "Record Drawings" shall consist of a set of electronic files of the Contract Drawings for this Division with the Engineer's seal and Engineer's firm name removed or blacked out. Prior to commencing work the Contractor shall purchase from the Architect a set of architectural electronic backgrounds to be used for the "Record Drawings".

C. Record dimensions shall clearly and accurately delineate the work as installed; locations shall be suitably identified by at least two dimensions to structural column lines or a permanent accessible structure or datum.

D. The Contractor shall mark all "Record Drawings" in the front lower right hand corner with a written indication that states the following:

"RECORD DRAWINGS" (3/8 inch high letters)
"To be used for recording Field
Deviations and Dimensional Data Only". (5/16 inch high letters)

3.16 INSTALLATION

A. All equipment shall be installed in strict conformance with the manufacturer's recommendations, as specified herein and as shown on the drawings. If any conflict arises between these instructions, notify the Engineer immediately for guidance.

3.17 VALVE CHART AND LABELS

A. Contractor shall prepare and install in a suitably glazed frame, typewritten valve charts giving the number, location and function of each line valve installed under this Contract. The Contractor shall also install on each valve stem a stamped one and one-half inch (1-1/2") diameter brass tag plainly numbered corresponding to the number indicated on the above chart. Tags shall be secured to valves by heavy figure eight hooks.

3.18 EQUIPMENT LABELS

A. Each item of equipment shall be permanently labeled with a nameplate of sufficient size to clearly indicate the identification designation (i.e., equipment number) appearing on the Contract Document. Nameplates may be 1/16" thick Bakelite laminate, engraved with letters through black, or aluminum with black enameled surface, with engraved letters. Handwritten marker identifications are not acceptable.

B. The installation of any product, finish or surface in the "public space" which has a readily observable exposed name, trademark, insignia, logo or any other identification mark, symbol or embossment (intended to identify manufacturer, model, or vendor) is not acceptable. This prohibition applies but is not limited to fire alarm devices, dimmers, light fixtures, plumbing fixtures, temperature sensors, thermostats, air conditioners, floor drains, and cleanouts.

3.19 ACCESS DOORS

A. Furnish and install access doors at each point required to provide access to concealed valves, cleanouts, fire dampers and other devices requiring operation, adjustment, or maintenance. Access doors shall be prime coat finished 16 gauge steel, with mounting straps, concealed hinges and screwdriver locks, designed for the doors to open 180°.

B. Access doors installed in fire walls or partitions shall be U.L. Labeled to maintain the fire rating of the wall or partition.

C. Access panels in ceilings are allowed only in back-of-house areas. Access panels in public areas are not acceptable unless specifically shown or noted on the Drawings or approved in writing by the Engineer prior to installation.

3.20 FLAME SPREAD AND SMOKE DEVELOPED PROPERTIES OF MATERIALS

A. Materials and adhesives used throughout the mechanical and incidental electrical systems, for insulation, 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. Materials need not meet the above listed requirements where they are located entirely outside of a building and do not penetrate a wall, floor or roof, and do not in any way 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)".

3.21 EQUIPMENT FURNISHED BY OWNER

A. The Contractor shall unload, uncrate, assemble, and make final connection to 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 take full charge of such equipment from the time the items are delivered to the job. The Contractor shall be responsible for such items until they are set in place, connected, tested, adjusted, and placed into operation as if the Contractor were the original purchaser.

3.22 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. Any requirements for such are beyond the scope of this Contract and shall be done only by those persons contracted to do so.

3.23 BELT DRIVES

A. Provide guards for all belt drives not totally enclosed within equipment housings. Belt guards for fans shall be expanded metal with heavy gauge sheet metal sides. Provide an opening in the guards at the center of the driving and driven sheaves to facilitate the use of a tachometer or revolution counter to determine rotational speed.

3.24 FREEZE PROTECTION

A. During construction, the Contractor shall assure that no portion of his work is subjected to freeze damage. The Contractor shall take all steps necessary such as temporary heat, draining of systems, heat tape, antifreeze solutions or other means to prevent damage. No antifreeze solutions shall be used in potable water systems. Any resultant damages from freezing shall be the responsibility of the Contractor to repair at no additional cost to the contract.

B. Prior to start up of any air handling unit supplied with water coils, when the ambient temperature is below 40 degrees F, the Contractor shall make certain the incoming volume of outside air is not sufficient to drive the mixed air temperature below 35 degrees F.

3.25 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

3.26 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves by applying appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

G. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

H. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

I. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

J. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.

K. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.

L. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.

M. PVC Nonpressure Piping: Join according to ASTM D 2855.

N. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

O. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

P. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

Q. Plain-End Pipe and Fittings: Use butt fusion.

R. Plain-End Pipe and Socket Fittings: Use socket fusion.

S. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.27 PIPING CONNECTIONS

A. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.

B. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

C. Edit dielectric connection types in two subparagraphs below for each fluid.

D. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.

E. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.28 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install HVAC equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.29 PAINTING

A. Division 9 Sections specify paint products for various surfaces (e.g., ferrous and nonferrous metals and insulation jackets), HVAC items to be field painted, application methods, and coating systems (number of prime and finish coatings and coating thicknesses). Coordinate these requirements with Architect to ensure that appropriate painting requirements are indicated in the Division 9 Sections.

B. Painting of HVAC systems, equipment, and components is specified in Division 9 Sections "Interior Painting" and "Exterior Painting."

C. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.30 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 5 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor HVAC materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.31 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor HVAC materials and equipment.

B. Select fastener sizes that will not penetrate the indicated members if opposite side will be exposed to view or is to receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.32 GROUTING

A. Mix and install grout for HVAC equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION

SECTION 23 05 11 MECHANICAL SUBMITTALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The requirements of the General Conditions, Supplementary Conditions, and Section 23 05 00 apply to all work herein.

1.02 QUALITY ASSURANCE

A. Nine (9) copies of shop drawings or fully descriptive catalog data shall be submitted by the Contractor for all items of material and equipment furnished and installed under this Contract.

B. Before submitting shop drawings to the Architect for review, the Contractor shall examine them and satisfy himself that they are correctly representative of the material or equipment to which they pertain. The Contractor shall so note these Drawings before submitting them. The Contractor's review of the shop drawings is not intended to take the place, in any way, of the official review of the Architect, and shop drawings which have not been reviewed by the Architect shall not be used in fabricating or installing any work.

C. The review of shop drawings or catalog data by the Architect shall not relieve the Contractor from responsibility for deviations from the Plans and Specifications unless he has, in writing, specifically called attention to such deviations at the time of submission and has obtained the permission of the Architect thereon; nor shall it relieve him from responsibility for error of any kind in shop drawings. When the Contractor does call such deviations to the attention of the Architect, he shall state in his letter whether or not such deviations involve any extra cost. If no additional costs to the Contract are specifically noted, it will be assumed that no extra cost is involved for making the change.

D. Verification and assignment of dimensions, quantities, and construction means, methods, sequences or procedures, the correctness of which is set forth in the Contract Documents or submittal, shall be the sole responsibility of the Contractor.

E. Reproduction of design documents in any portion for use in a submittal is not acceptable.

F. The Engineer or Architect reserves the right to require a sample of any equipment to be submitted for approval and to retain its possession.

G. The shop drawing and product data review stamp notation requirements are defined as follows:

1. "NO EXCEPTIONS TAKEN": The reviewer did not observe any items which were not in compliance with the Contract Documents. All dimensions, details and coordination with other trades is the responsibility of the Contractor. The submittal is not required to be resubmitted and is ready for distribution to the field and shall be included in the "Record Drawings".
2. "MAKE CORRECTIONS NOTED": The reviewer indicated items observed which were not in compliance with the Contract Documents. The Contractor shall not resubmit, but shall make corrections, and provide corrected document with the "Record Drawings". All dimensions, details and coordination with the other trades is the responsibility of the Contractor.

3. "AMEND AND RESUBMIT": The reviewer indicated items observed which were not in compliance with the Contract Documents. The Contractor shall resubmit showing corrections of all noted items. Delays for resubmittal does not relieve the Contractor from meeting project schedules.
4. "REJECTED - SEE REMARKS": The submission does not comply with the contract requirements. The Contractor shall resubmit the correct drawing or piece of equipment for review. Delays for resubmittal does not relieve the Contractor from meeting project schedules.
5. "SUBMIT SPECIFIED ITEM": The submission does not comply with the contract requirements. The Contractor shall resubmit the correct drawing or piece of equipment for review. Delays for resubmittal does not relieve the Contractor from meeting project schedules.

H. If resubmittals are necessary, they shall be made as specified herein for submittals. Resubmittals shall highlight all revisions made and cover shall include the phrase "RESUBMITTAL NO. __."

PART 2 - PRODUCTS

2.01 GENERAL

A. All product samples shall be new and bear all labels which are identified by the applicable specification section and Contract Documents.

B. All submittals made on this project shall be electronic in nature and forwarded to the Engineer's Project Manager as the single point of contact.

C. All submittals will be returned to the Architect in electronic form following the review, annotations and affixing of the review stamp. Subsequent distribution of copies will be handled by him.

PART 3 - EXECUTION

3.01 SUBMITTAL DATA

A. General

1. The submittal data to be furnished for this project shall comply with the Specifications and Contract Documents in their entirety. Any submittals herein scheduled are as a minimum only and shall not be construed to limit the submittal data required within the individual Sections of these Specifications.
2. HVAC, Plumbing and Fire Protection submittal data shall be bound into separate HVAC, Plumbing and Fire Protection electronic volumes, with each volume containing one (1) copy of <u>all</u> specified equipment shop drawings. The submission shall be clearly noted with an identification tab for each 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 highlighting the paragraph on the first page concerning the item. If necessary, information shall be submitted with the original submittal data and will address and resolve all comments thereon. All submittals shall include identification tabs and sufficient space for all submittal data. FAILURE to provide complete bound and identified submittals will result in the automatic rejection of the submittal data with no exception.

3. Shop drawings will be returned unchecked unless the following information is included: Reference to all pertinent data in the Specifications or on the Drawings, such as sound power levels of motor driven equipment where called for in the Specifications, electrical characteristics and horse power, capacities, construction material of equipment, UL labels and ASME stamps where required, accessories specified, manufacturer, make and model number, weights where specified, starters where required by Division 23, size and characteristics of the equipment, name of the project and a space large enough to accept an approval stamp. The data submitted shall reflect the actual equipment performance under the specified conditions and shall not be a copy of the scheduled data on the Drawings. All submitted equipment must be identified on Shop Drawings with same "Mark Numbers" as identified on Drawings or in Specifications. All pertinent data such as accessories shall also be marked. Any deviation from any part of the Contract Documents shall be clearly and completely highlighted.
4. The packaged submittals are to be submitted for review within thirty (30) days after the Contract is awarded. No submittal will be checked until all required submittals have been submitted in one complete package. Only Automatic Temperature Controls, ductwork and piping fabrication drawings may be submitted after the complete submittal is reviewed and accepted by the Architect/ Engineer.
5. The Contractor shall submit with the package, an identified submittal data a letter signed by the Contractor's Project Manager or higher level officer of the firm stating that all electrical characteristics of the mechanical equipment to be supplied have been fully coordinated with the electrical contractor. No submittal will be checked until this letter is submitted. Any changes to the electrical requirements from the Contract Documents resulting from alternate equipment being submitted shall be borne by the Contractor and performed <u>without</u> any additions to the Contract Sum.
6. Shop Drawings shall be submitted for each of the following:
   a. HVAC Submittals:
      1) Air Handling Units (AHU) with fan, filter, sound and coil data
      2) Automatic Temperature Controls (including control diagrams, cuts of instrumentation, description of operation)
      3) Heating and Cooling Coils
      4) Air Cooled Condensing Units
      5) Electric Heating Equipment
      6) Ductwork Layout, Accessories and Details (min. 1/4"=1'0"scale)
      7) Fans With Sound Data and Performance Curves
      8) Fan Powered Induction Units (PIU) With Fan and sound data
      9) Test, Adjusting and Balancing Reports and Forms
      10) Variable Air Volume Units (VAV)

      Submit all attachment and fastening methods for piping and equipment to the Structural Engineer for approval.
   b. Plumbing Submittals:
      1) Air Compressor, Dryer, Filters and Accessories
      2) Backflow Preventors
      3) Double Wall Piping/Containment Systems
      4) Grease Interceptors
      5) Leak Detection and Monitoring Systems
      6) Plumbing Fixtures and Trim
      7) Pumps with Performance Curves
      8) Sewage Lift and Waste Water Pump Stations
      9) Pressure Booster Pump System
      10) Water Heaters

      Submit all attachment and fastening methods for piping and equipment to the Structural Engineer for approval.

c. Fire Protection Submittals:
   1) Backflow Preventor (Fire System)
   2) Fire Protection Shop Drawings with complete Hydraulic Calculations
   3) Fire Pump, Jockey Pump and Controllers
   4) Siamese Connection
   5) Sprinkler Heads and Escutcheons
   6) Test Header

   Submit all attachment and fastening methods for piping and equipment to the Structural Engineer for approval.

7. The Contractor shall electronically submit a preliminary sprinkler head layout for review and comment prior to design and layout of piping. The submittal shall consist of an electronic PDF (Portable Document Format) file with dimensioned sprinkler head layout for all areas with ceilings for approval prior to design and layout of piping. All lights, diffusers, detectors, speakers, soffits and other ceiling components shall be indicated on all drawings.

   Following approval of the sprinkler head layout submittal, the Contractor shall prepare one eighth (1/8") scale electronic PDF (Portable Document Format) file shop drawings for fire protection systems indicating pipe and fittings, cutting lengths, hydraulic calculations and node points, pipe sizes, locations, elevations, hangers, wall and floor penetrations and connections as well as all ceiling components noted previously. Include all information as required by NFPA 13, Item 22.1.3.

   Upon completion of fire protection work, submit to Owners' Underwriter/Insurance Agency and to the local authority having jurisdiction a certificate signed by an Officer of the Company which indicates that work has been tested in accordance with NFPA 13, NFPA 14, and NFPA 20 and also that the system is operational, complete, and has no defects. At project closeout, submit record drawings of installed fire protection piping and products; in accordance with requirements of Section 15010. Submit maintenance data and parts list for fire protection materials and products. Include this data, product data, shop drawings, approved installation drawings, approved calculations, certificate of installation, and record drawings in maintenance manual; in accordance with requirements of Section 15010.

8. The Contractor shall electronically submit Composite Coordination Drawings of Above Ceiling areas of All Public and Back Of House Areas. The submittal shall consist of an electronic PDF (Portable Document Format) file with dimensioned layout (at a minimum ¼" = 1'- 0") for all areas with ceilings for approval prior to fabrication and installation. All Lights, Diffusers, Smoke Detectors, Speakers, Architectural Elements, Soffits, Pipe, Duct, Equipment, Conduit, and other trade components shall be indicated on all drawings. Each drawing submitted shall be signed and dated by the General and Trade Subcontractors indicating that they have assured themselves the installation can proceed without interference.

9. The Contractor shall submit two (2) copies of a letter, signed by an officer of the company that the items listed below meet or exceed criteria of the Plans and Specifications. The letter is to include a list of each item to be used on the project along with the manufacturer.
   a. HVAC Submittals:
      1) Flexible Duct
      2) Ductwork Access Doors and Panels
      3) Flexible Pipe Connectors
      4) Filters
      5) Vibration Isolators
      6) Ductwork Accessories
      7) Grilles, Registers and Diffusers

8) Piping Identification Markers
9) Valves
10) Thermal Insulation
11) Dampers
12) Louvers
13) Roof Curbs
14) Pipe Hangers and Supports

b. Plumbing Submittals:
1) Access Doors
2) Cleanouts
3) Drains and Drainage Accessories
4) Electric Heat Trace Cable
5) Fire Stopping Sealant
6) Fixture Carriers
7) Flexible Pipe Connectors
8) Flow Measuring Devices
9) Flow Switches
10) Gauge Cocks and Snubbers
11) Hose Bibbs
12) Level Gauges
13) Pipe and Fittings
14) Pipe Guides
15) Pipe Hangers and Supports
16) Piping Expansion Devices
17) Piping Identification Markers
18) Pressure and Temperature Gauges
19) Shock Absorbers
20) Steam Piping Accessories
21) Strainers
22) Test Wells
23) Thermal Insulation
24) Thermometers
25) Trap Primers
26) Vacuum Breakers
27) Valve Tags
28) Valves
29) Vibration Isolators
30) Wall Hydrants

c. Fire Protection Submittals:
1) Fire Hose Cabinets
2) Fire Valve Cabinets
3) Fire Stopping Sealant
4) Flow Switches
5) Pipe and Fittings
6) Pipe Hangers and Supports
7) Piping Identification Markers
8) Roof Manifold
9) Tamper Switches
10) Valve Tags

3.02 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Description

1. Complete bound operating and maintenance instructions shall be provided to the Owner. One electronic PDF (Portable Document Format) file shall be provided. Operating instructions shall be provided for each system, and shall include a brief system description, a simple schematic and a sequence of operation. Operating and maintenance instructions and all warranties shall be included for each piece of equipment. Manufacturers' Standard literature is acceptable for each piece of equipment. However, the Contractor shall prepare a SYSTEM O&M manual including overall system descriptions, operating and energy conservation techniques.
2. A system wiring and control diagram shall be included in the operating and maintenance instructions.

3.03 OTHER SUBMITTALS

A. Submit or provide the following at project closeout prior to occupancy of the project by the Owner:

1. Electronic PDF (Portable Document Format) file "As-built" record drawings for ductwork, HVAC piping, plumbing and fire protection systems.
2. Provide a combination pressure and temperature test plug kit to Owner.
3. Provide a spare seal and coupling for each pump labeled for their service and associated pump number.
4. Submit two (2) copies of welder’s certificate.
5. Submit two (2) copies of the vibration isolation manufacturer's certified letter of approval.
6. Submit two (2) copies of the certified water analysis chemical treatment performance tests to the Owner.
7. Provide a twelve (12) month supply of chemicals, chemical treatment procedures and schedule of visits to the Owner.
8. Submit two (2) copies of the certification of the disinfection of domestic water service.
9. Submit two (2) copies of certification that all pumps have been aligned and provide data to show that pumps were re-aligned after each was grouted. Certification shall come from manufacturer's representative.
10. Manufacturer's representative shall certify that HVAC equipment is installed in accordance with their recommendations.

END OF SECTION

SECTION 23 05 23 VALVES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene copolymer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

D. NRS: Nonrising stem.

E. OS&Y: Outside screw and yoke.

F. RS: Rising stem.

G. SWP: Steam working pressure.

1.03 SUBMITTALS

A. Product Data: For each type of valve indicated.

1.04 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
2. ASME B31.1 for power piping valves.
3. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set angle, gate, and globe valves closed to prevent rattling.
4. Set ball and plug valves open to minimize exposure of functional surfaces.

5. Set butterfly valves closed or slightly open.
6. Block check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Valve Actuator Types:

1. Gear Actuator: For quarter-turn valves NPS 8 and larger.
2. Handwheel: For valves other than quarter-turn types.
3. Handlever: For quarter-turn valves NPS 6 and smaller except plug valves.
4. Wrench: For plug valves with square heads. Furnish Owner with 1 wrench for every 10 plug valves, for each size square plug-valve head.
5. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator; of size and with chain for mounting height, as indicated in the "Valve Installation" Article.

E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:

1. Gate Valves: With rising stem.
2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
3. Butterfly Valves: With extended neck.

F. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Grooved: With grooves according to AWWA C606.
3. Solder Joint: With sockets according to ASME B16.18.
4. Threaded: With threads according to ASME B1.20.1.

G. Valve Bypass and Drain Connections: MSS SP-45.

2.02 BRASS BALL VALVES

A. Two-Piece, Full-Port, Brass Ball Valves with Brass Trim:

1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Crane Valves, Crane Co.; Crane Valve Group.
   b. Jenkins Valves, Crane Co.; Crane Valve Group.
   c. Flow-Tek, Inc.; a subsidiary of Bray International, Inc.
   d. Hammond Valve.
   e. Jamesbury; a subsidiary of Metso Automation.
   f. Kitz Corporation.
   g. Milwaukee Valve Company.
2. Description:
   a. Standard: MSS SP-110.
   b. SWP Rating: 150 psig.
   c. CWP Rating: 600 psig.
   d. Body Design: Two piece.
   e. Body Material: Forged brass.
   f. Ends: Threaded.
   g. Seats: PTFE or TFE.
   h. Stem: Brass.
   i. Ball: Chrome-plated brass.
   j. Port: Full.

B. Two-Piece, Regular-Port, Brass Ball Valves with Brass Trim:

1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Hammond Valve.
   b. Jamesbury; a subsidiary of Metso Automation.
   c. Legend Valve.
   d. Marwin Valve; a division of Richards Industries.
   e. Milwaukee Valve Company.

2. Description:
   a. Standard: MSS SP-110.
   b. SWP Rating: 150 psig.
   c. CWP Rating: 600 psig.
   d. Body Design: Two piece.
   e. Body Material: Forged brass.
   f. Ends: Threaded.
   g. Seats: PTFE or TFE.
   h. Stem: Brass.
   i. Ball: Chrome-plated brass.
   j. Port: Regular.

C. Three-Piece, Full-Port, Brass Ball Valves with Brass Trim:

1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Jomar International, LTD.
   b. Kitz Corporation.
   c. Red-White Valve Corporation.
   d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
   a. Standard: MSS SP-110.
   b. SWP Rating: 150 psig.
   c. CWP Rating: 600 psig.
   d. Body Design: Three piece.
   e. Body Material: Forged brass.
   f. Ends: Threaded.
   g. Seats: PTFE or TFE.
   h. Stem: Brass.
   i. Ball: Chrome-plated brass.
   j. Port: Full.

2.03 BRONZE BALL VALVES

A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:

1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. American Valve, Inc.
   b. Conbraco Industries, Inc.; Apollo Valves.
   c. Crane Valves, Crane Co.; Crane Valve Group.
   d. Hammond Valve.
   e. Lance Valves; a division of Advanced Thermal Systems, Inc.
   f. Legend Valve.
   g. Milwaukee Valve Company.
   h. NIBCO INC.
   i. Red-White Valve Corporation.
   j. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
   a. Standard: MSS SP-110.
   b. SWP Rating: 150 psig
   c. CWP Rating: 600 psig.
   d. Body Design: Two piece.
   e. Body Material: Bronze.
   f. Ends: Threaded.
   g. Seats: PTFE or TFE.
   h. Stem: Bronze.
   i. Ball: Chrome-plated brass.
   j. Port: Full.

B. Three-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:

1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Conbraco Industries, Inc.; Apollo Valves.
   b. DynaQuip Controls.
   c. Hammond Valve.
   d. Milwaukee Valve Company.
   e. NIBCO INC.
   f. Red-White Valve Corporation.
2. Description:
   a. Standard: MSS SP-110.
   b. SWP Rating: 150 psig.
   c. CWP Rating: 600 psig.
   d. Body Design: Three piece.
   e. Body Material: Bronze.
   f. Ends: Threaded.
   g. Seats: PTFE or TFE.
   h. Stem: Bronze.
   i. Ball: Chrome-plated brass.
   j. Port: Full.

2.04 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Bronze Disc:

1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. American Valve, Inc.
   b. Crane Co.; Crane Valve Group; Crane Valves.
   c. Crane Co.; Crane Valve Group; Jenkins Valves.
   d. Crane Co.; Crane Valve Group; Stockham Division.
   e. Hammond Valve.
   f. Kitz Corporation.
   g. Milwaukee Valve Company.
   h. NIBCO INC.
   i. Powell Valves.
   j. Red-White Valve Corporation.
   k. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
   l. Zy-Tech Global Industries, Inc.
2. Description:
   a. Standard: MSS SP-80, Type 3.
   b. CWP Rating: 200 psig.
   c. Body Design: Horizontal flow.
   d. Body Material: ASTM B 62, bronze.
   e. Ends: Threaded.
   f. Disc: Bronze.

B. Class 125, Bronze Swing Check Valves with Nonmetallic Disc:

1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Crane Co.; Crane Valve Group; Crane Valves.
   b. Crane Co.; Crane Valve Group; Jenkins Valves.
   c. Crane Co.; Crane Valve Group; Stockham Division.
   d. Hammond Valve.
   e. Kitz Corporation.
   f. Milwaukee Valve Company.
   g. NIBCO INC.
   h. Red-White Valve Corporation.
   i. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
   a. Standard: MSS SP-80, Type 4.
   b. CWP Rating: 200 psig.
   c. Body Design: Horizontal flow.
   d. Body Material: ASTM B 62, bronze.
   e. Ends: Threaded.
   f. Disc: PTFE or TFE.

C. Class 150, Bronze Swing Check Valves with Bronze Disc:

1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. American Valve, Inc.
   b. Crane Co.; Crane Valve Group; Crane Valves.
   c. Crane Co.; Crane Valve Group; Jenkins Valves.
   d. Crane Co.; Crane Valve Group; Stockham Division.
   e. Kitz Corporation.
   f. Milwaukee Valve Company.
   g. NIBCO INC.
   h. Red-White Valve Corporation.
   i. Zy-Tech Global Industries, Inc.
2. Description:
   a. Standard: MSS SP-80, Type 3.
   b. CWP Rating: 300 psig.
   c. Body Design: Horizontal flow.
   d. Body Material: ASTM B 62, bronze.
   e. Ends: Threaded.
   f. Disc: Bronze.

2.05 IRON SWING CHECK VALVES

A. Class 125, Iron Swing Check Valves with Metal Seats:

1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Crane Co.; Crane Valve Group; Crane Valves.
   b. Crane Co.; Crane Valve Group; Jenkins Valves.
   c. Crane Co.; Crane Valve Group; Stockham Division.

d. Hammond Valve.
e. Kitz Corporation.
f. Legend Valve.
g. Milwaukee Valve Company.
h. NIBCO INC.
i. Powell Valves.
j. Red-White Valve Corporation.
k. Sure Flow Equipment Inc.
l. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:
a. Standard: MSS SP-71, Type I.
b. NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.
c. NPS 14 to NPS 24, CWP Rating: 150 psig.
d. Body Design: Clear or full waterway.
e. Body Material: ASTM A 126, gray iron with bolted bonnet.
f. Ends: Flanged.
g. Trim: Bronze.
h. Gasket: Asbestos free.

2.06 BRONZE GATE VALVES

A. Class 125, NRS Bronze Gate Valves:

1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. American Valve, Inc.
b. Crane Co.; Crane Valve Group; Crane Valves.
c. Crane Co.; Crane Valve Group; Jenkins Valves.
d. Crane Co.; Crane Valve Group; Stockham Division.
e. Hammond Valve.
f. Kitz Corporation.
g. Milwaukee Valve Company.
h. NIBCO INC.
i. Powell Valves.
j. Red-White Valve Corporation.
k. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:
a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig.
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded or solder joint.
e. Stem: Bronze.
f. Disc: Solid wedge; bronze.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron.

B. Class 125, RS Bronze Gate Valves:

1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. American Valve, Inc.

b. Crane Co.; Crane Valve Group; Crane Valves.
c. Crane Co.; Crane Valve Group; Jenkins Valves.
d. Crane Co.; Crane Valve Group; Stockham Division.
e. Hammond Valve.
f. Kitz Corporation.
g. Milwaukee Valve Company.
h. NIBCO INC.
i. Powell Valves.
j. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:
a. Standard: MSS SP-80, Type 2.
b. CWP Rating: 200 psig.
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded or solder joint.
e. Stem: Bronze.
f. Disc: Solid wedge; bronze.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron.

2.07 IRON GATE VALVES

A. Class 125, NRS, Iron Gate Valves:

1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Division.
d. Flo Fab Inc.
e. Hammond Valve.
f. Kitz Corporation.
g. Legend Valve.
h. Milwaukee Valve Company.
i. NIBCO INC.
j. Powell Valves.
k. Red-White Valve Corporation.
l. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:
a. Standard: MSS SP-70, Type I.
b. NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.
c. NPS 14 to NPS 24, CWP Rating: 150 psig).
d. Body Material: ASTM A 126, gray iron with bolted bonnet.
e. Ends: Flanged.
f. Trim: Bronze.
g. Disc: Solid wedge.
h. Packing and Gasket: Asbestos free.

B. Class 125, OS&Y, Iron Gate Valves:

1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Crane Co.; Crane Valve Group; Crane Valves.
   b. Crane Co.; Crane Valve Group; Jenkins Valves.
   c. Crane Co.; Crane Valve Group; Stockham Division.
   d. Flo Fab Inc.
   e. Hammond Valve.
   f. Kitz Corporation.
   g. Legend Valve.
   h. Milwaukee Valve Company.
   i. NIBCO INC.
   j. Powell Valves.
   k. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
   a. Standard: MSS SP-70, Type I.
   b. NPS 2-1/2 to NPS 12N 65 to DN 300), CWP Rating: 200 psig.
   c. NPS 14 to NPS 24, CWP Rating: 150 psig.
   d. Body Material: ASTM A 126, gray iron with bolted bonnet.
   e. Ends: Flanged.
   f. Trim: Bronze.
   g. Disc: Solid wedge.
   h. Packing and Gasket: Asbestos free.

2.08 BRONZE GLOBE VALVES

A. Class 125, Bronze Globe Valves with Bronze Disc:

1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Crane Co.; Crane Valve Group; Crane Valves.
   b. Crane Co.; Crane Valve Group; Stockham Division.
   c. Hammond Valve.
   d. Kitz Corporation.
   e. Milwaukee Valve Company.
   f. NIBCO INC.
   g. Powell Valves.
   h. Red-White Valve Corporation.
   i. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
   a. Standard: MSS SP-80, Type 1.
   b. CWP Rating: 200 psig.
   c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
   d. Ends: Threaded or solder joint.
   e. Stem and Disc: Bronze.
   f. Packing: Asbestos free.
   g. Handwheel: Malleable iron

B. Class 150, Bronze Globe Valves with Nonmetallic Disc:

1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Crane Co.; Crane Valve Group; Crane Valves.
   b. Hammond Valve.
   c. Kitz Corporation.
   d. Milwaukee Valve Company.
   e. NIBCO INC.
   f. Powell Valves.
   g. Red-White Valve Corporation.
   h. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
   a. Standard: MSS SP-80, Type 2.
   b. CWP Rating: 300 psig.
   c. Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
   d. Ends: Threaded.
   e. Stem: Bronze.
   f. Disc: PTFE or TFE.
   g. Packing: Asbestos free.
   h. Handwheel: Malleable iron

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.02 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install chainwheels on operators for all valves more than 84 inches above floor. Extend chains to 72 inches above finished floor.

F. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level.
2. Center-Guided and Plate-Type Check Valves: In horizontal or vertical position, between flanges.
3. Lift Check Valves: With stem upright and plumb.

3.03 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.04 GENERAL REQUIREMENTS FOR VALVE APPLICATION

System	Gate	Globe	Butterfly	Ball	Swing Check	Silent Check	Plug	Lift Check
Domestic Hot & Cold Water	*	*	*	*	*	*	*	
Sprinkler & Fire Protection System	*		*	*	*			

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball, butterfly (not hot water service), gate, or plug valves.
2. Butterfly Valve Dead-End Service: Single-flange (lug) type.
3. Throttling Service except Steam: Globe, ball, butterfly valves.
4. Throttling Service, Steam: Globe or angle valves.
5. Pump Discharge Check Valves:
   a. NPS 2 and Smaller: Bronze swing check valves with nonmetallic disc.
   b. NPS 2-1/2 and Larger: Iron swing check valves with lever and weight or with spring or iron, center-guided, resilient-seat check valves.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

C. Select valves, except wafer types, with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
3. For Copper Tubing, NPS 6 and Larger: Flanged ends.
4. For Steel Piping, NPS 2 and Smaller: Threaded ends.
5. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.

6. For Steel Piping, NPS 6 and Larger: Flanged ends.
7. For Grooved-End Steel Piping except Steam and Steam Condensate Piping: Valve ends may be grooved.

3.09 DOMESTIC HOT AND COLD WATER SERVICE:

A. Gate Valves – 2 inches and Smaller:

1. Valves 2 inches and smaller shall be Class 125, 200 psi WOG and shall have body and threaded bonnet of ASTM B-62 cast bronze composition, solid wedge disc, copper-silicon alloy stem, brass packing gland, solder ends, Teflon-impregnated packing, and malleable iron handwheel.

RISING STEM	NON-RISING STEM
Stockham B-108	Stockham B-104
Powell 1821	Powell 1822
Kitz 44	Kitz 41
Milwaukee 149	Milwaukee 115

2. Class 150, 300 psi WOG valves meeting the above specifications, with union bonnets shall be used where pressure requires.

RISING STEM
Stockham B-124
Powell N/A
Kitz 45
Milwaukee 1169

B. Ball Valves – 2 inches and Smaller:

1. Valves 2 inches and smaller shall be 600 psi CWP, have cast brass body, replaceable reinforced Teflon seat, conventional port, blowout proof stem, chrome-plated brass ball, solder ends with extended solder cups. Provide stem extension to insure handle clears insulation where provided on insulated pipe.

Stockham S-216-BR-R-S
Apollo 70-200
Kitz 57
Milwaukee "Butterball" BB2-350

C. Gate Valves – 2-1/2 inches and Larger:

1. Valves 2-1/2 inches and larger shall be Class 125, 200 psi WOG, iron body, bronze mounted solid wedge disc, with body and bolted bonnet conforming to ASTM A-126 Class B cast iron, flanged ends, with Teflon-impregnated packing and two-piece packing gland assembly.

RISING STEM	NON-RISING STEM
Stockham G-623	Stockham G-612
Powell 1793	Powell 1787
Kitz 72	Kitz 75
Milwaukee F-2885-M	Milwaukee F-2882-M

D. Butterfly Valves – 2-1/2 inches and Larger:

1. Valves 2-1/2 inches and larger shall be lug type body, 200 psi CWP, conforming to ASTM A-395 ductile iron, replaceable EPDM sleeve, with ductile nickel-plated disc, 410 stainless steel stem, and EPDM O-ring stem seals. Sizes 2 inch – 6 inch shall be lever operated and 8 inch – 24 inch shall have gear operations.

Lever	Gear
Stockham LD-712-DS3-B	Stockham LD-722-DS3-B
Centerline Series LT	Centerline Series LT
Milwaukee ML132E	
Milwaukee ML132E	

E. Globe Valves – 2 inches and Smaller:

1. Valves 2 inches and smaller shall be of Class 125, 200 psi WOG, body and union bonnet of ASTM B-62 cast bronze composition, solder ends, composition disc, copper silicon alloy stem, brass packing gland, Teflon-impregnated packing and malleable iron handwheel.

Stockham B-14-T
Kitz 10
Powell 1823

2. Class 150, 300 psi WOG valves meeting the above specifications shall be used where pressure requires.

Stockham B-24T
Powell 1823
Kitz 10
Milwaukee 1590T

F. Globe Valves – 2-1/2 inches and Larger:

1. Valves 2-1/2 inches and larger shall be of Class 125, 200 psi WOG, iron body, bronze mounted with body and bonnet conforming to ASTM A-126 Class B cast iron, flanged end, with Teflon-impregnated packing and two-piece packing gland assembly.

Stockham G-512
Powell 241
Kitz 76
Milwaukee F2981-M

G. Check Valves – 2 inches and Smaller:

1. Valves 2 inches and smaller shall be of Class 125, 200 psi WOG, solder ends, with bodies and caps conforming to ASTM B-62 cast bronze composition, swing type bronze disc.

Stockham B-309
Powell 1825
Kitz 23
Milwaukee 1509

H. Check Valves – 2-1/2 inches and Larger:

1. Valves 2-1/2 inches and larger shall be Class 125, 200 psi WOG, iron body, bronze mounted, with body and bolted cap conforming to ASTM A-126 Class B cast iron, flanged ends, swing type bronze disc.

Stockham G-931
Powell 559
Kitz 78
Milwaukee F2974-M

I. Lubricated Plug Valves – 2 inches and Smaller:

1. Valves 2 inches and smaller shall be of Class 175 semi-steel body, full port, tapered teflon coated plug, lubricated under pressure, threaded or flanged ends conforming to ASTM A-126, Class B with adjustable memory stop, wrench operated.

Powell 2200, 2201
Nordstrom 115
Walworth 1757-F

2. Class 200 valves meeting the above specifications shall be used where pressures require.

Powell 2202
Nordstrom 114
Walworth 1754-F

J. Lubricated Plug Valves 2-1/2 inches and Larger:

1. Valves 2-1/2 inches and larger shall be of Class 175, semi-steel body, full port, tapered teflon coated plug, lubricated under pressure, flanged ends, conforming to ASTM A-126. Class B, with adjustable memory stop, wrench operated.

Powell 2201
Nordstrom 143
Walworth 1760-F

2. Class 200 valves meeting the above specification may be used where pressure requires.

Powell 2203
Nordstrom 115
Walworth 1757-F

K. Calibrated Balancing Valve:

1. Valves shall be of Class 125 at 250 degrees F, bronze body, leak tight ball construction. Valves to have differential pressure read out parts with check valves across the valve seat area. Valves to have memory stop feature to allow valve to be closed for service and reopened to set point without disturbing balance position. Valve shall be capable of metering to a minimum of 0.5 GPM. Valve shall have an attached calibrated nameplate to indicate degree of closure.

   Bell and Gossett CB
   TACO CS
   Armstrong CBV

L. Temperature and Pressure Relief Valves:

1. Valves shall be A.G.A. temperature rated and ASME pressure rated and nameplate, and shall conform to ANSI Z21, 22. The operating limit of the relief valve shall not exceed 200 degrees F. Valve shall be bronze body, non-stick or freeze seat to disc alignment, fully automatic, self closing.

   Watts Series 40, 1450, 240 and 340
   A.W. Cash FV, Series
   Nibco

2.

Valves Size	Equipment Max. BTU/HR input
½ inch	15,000
¾ inch	200,000
1 inch	2,000,000
1½ inch	3,000,000

M. Pressure Reducing Valves – 2 inches and Smaller:

1. Valves shall be bronze body, screwed ends, renewable seat and disc, high temperature diaphragm for hot or cold water service, Y type strainer, water tight cage assembly, adjustable outlet pressure.

   Watts Regulators 223-SB
   Wilkins Regulator 500-YS-BR
   Mueller H-93000 Series
   A.W. Cash E-55 Series

N. Pressure Reducing Valves - 2-1/2 inches and Larger:

1. Valves shall be iron body, flanged ends, renewable seat and disc, high temperature diaphragm for hot or cold water service, Y type strainer, water tight cage assemble, pilot operated.

   A-W Cash Type B-70
   OCV Series 127
   Clayton 91-A or 91-G

O. Backflow Preventers:

1. Provide reduced pressure principle backflow preventers consisting of assembly including shutoff valves, strainer on inlet. Backflow preventers shall include test cocks, air-gap drain funnel, pressure differential relief valve located between two (2) positive seating check valves backflow preventer shall conform to ASSE Standard 1013.

Watts Regulator 909
Hersey Products FRP-11
Wilkins 575-RP
Clayton RP-1

Thermostatic Water Temperature Regulators:

2. Valves shall be of Class 125, bronze body for size 2 inches and smaller, iron body for size 2-1/2 inches and larger, bronze fitted, union screw or flanged ends, spring loaded packing, single seat, self operating, pilot actuated, 3-way mixing valve.

Powers 11-WM
ITT Lawler Type S
Jordan Valve MK-89-MK

P. Miscellaneous Valves:

1. Hose Bibbs: Hose bibbs shall be threaded end, bronze body, renewable composition disc, integral vacuum breaker, 1/2 NPT inlet, ¾ inch hose outlet.

Chicago Faucet 5-T
Royal Brass 5105
Watts Regulator SC-6

2. Hose bibbs in mechanical rooms and building service areas shall be rough bronze body, lock shield, integral vacuum breaker, wall flange and threaded inlet, angle sillcock.

Nibco 63-VB
Watts Regulator SC-4
Woodford 21-P

3. Hose bibbs in finished areas shall be chrome plated bronze body, lock shield, integral vacuum breaker, wall flange, loose key.

Chicago Faucet 387
Woodford 24-P
Hammond

4. Freezeless hose bibbs at the building exterior shall be rough bronze body with integral vacuum breaker, wall flange and threaded inlet.

Nibco 80-VB
Hammond 58
Woodford 17

Q. Drain Valves:

1. Drain valves shall be threaded end, bronze body renewable composition disc, wheel handle, 3/4 NPT inlet, ¾ inch hose outlet.

Nibco 73
Watts Regulator BD-1
Woodford 24

R. Hydrants:

1. Recessed, non-freeze, cast-bronze box, chrome plated face, loose tee handle key, bronze casting, length to suite wall thickness, vacuum breaker, hinged locking cover, ¾ inch inlet, hose outlet.

Josam 71000
Wade W-8625
Zurn, Hydromechanics Div., 1300

2. Floor level and yard non-freeze hydrants, bronze hydrant, rough bronze box tee handle key, bronze casting length to suite depth of bury, drain hole, vacuum breaker, hinged locking cover, ¾ inch inlet, hose outlet. Depth of bury shall be not less than 2 feet.

Josam 6-71600
Wade W-8609
Zurn 1360

3. Hot and cold wall box hydrants shall be ¾ inch non-freeze type with bronze locking cover, hot and cold inlets, vacuum breaker and loose key. The box shall be deep enough to accommodate the vacuum breaker.

Josam 71650
Wade W-8606
Zurn 1355

3.10 SPRINKLER AND FIRE PROTECTION SERVICE:

A. Gate Valves – 2 inches and Smaller:

1. Valves 2 inches and smaller shall be of Class 175, with body and bonnet conforming to ASTM B-62 cast bronze composition, threaded ends, OS&Y, solid disc, and listed by Underwriters Laboratories, Inc.

Stockham B-133
Kennedy 66
United 126-S

B. Gate Valves – 2-1/2 inches and Larger:

1. Valves 2-1/2 inches and larger shall be rated 175 psi WWP, iron body, bronze mounted, with body and bonnet conforming to ASTM A-126 Class B cast iron, OS&Y, flanged or threaded end, and listed by Underwriters Laboratories, Inc.

Threaded	Flanged
Stockham G-633	Stockham G-634
Mueller A-2073-8	Mueller A-2073-6
Kennedy 67	Kennedy 68

C. Ball Valves – 2 inches and Smaller:

1. Valves 2 inches and smaller shall be constructed of commercial brass rod, with Teflon seats, blowout proof stem, and listed by Underwriters Laboratories, Inc. for fire protection service.

Stockham US-124-BR-RT
Milwaukee Butterball – UL
Nibco

D. Gate Valves for Indicator Post – 4 inches and Larger:

1. Valves for Underground Bury shall be of Class 175, with body and bonnet conforming to ASTM A-126 Class B cast iron, bronze mounted, non-rising stem, flanged ends, with mounting plate for indicator post and listed by Underwriters Laboratories, Inc.

Stockham G-623-0
Nibco F-609
Kennedy 704-X
Mueller A-2052-6

2. When required, a vertical indicator post may be used on underground valves. Posts must provide a means of knowing if valve is open or shut. Indicator posts must be listed by Underwriters Laboratories, Inc.

Wall Indicator	Post Indicator
Stockham G-950	Stockham G-951
Kennedy 541-13	Kennedy 541-20-2
Mueller A-20810	Mueller A-20800

E. Butterfly Valve – 4 inch Through 12 inch:

1. In lieu of gate valves, butterfly valves, may be substituted for gate valves, where appropriate. Valves shall be rated for 175 PSIG working pressures, as listed by Underwriters Laboratories, Inc.

2. Valves furnished may have ductile iron (nickel-plated) discs or aluminum bronze discs, depending upon the local water conditions. In addition, either wafer or lug style bodies may be specified, depending upon the system needs. Sleeves shall be EPDM.

3. Ductile Iron Discs

Wafer	Lug
Stockham LG-52U-DS3E	Stockham LG-72U-DS3-E
Kennedy NE-H	Kennedy NE-H
Kitz	Kitz

4. Aluminum Bronze Discs

Wafer	Lug
Stockham LG-520-BS3-E	Stockham LG-72U-BS3-E
Kennedy 911-UL-WE	Kennedy 911-UL-LE
Kitz	Kitz

5. Monitor or tamper switches are specified as required.

6. Butterfly valves may be specified for underground service. Post indicators must be specified with proper post length.

F. Gate Valves High Rise Service 2-1/2 inch – 12 inch:

1. Valves 2-1/2 inch – 10 inch shall be rated 300 psi WWP, 12 inch shall be rated 250 psi WWP, iron body, bronze mounted, with body and bonnet conforming to ASTM-A-126 Class B Cast Iron, OS&Y flanged end and listed by the Underwriters Laboratories, Inc.

Stockham F-670
Kennedy 3068
Crane

G. Check Valves – 2-1/2 inch and Larger:

1. Valves 2-1/2 inch and larger shall be 175 psi WWP, bolted cap, with body and cap conforming to ASTM, A-126 Class B cast iron, flanged end, with composition swing type disc and listed by Underwriters Laboratories, Inc.

Stockham G-940
Kennedy 126-A
Crane

3.17 GENERAL

A. Automatic air vents shall be installed with gate valves.

B. Provide gate, globe and check valves throughout the piping systems where shown and where necessary to properly regulate and control the systems. Valves shall be the full size of the lines and shall be designed for low pressure drop.

C. Adjust pressure reducing valve serving compression tanks to maintain between 5 and 10 psig at the highest point in the system.

END OF SECTION

SECTION 23 05 29 HANGERS AND SUPPORTS FOR PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following hangers and supports for HVAC, plumbing and fire protection piping and equipment:

1. Steel pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal-hanger shield inserts.
5. Fastener systems.
6. Pipe stands.
7. Equipment supports.

B. Related Sections include but are limited to the following:

1. Division 23 0548 Section "Vibration Isolation" for vibration isolation devices.
2. Division 22 116 Section "Domestic Water Piping" for pipe hangers for domestic water piping.
3. Division 22 1316 Section "Sanitary Waste and Vent Piping" for pipe hangers for sanitary piping.
4. Division 23 2113 Section "Hydronic Piping and Accessories" for pipe hangers for hydronic piping.
5. Division 21 1313 Section "Fire Protection" for pipe hangers for fire protection piping.
6. Division 23 3113 Section “Ductwork and Accessories” for duct hangers and supports.

1.03 DEFINITIONS

A. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry Inc.

B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.04 PERFORMANCE REQUIREMENTS

A. All piping and equipment shall be supported square with, perpendicular to and/or parallel with building structural and architectural elements.

B. Furnish hangers to support the required loads. Where necessary, supports shall be designed to permit movement due to expansion and contraction. Where Drawings show details of supports and anchors, conform to details shown. Where details are not shown, conform to general requirements specified herein.

C. Install lateral bracing with pipe hangers and supports to prevent swaying in all piping systems.

D. Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

E. Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.

F. Support design for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water are covered under this section.

G. Equipment support design capable of supporting combined operating weight of supported equipment and connected systems and components are covered under this section.

H. Seismic restraint hangers and supports for piping and equipment with the requirements for obtaining approval from authorities having jurisdiction are covered under this section.

I. Unrestrained “C” clamps shall not be used to support piping systems covered by this section from the structure above.

J. Do not pierce any waterproofing installation or insulation vapor barrier with supports or support bolts.

K. All ferrous metal hangers, supports and rods shall be cadmium plated or galvanized. Field painting of hangers, supports or rods is unacceptable.

1.05 SUBMITTALS

A. Product Data for the following is required:

1. Steel pipe hangers and supports.
2. Thermal hanger shield inserts.
3. Powder actuated fastener systems.(Structural engineer approval required)
4. Pipe positioning systems.

B. Shop Drawings shall be signed and sealed by a qualified professional engineer. They shall show the fabrication and installation details and include calculations for the following:

1. Trapeze pipe hangers including Product Data for components.
2. Metal framing systems including Product Data for components.
3. Pipe stands including Product Data for components.
4. Equipment supports.

C. Welding certificates for proposed welders.

1.06 QUALITY ASSURANCE

A. Welding procedures and personnel shall be qualified according to AWS D1.1, "Structural Welding Code--Steel."

B. All hangers, support, anchors, and guides shall be in accordance with the American National Standard Code for Pressure Piping, ANSI/B31.1 with Addenda 31.1 OA and Federal Specification WW-H-171E.

C. Provide an adequate suspension system in accordance with recognized engineering practices using standard commercially accepted pipe hangers and accessories.

D. Horizontal suspended pipe shall be hung using adjustable pipe hangers with bolted hinged loops or turnbuckles. Chains, wire, perforated strap iron or flat steel straps are not acceptable.

E. Prior to submittal to Architect/Engineer, submit fastening methods to the Architect for approval by the Structural Engineer. Forward an approved copy to the Architect/Engineer for review.

PART 2 - PRODUCTS

2.01 STEEL PIPE HANGERS AND SUPPORTS

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

1. Anvil
2. B-Line Systems, Inc.; a division of Cooper Industries.
3. Carpenter & Paterson, Inc.
4. ERICO/Michigan Hanger Co.
5. Globe Pipe Hanger Products, Inc.
6. National Pipe Hanger Corporation.

B. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" for where to use specific hanger and support types.

C. Galvanized, Metallic Coatings: Pre-galvanized or hot dipped.

D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

E. Padded Hangers: Hanger with other pipe insulation pad or cushion for support of bearing surface of piping.

2.02 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.03 METAL FRAMING SYSTEMS

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

1. B-Line Systems, Inc.; a division of Cooper Industries.
2. ERICO/Michigan Hanger Co.; ERISTRUT Div.
3. GS Metals Corp.
4. Power-Strut Div.; Tyco International, Ltd.
5. Thomas & Betts Corporation.
6. Tolco Inc.
7. Unistrut Corp.; Tyco International, Ltd.

B. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.

C. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.

D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.04 THERMAL HANGER SHIELD INSERTS

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

1. Carpenter & Paterson, Inc.
2. ERICO/Michigan Hanger Co.
3. PHS Industries, Inc.
4. Pipe Shields, Inc.

B. Description: 100-psig minimum, compressive-strength insulation insert encased in sheet metal shield.

C. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass with vapor barrier.

D. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass.

E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

G. Insert Length: Extend 3 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.05 FASTENER SYSTEMS

A. Subject to compliance with requirements and with the approval of the Structural Engineer, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Hilti, Inc.
b. ITW Ramset/Red Head.
c. Masterset Fastening Systems, Inc.
d. MKT Fastening, LLC.
e. Powers Fasteners.

B. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete with pull-out, tension and shear capacities appropriate for supported loads and building materials where approved by the Structural Engineer for use.

C. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated steel, for use in hardened Portland cement concrete with pull-out, tension and shear capacities appropriate for supported loads and building materials where approved by the Structural Engineer for use.

2.06 PIPE STAND FABRICATION

A. Pipe Stands, General: Shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand: One-piece plastic unit with integral-rod-roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

1. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the named manufacturers.Coordinate subparagraph and list below with Part 2 "Manufacturers" Article. Retain "Available" for nonproprietary and delete for semiproprietary specifications.
2. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the named manufacturers:
   a. ERICO/Michigan Hanger Co.
   b. MIRO Industries.

C. Low-Type, Single-Pipe Stand: One-piece plastic base unit with plastic roller, for roof installation without membrane penetration.

1. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the named manufacturers:
   a. MIRO Industries.

D. High-Type, Single-Pipe Stand: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.

1. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the named manufacturers:
   a. ERICO/Michigan Hanger Co.
   b. MIRO Industries.
   c. Portable Pipe Hangers.
2. Base: Plastic.
3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

E. High-Type, Multiple-Pipe Stand: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.

1. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the named manufacturers:
   a. Portable Pipe Hangers.
2. Bases: One or more plastic.
3. Vertical Members: Two or more protective-coated-steel channels.
4. Horizontal Member: Protective-coated-steel channel.
5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.

F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe support made from structural-steel shape, continuous-thread rods, and rollers for mounting on permanent stationary roof curb.

2.07 PIPE POSITIONING SYSTEMS

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

1. C & S Mfg. Corp.
2. HOLDRITE Corp.; Hubbard Enterprises.
3. Samco Stamping, Inc.

B. Description: IAPMO PS 42, system of metal brackets, clips, and straps for positioning piping in pipe spaces for plumbing fixtures for commercial applications.

2.08 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

2.09 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, non-shrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Non-staining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.01 HVAC HANGER AND SUPPORT APPLICATIONS

A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use padded hangers for piping that is subject to scratching.

3.02 DOMESTIC WATER / FIRE PROTECTION PIPE HANGER AND SUPPORT INSTALLATION

A. Steel Pipe Hanger Installation shall comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes can be supported together and trapezes spaced for smallest pipe size or Contractor shall install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation (Structural Engineer approval required):

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's published operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's published written instructions.

F. Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounting Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
2. Curb-Mounting-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. Refer to Division 7 Section "Roof Accessories" for curbs.

G. Pipe Positioning System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. Refer to Division 22 Section "Plumbing Fixtures" for plumbing fixtures.

H. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

I. Equipment Support Installation shall be fabricated from welded-structural-steel shapes.

J. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

K. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

L. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

M. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.

N. Insulated Piping: Comply with the following:

1. Attach clamps and spacers to piping.
   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
   b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.

c. Do not exceed pipe stress limits according to ASME B31.1 for power piping and ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
4. Shield Dimensions for Pipe: Not less than the following:
   a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
   b. NPS 4: 12 inches long and 0.06 inch thick.
   c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
   d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
   e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
5. Pipes NPS 8 and Larger: Include wood inserts.
6. Insert Material: Length at least as long as protective shield.
7. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

O. Domestic cold, hot, fire protection, waste and vent piping.

1. Upper Attachments: Support piping in new concrete construction with adjustable type inserts.
   a. Anvil Figure 282
   b. B-Line Figure B3014 and B3014N
   c. Elcen Figure 65
2. Where hangers are required between structural members, provide side beam brackets attached to the upper 1/3 of the beam, and all auxiliary steel for the installation of the pipe hangers. Supports shall be designed in accordance with the AISC Steel Handbook.
   a. Anvil Figure 202
   b. B-Line Figure B3062
   c. Elcen Figure 27
3. Support piping in existing concrete construction with cadmium plated, malleable iron, expansion case anchor.
   a. Anvil Figure 117
   b. B-Line Series LA
   c. Elcen Figure 212
4. Support piping in new and existing steel construction with adjustable beam clamps or welded beam attachment with threaded rods.
   a. Anvil Figure 218 Anvil Figure 66
   b. B-Line Figure B3054 B-Line Figure B3083WO
   c. Elcen Figure 95 and 76
5. Support piping from steel joist construction with all threads rods and square steel washer plate with double nuts top and bottom.
   a. Anvil Figure 60
   b. B-Line Figure B3134W
   c. PHD Figure 930

6. Where hangers are required between structural members (beams or joists) provide a welded steel bracket sized to meet the constraints of the structural installation. The bracket shall be attached with a continuous weld between the support and the structural member. Supports shall be designed in accordance with the AISC Steel Handbook.
   a. Anvil Figure 195
   b. B-Line Figure B3066
   c. Elcen Figure 57
7. Pipe Attachments: Hangers for horizontal piping shall be clevis type with vertical adjustment. Hangers for insulated pipes shall be selected to bear on the outside of the insulation.
   a. Anvil Figure 260
   b. B-Line Figure B3100
   c. Elcen Figure 12
8. Hangers for horizontal fire protection piping only shall be adjustable swivel ring type, U.L. listed and Factory Mutual approved.
   a. Anvil Figure 70
   b. B-Line Figure B3170NF
   c. PHD Figure 151
9. Hangers for multiple horizontal piping systems shall be trapeze type.
   a. Anvil Figure 46
   b. B-Line Figure B22
   c. Unistrut Model P3200
   d. Michigan Hanger Figure 380
10. Provide an insulation protection shield between all hangers and the pipe insulation.
   a. Anvil Figure 167
   b. B-Line Figure B3151
   c. Elcen Figure 400
11. Wall Supports: Where piping is run adjacent to masonry walls or steel columns welded steel brackets may be used. The bracket shall be bolted to the wall with a back plate or welded to a mounting flange then attached to the wall or column. The back plate or flange shall be of such size and thickness as to distribute the weight properly.
   a. Anvil Figure 195
   b. B-Line Figure B3066
   c. Elcen Figure 57
12. Insulated pipe shall be provided with a protection shield between the hanger and the pipe insulation.
   a. Anvil Figure 167
   b. B-Line Figure B3151
   c. Elcen Figure 400
13. Floor Supports: Where pipe runs are located next to the floor, the pipe shall be supported with an adjustable pipe saddle support and floor flange.
   a. Anvil Figure 264
   b. B-Line Figure B3092
   c. Elcen Figure 50
14. Vertical piping shall be supported at every floor using riser clamps. Provide a steel plate and neoprene sandwich type pad at each riser clamp for support.
   a. Anvil Figure 261
   b. B-Line Figure B3373
   c. Elcen Figure 1

15. Chase Supports: Support domestic hot and cold water piping and waste and vent piping in wall or chase spaces behind plumbing fixtures with manufactured brackets and plastic or copper grip clamp systems.
    a. Bee Line Ruff-in Series
    b. Sioux Chief Hold Rite
    c. Hubbard Enterprises, Holdrite

3.03 SANITARY / STORM PIPE HANGER AND SUPPORT INSTALLATION

A. Seismic-restraint devices are specified in Division 23 0548 "Vibration and Isolation."

B. Install the following:

1. Vertical Piping: MSS Type 8 or Type 42, clamps.
2. Install individual, straight, horizontal piping runs according to the following:
    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet, if Indicated: MSS Type 49, spring cushion rolls.
3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support each horizontal length of NO-HUB cast iron pipe within one foot (1'-0") of each joint and a maximum of ten feet (10'-0") on centers, and as required to maintain alignment and prevent sagging. Pipe shall be supported and anchored in accordance with manufacturers' recommendations.

D. Provide a hanger within one foot (1-0") of each elbow.

E. Support vertical piping and tubing at base and at each floor.

F. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

G. Install supports for vertical cast-iron soil piping every 15 feet.

H. Install supports for vertical steel piping every 15 feet.

I. Install supports for vertical stainless-steel piping every 10 feet.

J. Install supports for vertical copper tubing every 10 feet.

K. Install supports for vertical PVC piping every 48 inches.

L. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.04 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make smooth bearing surface.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.05 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and 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. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.06 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.07 PAINTING

A. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.10 INSTALLATION:

A. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.
2. Adjustable roller hangers and spring hangers for individual horizontal piping 20 feet or longer.

3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
4. Spring hangers to support vertical runs.
5. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
6. On plastic pipe, install pads or cushions on bearing surfaces to prevent hanger from scratching pipe.

B. Support horizontal equipment such as in-line pumps, strainers, and air separators independently of the piping system.

C. Hang pipe from substantial building structure. Pipe shall not be hung from other piping, ductwork, ceiling, steel decking, or any other building component.

D. All vertical piping shall be supported at every floor using riser clamps. All vertical piping in highrise applications or above 5 stories shall be supported at every other floor using spring-type riser clamps. All vertical piping drops along columns or walls shall be secured at the top and bottom of the drop and every ten feet (10'-0") on center.

E. Provide a hanger within one foot (1-0") of each riser horizontal offset in addition to the riser clamp support at every floor.

F. Support all fire protection piping independently of all other piping. Reference Specification Section 15500 for additional details.

G. All copper tubing shall be isolated from steel supports, anchors and metal studs to prevent electrolysis. Isolate piping with neoprene pads or plastic inserts. Tape (duct or electrical) shall not be used to isolate piping.

H. Spacing of hangers and supports for above ground horizontal piping shall be as follows:

Type	Pipe Size	Maximum Span	Rod Size
Steel			
	3/4	7	3/8
	1	7	3/8
	1 ¼	7	3/8
	1 ½	9	3/8
	2	10	3/8
	2 ½	11	1/2
	3	12	1/2
	4	13	5/8
Copper			
	3/4	5	3/8
	1	6	3/8
	1 ¼	7	3/8
	1 ½	8	3/8
	2	8	3/8

Type	Pipe Size	Maximum Span	Rod Size
Plastic			
	3/4	5	3/8
	1	5	3/8
	1 ¼	5	3/8
	1 ½	4	3/8
	2	4	3/8
	2 ½	4	1/2
	3	4	1/2
	4	4	5/8
Cast Iron			
	2	5	3/8
	3	5	1/2
	4	5	5/8
	6	5	3/4

Notes:

A. Plastic Piping Hanger Spacing: A Space hanger according to pipe manufacturer's published instructions for service conditions. Avoid point loading. Space and install hangers with the fewest practical rigid anchor points.
B. Support vertical runs at roof, at each floor, and at 10-foot intervals between floors.
C. Verify actual supported loads for hanger sizes and spacing.
D. Consult Structural Engineer for any attachment / loading requirements.
E. Spacing and sizes are from MSS SP-69.
F. Spacing of less than shown may be required to conform with building structure loading limitations and standard product load ratings.

END OF SECTION

SECTION 23 05 48 VIBRATION ISOLATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Isolation pads.
2. Isolation mounts.
3. Restrained elastomeric isolation mounts.
4. Spring isolators.
5. Housed spring mounts.
6. Vibration isolation equipment bases.

1.03 DEFINITIONS

A. IBC: International Building Code.

B. ICC-ES: ICC-Evaluation Service.

C. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.04 SUBMITTALS

A. Product Data: For the following:

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.

B. Coordination Drawings: Show coordination of bracing for plumbing piping and equipment with other systems and equipment in the vicinity, including other supports.

C. Welding certificates.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For air-mounting systems to include in operation and maintenance manuals.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

B. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

PART 2 - PRODUCTS

2.01 VIBRATION ISOLATORS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Ace Mountings Co., Inc.
2. Amber/Booth Company, Inc.
3. Isolation Technology, Inc.
4. Kinetics Noise Control.
5. Mason Industries.
6. Vibration Eliminator Co., Inc.
7. Vibration Isolation.
8. Vibration Mountings & Controls, Inc.

B. Pads: Arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.

1. Resilient Material: Oil- and water-resistant neoprene.

C. Mounts: Double-deflection type, with molded, oil-resistant rubber, hermetically sealed compressed fiberglass, or neoprene isolator elements with factory-drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure. Color-code or otherwise identify to indicate capacity range.

1. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.

D. Spring Isolators: Freestanding, laterally stable, open-spring isolators.

1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

5. Baseplates: Factory drilled for bolting to structure and bonded to 1/4-inch thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to 500 psig.
6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

2.02 VIBRATION ISOLATION EQUIPMENT BASES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Amber/Booth Company, Inc.
2. California Dynamics Corporation.
3. Isolation Technology, Inc.
4. Kinetics Noise Control.
5. Mason Industries.
6. Vibration Eliminator Co., Inc.
7. Vibration Isolation.
8. Vibration Mountings & Controls, Inc.

B. Steel Base: Factory-fabricated, welded, structural-steel bases and rails.

1. Design Requirements: Lowest possible mounting height with not less than 1-inch clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.
   a. Include supports for suction and discharge elbows for pumps.
2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.

C. Inertia Base: Factory-fabricated, welded, structural-steel bases and rails ready for placement of cast-in-place concrete.

1. Design Requirements: Lowest possible mounting height with not less than 1-inch clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.
   a. Include supports for suction and discharge elbows for pumps.
2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.
4. Fabrication: Fabricate steel templates to hold equipment anchor-bolt sleeves and anchors in place during placement of concrete. Obtain anchor-bolt templates from supported equipment manufacturer.

2.03 FACTORY FINISHES

A. Finish: Manufacturer's standard paint applied to factory-assembled and tested equipment before shipping.

1. Powder coating on springs and housings.
2. All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
3. Baked enamel or powder coat for metal components on isolators for interior use.
4. Color-code or otherwise mark vibration isolation and seismic-control devices to indicate capacity range.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and equipment to receive vibration isolation and seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 APPLICATIONS

A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by Indicate on Drawings, by details, schedules, or a combination of both, the locations where hanger rods for individual pipes and hanger rods for trapeze hangers require hanger rod stiffeners.

B. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.

3.03 VIBRATION-CONTROL INSTALLATION

A. Equipment Restraints:

1. Install seismic snubbers on plumbing equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.
2. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inches.

B. Piping Restraints:

1. Comply with requirements in MSS SP-127.
2. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
3. Brace a change of direction longer than 12 feet.

C. Install cables so they do not bend across edges of adjacent equipment or building structure.

D. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.

E. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

F. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

G. Drilled-in Anchors (Used only with the Structural Engineers approval):

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
5. Set anchors to manufacturer's recommended torque, using a torque wrench.
6. Install zinc-coated steel anchors for interior and stainless steel anchors for exterior applications.

3.04 FIELD QUALITY CONTROL

A. Testing Agency Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
5. Test to 90 percent of rated proof load of device.
6. Measure isolator restraint clearance.
7. Measure isolator deflection.

8. Verify snubber minimum clearances.
9. Air-Mounting System Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
10. Air-Mounting System Operational Test: Test the compressed-air leveling system.
11. Test and adjust air-mounting system controls and safeties.
12. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.

D. Remove and replace malfunctioning units and retest as specified above.

E. Prepare test and inspection reports.

3.05 ADJUSTING

A. Adjust isolators after piping system is at operating weight.

B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

C. Adjust active height of sprint isolators.

D. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION

SECTION 23 05 53 IDENTIFICATION FOR PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Duct labels.
5. Stencils.
6. Valve tags.
7. Warning tags.

1.03 SUBMITTALS

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

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system, to be included in maintenance manuals.

1.04 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

1.05 MANUFACTURERS

A. Subject to compliance with requirements, provide products of one of the following manufacturers:

1. Craftmark
2. Marking Services, Inc.
3. Seton
4. W.H. Brady Company

PART 2 - PRODUCTS

2.01 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
4. Fasteners: Stainless-steel rivets or self-tapping screws.
5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
2. Letter Color: Black.
3. Background Color: White.
4. Maximum Temperature: Able to withstand temperatures up to 160°F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless-steel rivets or self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.02 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: White.

D. Maximum Temperature: Able to withstand temperatures up to 160°F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.03 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive. Where pipe diameter exceeds the size of precoiled bands, label fasteners shall be used to attach label to pipe surface.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations as noted in Section 3.03 of this Specification. Pipe label shall include an arrow indicating flow direction. Piping which also is provided with electric heat tracing shall have “Electric Traced” added to description.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high.

E. Piping color coding shall comply with ANSI A13.1 Standard for Pipe Marking.

2.04 DUCT LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: White.

D. Maximum Temperature: Able to withstand temperatures up to 160°F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings, duct size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions or as separate unit on each duct label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high.

2.05 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire-link or beaded chain; or S-hook.

B. Valve Schedules: For each piping system, on 8 ½" by 11" bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

2.06 WARNING TAGS

A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.

1. Size: 3 by 5-1/4 inches minimum.
2. Fasteners: Reinforced grommet and wire.
3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.01 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers and paints.

3.02 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.03 PIPE LABEL INSTALLATION

A. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

B. Visibility: Where pipe lines are located above or below the normal line of vision, the lettering shall be placed above or below the horizontal centerline of the pipe, to insure ease of visibility.

C. Label and letter size:

1. Label and letter sizes shall conform to ANSI A13.1 standard of identification of piping systems according to the following table:

O.D. of Pipe Or Covering	Length of Color Field	Size of Letters
1 1/4 inches to 3/4 inch	8 inches	1/2 inch
1 1/2 inches to 2 inches	8 inches	3/4 inch
2 1/2 inches to 6 inches	12 inches	1 1/4 inches

2. For identification of piping less than 3/4 inches in diameter, use a permanently legible metal tag.

D. Pipe Label Legend and Color Schedule:

Pipe Label	Legend	Background	Letter Color
Cold Water (Domestic)	CW	White	Green
Compressed Air	AIR	Black	Yellow
Condensate Drain	CD	White	Green
Drain	D	White	Green
Fire Standpipe	FSP	White	Red
Grease Vent	GV	White	Green
Grease Waste	GW	White	Green
Hot Water (Domestic)	HW	Black	Yellow
Hot Water Recirculation	HWR	Black	Yellow
Indirect Waste	IW	White	Green
Refrigerant Liquid	RL	Black	Yellow
Refrigerant Suction	RS	Black	Yellow
Sanitary Drain	SAN	White	Green
Sanitary Vent	SAN V	White	Green
Standpipe	SP	White	Red
Storm Drain	ST	White	Green
Storm Drain – Emergency	EST	White	Green

3.04 DUCT LABEL INSTALLATION

A. Install plastic-laminated duct labels with permanent adhesive on air ducts in the following color codes:

1. Blue: For cold-air supply ducts.
2. Green: For exhaust, outside, relief, return, and mixed air ducts.
3. ASME A13.1 Colors and Designs: For hazardous material exhaust.

B. Stenciled Duct Label Option: Stenciled labels, showing service and flow direction may be

Floor Level	Room No.	Valve Tag No	Function	Valve Type	Area Under Control	Manuf. /Model No.	Valve Size	Valve Rating	Normal Valve Position
1st	1234	H-0100	Shut-Off	Ball	List	Apollo A100	2 inches	125 psig / 210 ° F	N.O.

provided instead of plastic-laminated duct labels, at Installer's option, if lettering larger than 1 inch high is needed for proper identification because of distance from normal location of required identification.

C. Locate labels near points where ducts enter concealed spaces/shafts and at maximum intervals of 125 feet in each space where ducts are exposed or concealed by removable ceiling system. Where the roof is penetrated each duct shall be labeled with minimum 6" high letters.

3.04 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

3.05 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

B. Valve Schedule – Sample Chart for Reference

Column Explanations:

Floor Level – Level as provided by Owner

Room Number – Number taken from latest Architectural Drawing
Valve Tag Number – Valve tag naming convention assigned by Contractor and approved by Owner /Engineer
Function – Valve function or use, i.e. shut-off, bypass, etc.
Valve Type - Self explanatory
qArea Controlled – Building area affected if the valve is opened or closed
Manufacturer/Model- Self explanatory
Valve Size - Self explanatory
Valve Rating - Self explanatory
Normal Position – Valve position during normal operation (NO = Normally Open)

END OF SECTION

SECTION 23 05 93 TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Balancing Air Systems:
   a. Constant-volume air systems.
   b. Variable-air-volume systems.

1.03 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. NEBB: National Environmental Balancing Bureau.

C. TAB: Testing, adjusting, and balancing.

D. TABB: Testing, Adjusting, and Balancing Bureau.

E. TAB Specialist: An entity engaged to perform TAB Work.

1.04 SUBMITTALS

A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.

B. Contract Documents Examination Report: Within 30 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.

C. Strategies and Procedures Plan: Within 30 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.

D. Certified TAB reports.

E. Sample report forms.

F. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.

4. Dates of use.
5. Dates of calibration.

1.05 QUALITY ASSURANCE

A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC NEBB or TABB.

B. TAB Conference: Meet with Architect, Engineer, Construction Manager and Commissioning Authority on approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Require the participation of the TAB field supervisor and technicians.

1. Agenda Items:
   a. The Contract Documents examination report.
   b. The TAB plan.
   c. Coordination and cooperation of trades and subcontractors.
   d. Coordination of documentation and communication flow.

C. Certify TAB field data reports and perform the following:

1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.

D. TAB Report Forms: Use standard TAB contractor's forms approved by Architect, Engineer, Construction Manager and Commissioning Authority].

E. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

1.06 PROJECT CONDITIONS

A. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.07 COORDINATION

A. Notice: Provide seven (7) days' advance notice for each test. Include scheduled test dates and times.

B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.

B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine ceiling plenums used for supply, return, or relief air to verify that they meet the leakage class of connected ducts as specified in Division 23 Section "Metal Ducts" and are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.

F. Examine equipment performance data including fan and pump curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

H. Examine test reports specified in individual system and equipment Sections.

I. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

J. Examine terminal units; such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.

K. Examine operating safety interlocks and controls on HVAC equipment.

L. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.02 PREPARATION

A. Prepare a TAB plan that includes strategies and step-by-step procedures.

B. Complete system-readiness checks and prepare reports. Verify the following:

1. Permanent electrical-power wiring is complete.
2. Automatic temperature-control systems are operational.
3. Equipment and duct access doors are securely closed.
4. Balance, smoke, and fire dampers are open.
5. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
6. Windows and doors can be closed so indicated conditions for system operations can be met.

3.03 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and in this Section.

1. Comply with requirements in ASHRAE 62.1-2004, Section 7.2.2, "Air Balancing."

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
2. After testing and balancing, install test ports and duct access doors that comply with requirements in Division 23 Section "Duct Accessories."
3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Division 23 Section "HVAC Insulation."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.04 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. For variable-air-volume systems, develop a plan to simulate diversity.

D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

G. Verify that motor starters are equipped with properly sized thermal protection.

H. Check dampers for proper position to achieve desired airflow path.

I. Check for airflow blockages.

J. Check condensate drains for proper connections and functioning.

K. Check for proper sealing of air-handling-unit components.

L. Verify that air duct system is sealed as specified in Division 23 Section "Metal Ducts."

3.05 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.

1. Measure total airflow.
   a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.
2. Measure fan static pressures as follows to determine actual static pressure:
   a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
   b. Measure static pressure directly at the fan outlet or through the flexible connection.
   c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
   d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
   a. Report the cleanliness status of filters and the time static pressures are measured.
4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.

6. Obtain approval from Architect, Construction Manager and Commissioning Authority for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in Division 23 Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.

1. Measure airflow of submain and branch ducts.
   a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.

C. Measure air outlets and inlets without making adjustments.

1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.

D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.

1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.06 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

A. Compensating for Diversity: When the total airflow of all terminal units is more than the indicated airflow of the fan, place a selected number of terminal units at a minimum set-point airflow with the remainder at maximum-airflow condition until the total airflow of the terminal units equals the indicated airflow of the fan. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.

B. Pressure-Independent, Variable-Air-Volume Systems: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

1. Set outdoor-air dampers at minimum, and set return- and exhaust-air dampers at a position that simulates full-cooling load.

2. Select the terminal unit that is most critical to the supply-fan airflow and static pressure. Measure static pressure. Adjust system static pressure so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
3. Measure total system airflow. Adjust to within indicated airflow.
4. Set terminal units at maximum airflow and adjust controller or regulator to deliver the designed maximum airflow. Use terminal-unit manufacturer's written instructions to make this adjustment. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
5. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.
    a. If air outlets are out of balance at minimum airflow, report the condition but leave outlets balanced for maximum airflow.
6. Remeasure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.
    a. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.
7. Measure static pressure at the most critical terminal unit and adjust the static-pressure controller at the main supply-air sensing station to ensure that adequate static pressure is maintained at the most critical unit.
8. Record final fan-performance data.

3.07 PROCEDURES FOR MOTORS

A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Efficiency rating.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter thermal-protection-element rating.

3.08 PROCEDURES FOR CONDENSING UNITS

A. Verify proper rotation of fans.

B. Measure entering- and leaving-air temperatures.

C. Record compressor data.

3.09 TOLERANCES

A. Set HVAC system's air flow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
2. Air Outlets and Inlets: Plus or minus 10 percent.

3.10 REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

B. Status Reports: Prepare monthly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.11 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Fan curves.
2. Manufacturers' test data.
3. Field test reports prepared by system and equipment installers.
4. Other information relative to equipment performance; do not include Shop Drawings and product data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB contractor.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:
    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.
12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.

15. Test conditions for fans and performance forms including the following:
    a. Settings for outdoor-, return-, and exhaust-air dampers.
    b. Conditions of filters.
    c. Cooling coil, wet- and dry-bulb conditions.
    d. Face and bypass damper settings at coils.
    e. Fan drive settings including settings and percentage of maximum pitch diameter.
    f. Inlet vane settings for variable-air-volume systems.
    g. Settings for supply-air, static-pressure controller.
    h. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data:
    a. Unit identification.
    b. Location.
    c. Make and type.
    d. Model number and unit size.
    e. Manufacturer's serial number.
    f. Unit arrangement and class.
    g. Discharge arrangement.
    h. Sheave make, size in inches, and bore.
    i. Center-to-center dimensions of sheave, and amount of adjustments in inches.
    j. Number, make, and size of belts.
    k. Number, type, and size of filters.
2. Motor Data:
    a. Motor make, and frame type and size.
    b. Horsepower and rpm.
    c. Volts, phase, and hertz.
    d. Full-load amperage and service factor.
    e. Sheave make, size in inches, and bore.
    f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
3. Test Data (Indicated and Actual Values):
    a. Total air flow rate in cfm.
    b. Total system static pressure in inches wg.
    c. Fan rpm.
    d. Discharge static pressure in inches wg.
    e. Outdoor airflow in cfm.
    f. Return airflow in cfm.
    g. Outdoor-air damper position.

h. Return-air damper position.
i. Vortex damper position.

F. Electric-Coil Test Reports: For electric furnaces, duct coils, and electric coils installed in central-station air-handling units, include the following:

1. Unit Data:
   a. System identification.
   b. Location.
   c. Coil identification.
   d. Capacity in Btu/h.
   e. Number of stages.
   f. Connected volts, phase, and hertz.
   g. Rated amperage.
   h. Air flow rate in cfm.
   i. Face area in sq. ft.
   j. Minimum face velocity in fpm.
2. Test Data (Indicated and Actual Values):
   a. Heat output in Btu/h.
   b. Air flow rate in cfm.
   c. Air velocity in fpm.
   d. Entering-air temperature in degrees F.
   e. Leaving-air temperature in degrees F.
   f. Voltage at each connection.
   g. Amperage for each phase.

G. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:
   a. System identification.
   b. Location.
   c. Make and type.
   d. Model number and size.
   e. Manufacturer's serial number.
   f. Arrangement and class.
   g. Sheave make, size in inches, and bore.
   h. Center-to-center dimensions of sheave, and amount of adjustments in inches.
2. Motor Data:
   a. Motor make, and frame type and size.
   b. Horsepower and rpm.
   c. Volts, phase, and hertz.
   d. Full-load amperage and service factor.
   e. Sheave make, size in inches, and bore.
   f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
   g. Number, make, and size of belts.
3. Test Data (Indicated and Actual Values):
   a. Total airflow rate in cfm.
   b. Total system static pressure in inches wg.
   c. Fan rpm.
   d. Discharge static pressure in inches wg.
   e. Suction static pressure in inches wg.

H. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:
   a. System and air-handling-unit number.
   b. Location and zone.
   c. Traverse air temperature in deg F.
   d. Duct static pressure in inches wg.
   e. Duct size in inches.
   f. Duct area in sq. ft.
   g. Indicated air flow rate in cfm.
   h. Indicated velocity in fpm.
   i. Actual air flow rate in cfm.
   j. Actual average velocity in fpm.
   k. Barometric pressure in psig.

I. Air-Terminal-Device Reports:

1. Unit Data:
   a. System and air-handling unit identification.
   b. Location and zone.
   c. Apparatus used for test.
   d. Area served.
   e. Make.
   f. Number from system diagram.
   g. Type and model number.
   h. Size.
   i. Effective area in sq. ft.
2. Test Data (Indicated and Actual Values):
   a. Air flow rate in cfm.
   b. Air velocity in fpm.
   c. Preliminary air flow rate as needed in cfm.
   d. Preliminary velocity as needed in fpm.
   e. Final air flow rate in cfm.
   f. Final velocity in fpm.
   g. Space temperature in deg F.

J. Instrument Calibration Reports:

1. Report Data:
   a. Instrument type and make.
   b. Serial number.
   c. Application.
   d. Dates of use.
   e. Dates of calibration.

3.12 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.

2. Check the following for each system:
   a. Measure airflow of at least 10 percent of air outlets.
   b. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
   c. Verify that balancing devices are marked with final balance position.
   d. Note deviations from the Contract Documents in the final report.

B. Final Inspection:

1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Architect, Construction Manager and Commissioning Authority.
2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Architect, Construction Manager and Commissioning Authority.
3. Architect, Construction Manager and Commissioning Authority shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:

1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.

D. Prepare test and inspection reports.

3.13 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION

SECTION 23 07 13 THERMAL INSULATION FOR MECHANICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Insulation Materials:
   a. Cellular glass.
   b. Flexible elastomeric.
   c. Mineral fiber.
2. Fire-rated insulation systems.
3. Insulating cements.
4. Adhesives.
5. Mastics.
6. Lagging adhesives.
7. Sealants.
8. Jackets.
9. Tapes.
10. Securements.

B. Related Sections:

1. Division 23 Section "Mechanical General".
2. Division 23815 Section "Metal Ducts" for duct liners.

1.03 DESCRIPTION

A. All insulation products shall meet NFPA requirements for Flame Spread Rating 25, Smoke Developed Rating 50, and Fuel Contributed 50.

B. Staples shall not be used for securing insulation. Insulation and vapor barrier shall be continuous through wall, ceiling, floor and roof openings and sleeves, except at fire/smoke dampers.

C. Supports for insulated piping shall be outside the insulation. Inserts shall be provided at hangers. Inserts shall be Foamglas® Insulation, Calcium Silicate or Perlite and shall be two (2") inches longer than the pipe shields. Pipe shoes welded to the pipe shall be used for roll type hangers.

D. All tests shall be completed before insulation is applied.

E. Do not store materials in building until it is enclosed and dry. Wet insulation shall not be installed.

F. Insulation products with self-sealing type jacket shall not be applied at temperatures below 40 degrees F.

G. Items not to be insulated:

1. Chromium plated brass connections to plumbing fixtures.
2. Underground domestic cold water piping.
3. Piping installed in enclosures for:
   a. Unit heaters
4. Vents from pressure relief valves.
5. Ducts with internal lining or factory insulated ducts.

H. Clean and dry all surfaces to be insulated from loose scale, dirt, oil, water and other foreign matter.

I. Pipes shall be painted with one (1) coat of rust inhibiting primer before installing insulation.

J. Insulate completely all metal surfaces of piping, ductwork and equipment other than hangers.

K. Surface finishes shall present a tight smooth appearance.

L. Permit expansion and contraction without causing damage to insulation or surface finish.

M. Surface finish shall be extended to protect all surfaces, ends, and raw edges of insulation.

N. Vapor barriers on pipe and duct insulation must be continuous and uninterrupted throughout the system except where fire dampers occur.

1.04 SUBMITTALS

A. First four paragraphs below are defined in Division 1 Section "Submittal Procedures" as "Action Submittals."

B. Product Data for each type of product indicated shall be submitted and include thermal conductivity, thickness, and jackets (both factory and field applied, if any).

C. Shop Drawings:

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties, equipment connections, and access panels.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.
8. Detail field application for each equipment type.

D. Qualification Data: For qualified Installer.

E. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

F. Field quality-control reports.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

C. Codes and regulations referred to are minimum standards. Where the requirements of these Specifications or Drawings exceed those of the codes and regulations, the Drawings and Specifications shall govern.

D. Any methods of application of insulation materials or finishes not specified in detail herein shall be in accordance with the particular manufacturer's published recommendations. Insulation shall be applied by experienced workers regularly employed for this type of work.

E. Material shall be furnished to the job bearing the manufacturer's label.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.07 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 23 Section "Hangers and Supports."

B. Coordinate clearance requirements with piping Installer for piping insulation application, duct Installer for duct insulation application, and equipment Installer for equipment insulation application. Before preparing piping and ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.08 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.09 PIPING:

A. Insulate all valves, strainers and fittings. For the purposes of this Specification, fittings include unions and flanges. Use pre-molded material where available.

B. Insulate valves up to and including bonnets.

1.10 DUCTWORK:

A. Insulation shall cover all standing seams and metal surfaces. Materials shall be applied subject to their temperature limits.

PART 2 - PRODUCTS

2.01 INSULATION MATERIALS

A. Products shall not contain asbestos, lead, mercury, or mercury compounds.

B. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

C. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

1. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Aeroflex USA Inc.; Aerocel.
   b. Armacell LLC; AP Armaflex.
   c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.

D. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Jackets" Article.

1. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. CertainTeed Corp.; Duct Wrap.
   b. Johns Manville; Microlite.
   c. Knauf Insulation; Duct Wrap.
   d. Manson Insulation Inc.; Alley Wrap.
   e. Owens Corning; All-Service Duct Wrap.

2.02 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Insulco, Division of MFS, Inc.; Triple I.
   b. P. K. Insulation Mfg. Co., Inc.; Super-Stik.
   c. Fosters Insulation Mfg. Co., Inc.; Quickcote

B. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C 196.

2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. P. K. Insulation Mfg. Co., Inc.; Thermal-V-Kote.
   b. Fosters Insulation Mfg. Co., Inc.; Quickcote
   c. P. K. Insulation Mfg. Co., Inc.; Super-stik

C. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Insulco, Division of MFS, Inc.; SmoothKote.
   b. P. K. Insulation Mfg. Co., Inc.; PK No. 127, and Quik-Cote.
   c. Rock Wool Manufacturing Company; Delta One Shot.

2.04 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.

B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Childers Products, Division of ITW; CP-35.
   b. Foster Products Corporation, H. B. Fuller Company; 30-90.
   c. ITW TACC, Division of Illinois Tool Works; CB-50.

d. Marathon Industries, Inc.; 590.
e. Mon-Eco Industries, Inc.; 55-40.
f. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 degrees F to plus 180 degrees F.
4. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
5. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below ambient services.

1. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Childers Products, Division of ITW; CP-30.
   b. Foster Products Corporation, H. B. Fuller Company; 30-35.
   c. ITW TACC, Division of Illinois Tool Works; CB-25.
   d. Marathon Industries, Inc.; 501.
   e. Mon-Eco Industries, Inc.; 55-10.
2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
3. Service Temperature Range: 0 degrees F to 180 degrees F.
4. Solids Content: ASTM D 1644, 44% by volume and 62% by weight.
5. Color: White.
   a. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

2.05 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.

1. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   b. Childers Products, Division of ITW; CP-52.
   c. Foster Products Corporation, H. B. Fuller Company; 81-42.
   d. Marathon Industries, Inc.; 130.
   e. Mon-Eco Industries, Inc.; 11-30.
   f. Vimasco Corporation; 136.
2. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct, equipment, and pipe insulation.
3. Service Temperature Range: Minus 50 degrees F to plus 180 degrees F.
4. Color: White.

2.06 FACTORY AND FIELD APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

D. See EXECUTION section for jacket thicknesses.

1. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

2.08 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
   b. Compac Corp.; 104 and 105.
   c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
   d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
   b. Compac Corp.; 110 and 111.
   c. Ideal Tape Co., Inc., an American Biltrite Company; 491 AWF FSK.
   d. Venture Tape; 1525 CW, 1528 CW, and 1528 CW/SQ.
2. Width: 3 inches.
3. Thickness: 6.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
   b. Compac Corp.; 120.
   c. Ideal Tape Co., Inc., an American Biltrite Company; 488 AWF.
   d. Venture Tape; 3520 CW.
2. Width: 2 inches.
3. Thickness: 3.7 mils.
4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

2.09 SECUREMENTS

A. Bands:

1. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Childers Products; Bands.
   b. PABCO Metals Corporation; Bands.
   c. RPR Products, Inc.; Bands.
2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316]; 0.015 inch thick, 3/4 inch wide with wing or closed seal.
3. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with wing or closed seal.

B. Insulation Pins and Hangers:

1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
   a. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      1) AGM Industries, Inc.; CWP-1.
      2) GEMCO; CD.
      3) Midwest Fasteners, Inc.; CD.
      4) Nelson Stud Welding; TPA, TPC, and TPS.
2. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
   a. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      1) AGM Industries, Inc.; Tactoo Insul-Hangers, Series TSA.
      2) GEMCO; Press and Peel.
      3) Midwest Fasteners, Inc.; Self Stick.
   b. Baseplate: Galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
   c. Spindle: zinc-coated, low carbon steel, fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
   d. Adhesive-backed base with a peel-off protective cover.
3. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
   a. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      1) GEMCO.
      2) Midwest Fasteners, Inc.

C. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

D. Wire: 0.062-inch soft-annealed, galvanized steel.

1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. C & F Wire.
   b. Childers Products.
   c. PABCO Metals Corporation.
   d. RPR Products, Inc.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

1. Verify that systems and equipment to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that applies to insulation.

C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.03 GENERAL INSULATION INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.04 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.

2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

3.05 PENETRATIONS

A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated) shall be continuous through walls and partitions.

B. Insulation Installation at Fire-Rated Wall and Partition Penetrations shall be continuous through penetrations of fire-rated walls and partitions. Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.

3.06 MINERAL-FIBER INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

E. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.

2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
   a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
   b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
   c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
   d. Do not overcompress insulation during installation.
   e. Impale insulation over pins and attach speed washers.
   f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
   a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
   b. Install vapor stops for ductwork and plenums operating below 50°F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches.
5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.08 WEATHERPROOFING

A. Protect piping and duct insulation exposed to weather outside the building with Pabco Insulating Division corrugated aluminum sheets of 0.024 thickness (22 gauge). Piping joints shall have aluminum formed elbows with leak proof beads and epoxy coated interior.

3.09 FINISHES

A. Duct, Equipment, and Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 9 painting Sections.

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
   a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or PVC jackets.

3.10 INDOOR JACKET SCHEDULE

A. Install jacket over insulation material.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Ducts and Plenums, Concealed:

1. None.

D. Ducts and Plenums, Exposed:

1. None.

E. Equipment, Concealed:

1. None.

F. Equipment, Exposed, up to 48 Inches in Diameter or with Flat Surfaces up to 72 Inches:

1. Aluminum, Smooth: 26 gauge (0.016 inch thick).

G. Equipment, Exposed, Larger Than 48 Inches in Diameter or with Flat Surfaces Larger Than 72 Inches:

1. None.
2. Aluminum, Smooth with 4-by-1-Inch Box Ribs: 26 gauge (0.016 inch thick).

H. Piping, Concealed:

1. None.

I. Piping, Exposed:

1. Aluminum, Smooth: 26 gauge (0.016 inch thick).
2. Stainless Steel, Type 304 or 316, Smooth 2B Finish: 24 gauge (0.020 inch thick).

J. Piping, Exposed in Mechanical Rooms and below 7'-0" from floor line:

1. Aluminum, Corrugated with Z-Shaped Locking Seam: 20 gauge (0.032 inch thick).

3.11 INSULATION SCHEDULE

PRE-MOLDED FIBER GLASS PIPE INSULATION:

INSULATION THICKNESS IN INCHES FOR PIPE SIZES					
Plumbing	Temperature Up to	up to 1 inch	1-1/4 inches to 2 inches	2-1/2 inches to 3-1/2 inches	4 inches & Over
Hot Water and Hot Water Circulating	200 degrees F	1-2 inches	1 inch	1 inch	1 1/2 inches
Cold Water	50-65 degrees F	1/2 inch	1 inch	1 inch	1 inch
Refrigerant Hot Gas and Liquid – interior locations	Any	3/4 inch	1 inch	1 1/2 inches	--
Refrigerant Suction – interior locations	Any	3/4 inch	1 inch	1 1/2 inches	--

FLEXIBLE ELASTOMERIC PIPE INSULATION:

INSULATION THICKNESS IN INCHES FOR PIPE SIZES					
	Temperature Up to	up to 1 inch	1-1/4 inches to 2 inches	2-1/2 inches to 3-1/2 inches	4 inches & Over
Refrigerant Hot Gas and Liquid – exterior locations	Any	3/4 inch	1 inch	1 1/2 inches	--
Refrigerant Suction – exterior locations	Any	3/4 inch	1 inch	1 1/2 inches	--

MINERAL FIBER BLANKET INSULATION:

DUCT INSULATION THICKNESS IN INCHES					
Supply Air					2 inches
Outside Air					2 inches
Return Air					2 inches
Factory Insulated					0 inches

END OF SECTION

SECTION 23 23 00 REFRIGERANT PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes refrigerant piping used for air-conditioning applications.

1.03 PERFORMANCE REQUIREMENTS

A. Line Test Pressure for Refrigerant R-410A:

1. Suction Lines for Air Conditioning Applications: 300 psig.
2. Suction Lines for Heat Pump Applications: 535 psig.
3. Hot Gas and Liquid Lines: 535 psig.

1.04 SUBMITTALS

A. Product Data shall be submitted for each type of valve and refrigerant piping specialty indicated. Include pressure drop, based on manufacturer's test data, for the following:

1. Thermostatic expansion valves.
2. Solenoid valves.
3. Hot-gas bypass valves.
4. Filter dryers.
5. Strainers.
6. Pressure regulating valves.

B. Contractor Installation Drawings (Shop Drawings) shall show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationships between piping and equipment.

1. Shop Drawing Scale: 1/4 inch equals 1 foot.
2. Refrigerant piping indicated on Drawings is schematic only. Size piping and design actual piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.

C. Welding certificates.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

1.05 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

B. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."

C. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.06 PRODUCT STORAGE AND HANDLING

A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

1.07 COORDINATION

A. Coordinate size and location of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 7 Section "Roof Accessories."

PART 2 - PRODUCTS

2.01 COPPER TUBE AND FITTINGS

A. Copper Tube: ASTM B 88, Type K or L.

B. Wrought-Copper Fittings: ASME B16.22.

C. Wrought-Copper Unions: ASME B16.22.

D. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.

E. Brazing Filler Metals: AWS A5.8.

F. Flexible Connectors:

1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
2. End Connections: Socket ends.
3. Offset Performance: Capable of minimum 3/4-inch misalignment in minimum 7-inch- long assembly.
4. Pressure Rating: Factory test at minimum 500 psig.
5. Maximum Operating Temperature: 250 degrees F.

2.02 VALVES AND SPECIALTIES

A. Diaphragm Packless Valves:

1. Body and Bonnet: Forged brass or cast bronze; globe design with straight-through or angle pattern.
2. Diaphragm: Phosphor bronze and stainless steel with stainless-steel spring.
3. Operator: Rising stem and hand wheel.
4. Seat: Nylon.
5. End Connections: Socket, union, or flanged.
6. Working Pressure Rating: 500 psig.
7. Maximum Operating Temperature: 275 degrees F.

B. Check Valves:

1. Body: Ductile iron, forged brass, or cast bronze; globe pattern.
2. Bonnet: Bolted ductile iron, forged brass, or cast bronze; or brass hex plug.
3. Piston: Removable polytetrafluoroethylene seat.
4. Closing Spring: Stainless steel.
5. Manual Opening Stem: Seal cap, plated-steel stem, and graphite seal.
6. End Connections: Socket, union, threaded, or flanged.
7. Maximum Opening Pressure: 0.50 psig.
8. Working Pressure Rating: 500 psig.
9. Maximum Operating Temperature: 275 degrees F.

C. Service Valves:

1. Body: Forged brass with brass cap including key end to remove core.
2. Core: Removable ball-type check valve with stainless-steel spring.
3. Seat: Polytetrafluoroethylene.
4. End Connections: Copper spring.
5. Working Pressure Rating: 500 psig.

D. Solenoid Valves: Comply with ARI 760 and UL 429; listed and labeled by an NRTL.

1. Body and Bonnet: Plated steel.
2. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
3. Seat: Polytetrafluoroethylene.
4. End Connections: Threaded.
5. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch conduit adapter, and 115-V ac coil.
6. Working Pressure Rating: 400 psig.
7. Maximum Operating Temperature: 240 degrees F.
8. Manual operator.

E. Safety Relief Valves: Comply with ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.

1. Body and Bonnet: Ductile iron and steel, with neoprene O-ring seal.
2. Piston, Closing Spring, and Seat Insert: Stainless steel.
3. Seat Disc: Polytetrafluoroethylene.
4. End Connections: Threaded.
5. Working Pressure Rating: 400 psig.
6. Maximum Operating Temperature: 240 degrees F.

F. Thermostatic Expansion Valves: Comply with ARI 750.

1. Body, Bonnet, and Seal Cap: Forged brass or steel.
2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
3. Packing and Gaskets: Non-asbestos.
4. Capillary and Bulb: Copper tubing filled with refrigerant charge.
5. Suction Temperature: 40 degrees F.
6. Superheat: Adjustable.
7. Reverse-flow option (for heat-pump applications).
8. End Connections: Socket, flare, or threaded union.
9. Working Pressure Rating: 450 psig.

G. Hot-Gas Bypass Valves: Comply with UL 429; listed and labeled by an NRTL.

1. Body, Bonnet, and Seal Cap: Ductile iron or steel.
2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
3. Packing and Gaskets: Non-asbestos.
4. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
5. Seat: Polytetrafluoroethylene.
6. Equalizer: Internal.
7. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch conduit adapter, and 115-V ac coil.
8. End Connections: Socket.
9. Throttling Range: Maximum 5 psig.
10. Working Pressure Rating: 500 psig.
11. Maximum Operating Temperature: 240 degrees F.

H. Straight-Type Strainers:

1. Body: Welded steel with corrosion-resistant coating.
2. Screen: 100-mesh stainless steel.
3. End Connections: Socket or flare.
4. Working Pressure Rating: 500 psig.
5. Maximum Operating Temperature: 275 degrees F.

I. Moisture/Liquid Indicators:

1. Body: Forged brass.
2. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.
3. Indicator: Color coded to show moisture content in ppm.
4. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.
5. End Connections: Socket or flare.
6. Working Pressure Rating: 500 psig.
7. Maximum Operating Temperature: 240 degrees F.

J. Replaceable-Core Filter Dryers: Comply with ARI 730.

1. Body and Cover: Painted-steel shell with ductile-iron cover, stainless-steel screws, and neoprene gaskets.
2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
3. Desiccant Media: Activated alumina.
4. Designed for reverse flow for heat-pump applications.
5. End Connections: Socket.

6. Access Ports: NPS 1/4 connections at entering and leaving sides for pressure differential measurement.
7. Maximum Pressure Loss: 2 psig.
8. Working Pressure Rating: 500 psig.
9. Maximum Operating Temperature: 240 degrees F.

K. Mufflers:

1. Body: Welded steel with corrosion-resistant coating.
2. End Connections: Socket or flare.
3. Working Pressure Rating: 500 psig.
4. Maximum Operating Temperature: 275 degrees F.

L. Receivers: Comply with ARI 495.

1. Comply with ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.
2. Comply with UL 207; listed and labeled by an NRTL.
3. Body: Welded steel with corrosion-resistant coating.
4. Tappings: Inlet, outlet, liquid level indicator, and safety relief valve.
5. End Connections: Socket or threaded.
6. Working Pressure Rating: 500 psig.
7. Maximum Operating Temperature: 275 degrees F.

M. Liquid Accumulators: Comply with ARI 495.

1. Body: Welded steel with corrosion-resistant coating.
2. End Connections: Socket or threaded.
3. Working Pressure Rating: 500 psig.
4. Maximum Operating Temperature: 275 degrees F.

2.03 REFRIGERANTS

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

1. Atofina Chemicals, Inc.
2. DuPont Company; Fluorochemicals Div.
3. Honeywell, Inc.; Genetron Refrigerants.
4. INEOS Fluor Americas LLC.

PART 3 - EXECUTION

3.01 PIPING APPLICATIONS

A. Suction Lines NPS 1-1/2 and Smaller for Conventional Air-Conditioning Applications: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed or soldered joints.

B. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications:

1. NPS 1-1/2 and Smaller: Copper, Type ACR or L, drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.

C. Safety-Relief-Valve Discharge Piping:

1. NPS 1-1/2 and Smaller: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed or soldered joints.
2. NPS 1-1/2 and Smaller: Copper, Type ACR or L, drawn-temper tubing and wrought-copper fittings with brazed joints.

3.02 VALVE AND SPECIALTY APPLICATIONS

A. Install diaphragm valves in suction and discharge lines of compressor.

B. Install service valves for gage taps at inlet and outlet of hot-gas bypass valves and strainers if they are not an integral part of valves and strainers.

C. Install a check valve at the compressor discharge and a liquid accumulator at the compressor suction connection.

D. Except as otherwise indicated, install diaphragm valves on inlet and outlet side of filter dryers.

E. Install a full-sized, three-valve bypass around filter dryers.

F. Install solenoid valves upstream from each expansion valve and hot-gas bypass valve. Install solenoid valves in horizontal lines with coil at top.

G. Install thermostatic expansion valves as close as possible to distributors on evaporators.

1. Install valve so diaphragm case is warmer than bulb.
2. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line.
3. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.

H. Install safety relief valves where required by ASME Boiler and Pressure Vessel Code. Pipe safety-relief-valve discharge line to outside according to ASHRAE 15.

I. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.

J. Install strainers upstream from and adjacent to the following unless they are furnished as an integral assembly for device being protected:

1. Solenoid valves.
2. Thermostatic expansion valves.
3. Hot-gas bypass valves.
4. Compressor.

K. Install filter dryers in liquid line between compressor and thermostatic expansion valve, and in the suction line at the compressor.

L. Install receivers sized to accommodate pump-down charge.

M. Install flexible connectors at compressors.

3.03 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

B. Install refrigerant piping according to ASHRAE 15.

C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping adjacent to machines to allow service and maintenance.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Select system components with pressure rating equal to or greater than system operating pressure.

J. Refer to Division 23 Sections "HVAC Instrumentation and Controls" and "Sequence of Operation" for solenoid valve controllers, control wiring, and sequence of operation.

K. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

L. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Division 8 Section "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.

M. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.

N. Slope refrigerant piping as follows:

1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
2. Install horizontal suction lines with a uniform slope downward to compressor.
3. Install traps and double risers to entrain oil in vertical runs.
4. Liquid lines may be installed level.

O. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

P. Before installation of steel refrigerant piping, clean pipe and fittings using the following procedures:

1. Shot blast the interior of piping.
2. Remove coarse particles of dirt and dust by drawing a clean, lintless cloth through tubing by means of a wire or electrician's tape.
3. Draw a clean, lintless cloth saturated with trichloroethylene through the tube or pipe. Continue this procedure until cloth is not discolored by dirt.
4. Draw a clean, lintless cloth, saturated with compressor oil, squeezed dry, through the tube or pipe to remove remaining lint. Inspect tube or pipe visually for remaining dirt and lint.
5. Finally, draw a clean, dry, lintless cloth through the tube or pipe.
6. Safety-relief-valve discharge piping is not required to be cleaned but is required to be open to allow unrestricted flow.

Q. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.

R. Seal pipe penetrations through exterior walls according to Division 7 Section "Joint Sealants" for materials and methods.

S. Identify refrigerant piping and valves according to Division 23 Section "Mechanical Identification."

3.04 PIPE JOINT CONSTRUCTION

A. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

B. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide), during brazing or welding, to prevent scale formation.

C. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."

D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."

1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.
2. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.

E. Threaded Joints: Thread steel pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry-seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

F. Welded Joints: Construct joints according to AWS D10.12/D10.12M.

3.05 HANGERS AND SUPPORTS

A. Hanger, support, and anchor products are specified in Division 23 Section 23 0529 "Hangers and Supports."

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet long.
2. Roller hangers and spring hangers for individual horizontal run 20 feet or longer.
3. Spring hangers to support vertical runs.
4. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

C. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:

1. NPS 1/2: Maximum span, 60 inches; minimum rod size, 1/4 inch.
2. NPS 5/8: Maximum span, 60 inches; minimum rod size, 1/4 inch.
3. NPS 1: Maximum span, 72 inches; minimum rod size, 1/4 inch.
4. NPS 1-1/4: Maximum span, 96 inches; minimum rod size, 3/8 inch.
5. NPS 1-1/2: Maximum span, 96 inches; minimum rod size, 3/8 inch.

3.06 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Comply with ASME B31.5, Chapter VI.
2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
3. Test high- and low-pressure side piping of each system separately.
   a. Fill system with nitrogen to the required test pressure.
   b. System shall maintain test pressure at the manifold gage throughout duration of test.
   c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
   d. Remake leaking joints using new materials and retest until satisfactory results are achieved.

3.07 SYSTEM CHARGING

A. Charge system using the following procedures:

1. Install core in filter dryers after leak test but before evacuation.
2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
4. Charge system with a new replaceable filter-dryer core in charging line.

3.08 ADJUSTING

A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.

B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.

C. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:

1. Open shutoff valves in condenser water circuit.
2. Verify that compressor oil level is correct.
3. Open compressor suction and discharge valves.
4. Open refrigerant valves except bypass valves that are used for other purposes.
5. Check open compressor-motor alignment and verify lubrication for motors and bearings.

D. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION

SECTION 23 31 13 DUCTWORK AND ACCESSORIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Single-wall round ducts and fittings.
3. Sheet metal materials.

B. Related Sections:

1. Division 23 Section 23 05 93 "Testing, Adjusting, and Balancing" for testing, adjusting, and balancing requirements for metal ducts.

1.03 PERFORMANCE REQUIREMENTS

A. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

1.04 SUBMITTALS

A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.

B. Shop Drawings:

1. Duct layout indicating sizes, liner material, and static-pressure classes.
2. Elevation of top of ducts.
3. Dimensions of main duct runs from building grid lines.
4. Penetrations through fire-rated and other partitions.

C. Field quality-control reports.

1.05 QUALITY ASSURANCE

A. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-Up."

B. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.01 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-4, "Transverse (Girth) Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-5, "Longitudinal Seams - Rectangular Ducts," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 2, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.02 SHEET METAL MATERIALS

A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G90.
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

B. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.03 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

B. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

2.04 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1, "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct."

D. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

2.05 BACKDRAFT RELIEF DAMPERS

A. Subject to compliance with requirements, provide products by one of but not limited to the following:

1. Air Balance Inc.; a division of Mestek, Inc.
2. Greenheck Fan Corporation.
3. Nailor Industries Inc.
4. Ruskin Company.

B. Description: Gravity balanced; Maximum Air Velocity: 2000 fpm; Maximum System Pressure: 1-inch wg.

C. Frame: 0.052-inch- thick, galvanized sheet steel with welded corners and mounting flange; Blades: Multiple single-piece blades, center-pivoted, maximum 6-inch width, 0.025-inch- thick, roll-formed aluminum with sealed edges.

D. Blade Action: Parallel; Blade Seals: Neoprene mechanically locked; Blade Axles: 0.20 inch Stainless steel; Tie Bars and Brackets: Galvanized steel.

E. Return Spring: Adjustable tension with Steel ball or synthetic pivot bushings.

F. Accessories:

1. Counterweights and spring-assist kits for vertical airflow installations.
2. Aluminum bird screen Mounting: Front mounted in sleeve.
   a. Sleeve Thickness: 20-gage minimum.
   b. Sleeve Length: 6 inches minimum.
3. 90-degree stops.

2.06 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:

1. Subject to compliance with requirements, provide products by one of but not limited to the following:
   a. Air Balance Inc.; a division of Mestek, Inc.
   b. Greenheck Fan Corporation.
   c. Nailor Industries Inc.
   d. Ruskin Company.
2. Standard leakage rating, with linkage outside airstream.

3. Suitable for horizontal or vertical applications.
4. Frames:
   a. Hat-shaped, galvanized-steel channels, 0.064-inch minimum thickness.
   b. Mitered and welded corners.
   c. Flanges for attaching to walls and flangeless frames for installing in ducts.
5. Blades:
   a. Multiple or single blade.
   b. Parallel- or opposed-blade design.
   c. Stiffen damper blades for stability.
   d. Galvanized-steel, 0.064 inch thick.
6. Blade Axles: Galvanized steel.
7. Bearings:
   a. Molded synthetic.
   b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
8. Tie Bars and Brackets: Galvanized steel.

2.07 FIRE DAMPERS

A. Subject to compliance with requirements, provide products by one of but not limited to the following:

1. Air Balance Inc.; a division of Mestek, Inc.
2. Arrow United Industries; a division of Mestek, Inc.
3. Prefco; Perfect Air Control, Inc.
4. Ruskin Company.

B. Type: Static and dynamic; rated and labeled according to UL 555 by an NRTL.

C. Closing rating in ducts up to 4-inch wg static pressure class and minimum 4000-fpm velocity.

D. Fire Rating: 1-1/2 and 2 hours.

E. Frame: Curtain type with blades outside airstream or Multiple-blade type; fabricated with roll-formed, 0.034-inch- thick galvanized steel; with mitered and interlocking corners.

F. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.

1. Minimum Thickness: 0.052 or 0.138 inch thick, as indicated, and of length to suit application.

G. Mounting Orientation: Vertical as indicated.

H. Blades: Roll-formed, interlocking, 0.034-inch- thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch- thick, galvanized-steel blade connectors.

I. Heat-Responsive Device: Replaceable, 165 deg F rated fusible links.

2.08 DUCT-MOUNTED ACCESS DOORS

A. Subject to compliance with requirements, provide products by one of but not limited to the following:

1. Air Balance Inc.; a division of Mestek, Inc.
2. Greenheck Fan Corporation.
3. Nailor Industries Inc.
4. Ruskin Company.

B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-10, "Duct Access Doors and Panels," and 2-11, "Access Panels - Round Duct."

1. Door:
   a. Double wall, rectangular.
   b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
3. Number of Hinges and Locks:
   a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
   b. Access Doors up to 18 Inches Square: Two hinges and two sash locks.

2.09 FLEXIBLE CONNECTORS

A. Subject to compliance with requirements, provide products by one of but not limited to the following:

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. Ventfabrics, Inc.
4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Materials: Flame-retardant or noncombustible fabrics.

C. Coatings and Adhesives: Comply with UL 181, Class 1.

D. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to 2 strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Provide metal compatible with connected ducts.

E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz. /sq. yd.
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F.

2.10 FLEXIBLE DUCTS

A. Subject to compliance with requirements, provide products by one of but not limited to the following:

1. Flexmaster U.S.A., Inc.
2. McGill AirFlow LLC.

3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Insulated, Flexible Duct: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; aluminized vapor-barrier film.

1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
2. Maximum Air Velocity: 4000 fpm.
3. Temperature Range: Minus 10 to plus 160 deg F.
4. Insulation R-value: Comply with ASHRAE/IESNA 90.1-2004.

PART 3 - EXECUTION

3.01 DUCT INSTALLATION

A. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

B. Install ducts with fewest possible joints.

C. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

D. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

E. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

F. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

G. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.

3.02 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.

B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

C. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

D. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.03 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
3. Conditioned Space, Exhaust Ducts: Seal Class B.
4. Conditioned Space, Return-Air Ducts: Seal Class C.

3.04 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports."

B. Building Attachments: Powder-actuated fasteners (with structural engineer approval), or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1, "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

3.05 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Division 9 painting Sections.

3.06 ACCESSORIES INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Install backdraft dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.

C. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.

D. Set dampers to fully open position before testing, adjusting, and balancing.

E. Install test holes at fan inlets and outlets and elsewhere as indicated.

F. Install fire dampers according to UL listing.

G. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:

1. Upstream and downstream from duct filters.
2. At outdoor-air intakes and mixed-air plenums.
3. At drain pans and seals.
4. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
5. Adjacent to and close enough to fire dampers, to reset or reinstall fusible links.
6. At each change in direction and at maximum 50-foot spacing.

H. Install access doors with swing against duct static pressure.

I. Access Door Sizes:

1. One-Hand or Inspection Access: 8 by 5 inches.
2. Two-Hand Access: 12 by 6 inches.
3. Head and Hand Access: 18 by 10 inches.

J. Install flexible connectors to connect ducts to equipment.

K. Connect diffusers or light troffer boots to ducts directly or with maximum 84-inch lengths of flexible duct clamped or strapped in place.

L. Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.

M. Install duct test holes where required for testing and balancing purposes.

3.07 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Operate fire dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.

B. Leakage Tests:

1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.

C. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.

D. Duct system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

END OF SECTION

SECTION 23 34 00 CENTRIFUGAL FANS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Backward-inclined centrifugal fans.
2. Forward-curved centrifugal fans.

1.03 SUBMITTALS

A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated and include the following:

1. Certified fan performance curves with system operating conditions indicated.
2. Certified fan sound-power ratings.
3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
4. Material thickness and finishes, including color charts.
5. Dampers, including housings, linkages, and operators.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Power, signal, and control wiring.
2. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
3. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.

C. Coordination Drawings: Show fan room layout and relationships between components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate and certify field measurements.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For centrifugal fans to include in emergency, operation, and maintenance manuals.

1.04 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.

C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA 1.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver fans as factory-assembled units, to the extent allowable by shipping limitations, with protective crating and covering.

B. Disassemble and reassemble units, as required for moving to the final location, according to manufacturer's written instructions.

C. Lift and support units with manufacturer's designated lifting or supporting points.

1.06 COORDINATION

A. Coordinate size and location of structural-steel support members.

B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.

C. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 7 Section "Roof Accessories."

1.07 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Belts: One set for each belt-driven unit.

PART 2 - PRODUCTS

2.01 BACKWARD-INCLINED CENTRIFUGAL FANS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ABB Fan Group North America.
2. Acme Engineering & Mfg. Corp.
3. Aerovent; a Twin City Fan Company.
4. Ammerman; General Resource Corp.
5. Central Blower Company.
6. Chicago Blower Corporation.

7. Cincinnati Fan.
8. Industrial Air; a division of Lau Industries, Inc.
9. Loren Cook Company.
10. New York Blower Company (The).

B. Description: Factory-fabricated, -assembled, -tested, and -finished, belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, and support structure.

C. Housings: Formed panels to make curved-scroll housings with shaped cutoff; with doors or panels to allow access to internal parts and components.

1. Panel Bracing: Steel angle- or channel-iron member supports for mounting and supporting fan scroll, wheel, motor, and accessories.
2. Horizontally split, bolted-flange housing.
3. Spun inlet cone with flange.
4. Outlet flange.

D. Backward-Inclined Wheels: Single-width-single-inlet and double-width-double-inlet construction with curved inlet flange, backplate, backward-inclined blades welded or riveted to flange and backplate; cast-iron or cast-steel hub riveted to backplate and fastened to shaft with set screws.

E. Shafts: Statically and dynamically balanced and selected for continuous operation at maximum rated fan speed and motor horsepower, with final alignment and belt adjustment made after installation.

1. Turned, ground, and polished hot-rolled steel with keyway. Ship with a protective coating of lubricating oil.
2. Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.

F. Prelubricated and Sealed Shaft Bearings: Self-aligning, pillow-block-type ball bearings.

1. Ball-Bearing Rating Life: ABMA 9, Ll0 at 120,000 hours.
2. Roller-Bearing Rating Life: ABMA 11, Ll0 at 120,000 hours.

G. Grease-Lubricated Shaft Bearings: Self-aligning, pillow-block-type, tapered roller bearings with double-locking collars and two-piece, cast-iron housing.

1. Ball-Bearing Rating Life: ABMA 9, Ll0 at 120,000 hours.
2. Roller-Bearing Rating Life: ABMA 11, Ll0 at 120,000 hours.

H. Grease-Lubricated Shaft Bearings: Self-aligning, pillow-block-type, ball or roller bearings with adapter mount and two-piece, cast-iron housing.

1. Ball-Bearing Rating Life: ABMA 9, Ll0 at 120,000 hours.
2. Roller-Bearing Rating Life: ABMA 11, Ll0 at 120,000 hours.

I. Belt Drives: Factory mounted, with final alignment and belt adjustment made after installation.

1. Service Factor Based on Fan Motor Size: 1.5.

2. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
3. Motor Pulleys: Adjustable pitch for use with motors through 5hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
4. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
5. Belt Guards: Fabricate to comply with OSHA and SMACNA requirements of diamond-mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation. Include provisions for adjustment of belt tension, lubrication, and use of tachometer with guard in place.
6. Motor Mount: Adjustable for belt tensioning.

J. Accessories:

1. Scroll Access Doors: Shaped to conform to scroll, with quick-opening latches and gaskets.
2. Cleanout Door: Quick-opening, latch-type gasketed door allowing access to fan scroll, of same material as housing.
3. Scroll Drain Connection: NPS 1 steel pipe coupling welded to low point of fan scroll.
4. Companion Flanges: Rolled flanges for duct connections of same material as housing.
5. Variable Inlet Vanes: With blades supported at both ends with two permanently lubricated bearings of same material as housing. Variable mechanism terminating in single control lever with control shaft for double-width fans.
6. Discharge Dampers: Assembly with opposed blades constructed of two plates formed around and to shaft, channel frame, and sealed ball bearings; with blades linked outside of airstream to single control lever of same material as housing.
7. Inlet Screens: Grid screen of same material as housing.
8. Shaft Cooler: Metal disk between bearings and fan wheel, designed to dissipate heat from shaft.
9. Spark-Resistant Construction: AMCA 99.
10. Shaft Seals: Airtight seals installed around shaft on drive side of single-width fans.
11. Weather Cover: Enameled-steel sheet with ventilation slots, bolted to housing.

K. Motors: Comply with requirements in Division 15 Section "Motors."

1. Enclosure Type: Totally enclosed, fan cooled.

2.02 FORWARD-CURVED CENTRIFUGAL FANS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ABB Fan Group North America.
2. Acme Engineering & Mfg. Corp.
3. Aerovent; a Twin City Fan Company.
4. Airmaster Fan Co.
5. Ammerman; General Resource Corp.
6. Central Blower Corporation.
7. Chicago Blower Corporation.

8. Industrial Air; a division of Lau Industries, Inc.
9. Loren Cook Company.
10. New York Blower Company (The).

B. Description: Factory-fabricated, -assembled, -tested, and -finished, belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, and support structure.

C. Housings: Formed panels to make curved-scroll housings with shaped cutoff; with doors or panels to allow access to internal parts and components.

1. Panel Bracing: Steel angle- or channel-iron member supports for mounting and supporting fan scroll, wheel, motor, and accessories.
2. Horizontally split, bolted-flange housing.
3. Spun inlet cone with flange.
4. Outlet flange.

D. Forward-Curved Wheels: Black-enameled or galvanized steel construction with inlet flange, backplate, shallow blades with inlet and tip curved forward in direction of airflow, mechanically secured to flange and backplate; cast-steel hub swaged to backplate and fastened to shaft with set screws.

E. Shafts: Statically and dynamically balanced and selected for continuous operation at maximum rated fan speed and motor horsepower, with final alignment and belt adjustment made after installation.

1. Turned, ground, and polished hot-rolled steel with keyway. Ship with protective coating of lubricating oil.
2. Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.

F. Prelubricated and Sealed Shaft Bearings: Self-aligning, pillow-block-type ball bearings.

1. Ball-Bearing Rating Life: ABMA 9, Ll0 at 120,000 hours.
2. Roller-Bearing Rating Life: ABMA 11, Ll0 at 120,000 hours.

G. Grease-Lubricated Shaft Bearings: Self-aligning, pillow-block-type, tapered roller bearings with double-locking collars and two-piece, cast-iron housing.

1. Ball-Bearing Rating Life: ABMA 9, Ll0 at 120,000 hours.
2. Roller-Bearing Rating Life: ABMA 11, Ll0 at 120,000 hours.

H. Grease-Lubricated Shaft Bearings: Self-aligning, pillow-block-type, ball or roller bearings with adapter mount and two-piece, cast-iron housing.

1. Ball-Bearing Rating Life: ABMA 9, Ll0 at 120,000 hours.
2. Roller-Bearing Rating Life: ABMA 11, Ll0 at 120,000 hours.

I. Belt Drives: Factory mounted, with final alignment and belt adjustment made after installation.

1. Service Factor Based on Fan Motor Size: 1.5.
2. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.

3. Motor Pulleys: Adjustable pitch for use with motors through 5hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
4. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
5. Belt Guards: Fabricate to comply with OSHA and SMACNA requirements of diamond-mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation. Include provisions for adjustment of belt tension, lubrication, and use of tachometer with guard in place.
6. Motor Mount: Adjustable for belt tensioning.

J. Accessories:

1. Scroll Access Doors: Shaped to conform to scroll, with quick-opening latches and gaskets.
2. Cleanout Door: Quick-opening, latch-type gasketed door allowing access to fan scroll, of same material as housing.
3. Scroll Drain Connection: NPS 1 steel pipe coupling welded to low point of fan scroll.
4. Companion Flanges: Rolled flanges for duct connections of same material as housing.
5. Variable Inlet Vanes: With blades supported at both ends with two permanently lubricated bearings of same material as housing. Variable mechanism terminating in single control lever with control shaft for double-width fans.
6. Discharge Dampers: Assembly with opposed blades constructed of two plates formed around and to shaft, channel frame, and sealed ball bearings; with blades linked outside of airstream to single control lever of same material as housing.
7. Inlet Screens: Grid screen of same material as housing.
8. Shaft Cooler: Metal disk between bearings and fan wheel, designed to dissipate heat from shaft.
9. Spark-Resistant Construction: AMCA 99.
10. Shaft Seals: Airtight seals installed around shaft on drive side of single-width fans.
11. Weather Cover: Enameled-steel sheet with ventilation slots, bolted to housing.

2.03 SOURCE QUALITY CONTROL

A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.

B. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install centrifugal fans level and plumb.

B. Support floor-mounting units using spring isolators or restrained spring isolators having a static deflection of 1 inch. Vibration- and seismic-control devices are specified in Division 15 Section "Mechanical Vibration and Seismic Controls."

1. Secure vibration and seismic controls to concrete bases using anchor bolts cast in concrete base.

C. Install floor-mounting units on concrete bases. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete."

D. Install floor-mounting units on concrete bases designed to withstand, without damage to equipment, the seismic force required by authorities having jurisdiction. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete."

E. Support suspended units from structure using threaded steel rods and elastomeric hangers; spring hangers or spring hangers with vertical-limit stops having a static deflection of 1 inch. Vibration-control devices are specified in Division 15 Section "Mechanical Vibration and Seismic Controls."

F. Install units with clearances for service and maintenance.

G. Label fans according to requirements specified in Division 15 Section "Mechanical Identification."

3.02 CONNECTIONS

A. Duct installation and connection requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Division 15 Section "Duct Accessories."

B. Install ducts adjacent to fans to allow service and maintenance.

C. Install line-sized piping from scroll drain connection, with trap with seal equal to 1.5 times specified static pressure, to nearest floor drain.

D. Ground equipment according to Division 16 Section "Grounding and Bonding."

E. Connect wiring according to Division 16 Section "Conductors and Cables."

3.03 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. Verify that shipping, blocking, and bracing are removed.
2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
3. Verify that cleaning and adjusting are complete.
4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.

5. Adjust belt tension.
6. Adjust damper linkages for proper damper operation.
7. Verify lubrication for bearings and other moving parts.
8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
9. Refer to Division 15 Section "Testing, Adjusting, and Balancing" for testing, adjusting, and balancing procedures.
10. Remove and replace malfunctioning units and retest as specified above.

B. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

END OF SECTION

SECTION 23 37 13 DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Rectangular and square ceiling diffusers.
2. Perforated diffusers.
3. Louver face diffusers.
4. Adjustable bar registers and grilles.
5. Fixed face registers and grilles.

B. Related Sections:

1. Division 23 Section 23 3113 "Ductwork and Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated, include the following:

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

B. Samples for Initial Selection: For diffusers, registers, and grilles with factory-applied color finishes.

C. Samples for Verification: For diffusers, registers, and grilles, in manufacturer's standard sizes to verify color selected.

D. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Ceiling suspension assembly members.
2. Method of attaching hangers to building structure.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
5. Duct access panels.

E. Source quality-control reports.

PART 2 - PRODUCTS

2.01 CEILING DIFFUSERS

A. Rectangular and Square Ceiling Diffusers :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Anemostat Products; a Mestek company.
   b. Carnes.
   c. Hart & Cooley Inc.
   d. Krueger.
   e. METALAIRE, Inc.
   f. Nailor Industries Inc.
   g. Price Industries.
   h. Titus.
   i. Tuttle & Bailey.
2. Devices shall be specifically designed for variable-air-volume flows.
3. Material: Aluminum.
4. Finish: Anodized aluminum color selected by Architect.
5. Face Size: 24 by 24 inches.
6. Face Style: four cones.
7. Mounting: Surface, T-bar, Snap in or Spline.
8. Pattern: Adjustable.
9. Dampers: Radial opposed blade.
10. Accessories:
    a. Equalizing grid.
    b. Plaster ring.
    c. Safety chain.
    d. Wire guard.
    e. Sectorizing baffles.
    f. Operating rod extension.

B. Perforated Diffuser :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Air Research Diffuser Products, Inc.
   b. Anemostat Products; a Mestek company.
   c. Carnes.
   d. Hart & Cooley Inc.
   e. Krueger.
   f. METALAIRE, Inc.
   g. Nailor Industries Inc.
   h. Price Industries.
   i. Titus.
   j. Tuttle & Bailey.
   k. Warren Technology.
2. Devices shall be specifically designed for variable-air-volume flows.
3. Material: Steel backpan and pattern controllers, with aluminum face.
4. Finish: Anodized aluminum color selected by Architect.

5. Face Size: 24 by 24 inches.
6. Duct Inlet: Round or Square.
7. Face Style: Flush.
8. Mounting: Surface, T-bar, Snap in or Spline.
9. Pattern Controller: Adjustable with louvered pattern modules at inlet.
10. Dampers: Opposed blade.
11. Accessories:
    a. Equalizing grid.
    b. Plaster ring.
    c. Safety chain.
    d. Wire guard.
    e. Sectorizing baffles.
    f. Operating rod extension.

C. Louver Face Diffuser :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Anemostat Products; a Mestek company.
    b. Carnes.
    c. METALAIRE, Inc.
    d. Nailor Industries Inc.
    e. Price Industries.
    f. Titus.
    g. Tuttle & Bailey.
2. Devices shall be specifically designed for variable-air-volume flows.
3. Material: Steel backpan and pattern controllers, with aluminum face.
4. Finish: Anodized aluminum color selected by Architect.
5. Face Size: 24 by 24 inches.
6. Duct Inlet: Round or Square.
7. Face Style: Flush.
8. Mounting: Surface, T-bar, Snap in or Spline.
9. Pattern Controller: Adjustable with louvered pattern modules at inlet.
10. Dampers: Opposed blade.
11. Accessories:
    a. Square to round neck adaptor.
    b. Adjustable pattern vanes.
    c. Throw reducing vanes.
    d. Equalizing grid.
    e. Plaster ring.
    f. Safety chain.
    g. Wire guard.
    h. Sectorizing baffles.
    i. Operating rod extension.

2.02 REGISTERS AND GRILLES

A. Adjustable Bar Grille :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Anemostat Products; a Mestek company.
    b. Carnes.
    c. Dayus Register & Grille Inc.

d. Hart & Cooley Inc.
e. Krueger.
f. METALAIRE, Inc.
g. Nailor Industries Inc.
h. Price Industries.
i. Titus.
j. Tuttle & Bailey.

2. Material: Aluminum.
3. Finish: Baked enamel, color selected by Architect.
4. Face Blade Arrangement: Horizontal spaced 1/2 inch apart.
5. Core Construction: Integral.
6. Rear-Blade Arrangement: Vertical spaced 1/2 inch apart.
7. Frame: 1 inch wide.
8. Mounting: Countersunk screw.

B. Fixed Face Register / Grille:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Anemostat Products; a Mestek company.
   b. Carnes.
   c. Dayus Register & Grille Inc.
   d. Hart & Cooley Inc.
   e. Krueger.
   f. Nailor Industries Inc.
   g. Price Industries.
   h. Titus.
   i. Tuttle & Bailey.
2. Material: Steel.
3. Finish: Baked enamel, color selected by Architect.
4. Face Arrangement: Perforated core.
5. Core Construction: Integral.
6. Frame: 1 inch wide.
7. Mounting: Countersunk screw.
8. Damper Type: Adjustable opposed blade.
9. Accessory: Filter.

2.03 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

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

3.02 INSTALLATION

A. Install diffusers, registers, and grilles level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.03 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION

SECTION 23 82 16 SPLIT-SYSTEM AIR-CONDITIONING UNITS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes split-system air-conditioning and heat pump units consisting of separate evaporator-fan and compressor-condenser components. Units are designed for exposed or concealed mounting, and may be connected to ducts.

1.03 SUBMITTALS

A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

F. Warranty: Special warranty specified in this Section.

1.04 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of split-system units and are based on the specific system indicated.

B. 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.

C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

D. ASHRAE/IESNA 90.1-2004 Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.05 COORDINATION

A. Coordinate size and location of concrete bases for units. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Division 3 Section "Cast-in-Place Concrete."

B. Coordinate size, location, and connection details with roof curbs, equipment supports, and roof penetrations specified in Division 7 Section "Roof Accessories."

1.06 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

1.07 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: One set of filters for each unit.
2. Fan Belts: One set of belts for each unit.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Carrier Air Conditioning; Div. of Carrier Corporation.
2. Friedrich Air Conditioning Company.
3. Lennox Industries Inc.
4. Mitsubishi Heavy Industries America, Inc.; Air-Conditioning & Refrigeration Division, Inc.
5. Sanyo Fisher (U.S.A.) Corp.
6. Trane Company (The); Unitary Products Group.

2.02 CONCEALED EVAPORATOR-FAN COMPONENTS

A. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.

1. Insulation: Faced, glass-fiber duct liner.
2. Drain Pans: Galvanized steel, with connection for drain; insulated and complying with ASHRAE 62.1-2004.
3. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

B. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.

C. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements with refractory ceramic support bushings; automatic-reset thermal cutout; built-in magnetic contactors; manual-reset thermal cutout; airflow proving device; and one-time fuses in terminal box for overcurrent protection.

D. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.

E. Fan Motors: Multitapped, multispeed with internal thermal protection and permanent lubrication.

F. Disposable Filters: 1 inch thick, in fiberboard frames with ASHRAE 52.2 MERV rating of 6 or higher.

G. Wiring Terminations: Connect motor to chassis wiring with plug connection.

2.03 WALL-MOUNTING, EVAPORATOR-FAN COMPONENTS

A. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect, and discharge drain pans with drain connection.

1. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
2. Drain Pan and Drain Connection: Comply with ASHRAE 62.1-2004.

B. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.

C. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements with refractory ceramic support bushings; automatic-reset thermal cutout; built-in magnetic contactors; manual-reset thermal cutout; airflow proving device; and one-time fuses in terminal box for overcurrent protection.

D. Fan: Direct drive, centrifugal fan.

E. Fan Motors: Multitapped, multispeed with internal thermal protection and permanent lubrication.

F. Filters: Permanent, cleanable, with ASHRAE 52.2 MERV rating of 6 or higher.

2.04 CEILING-MOUNTING, EVAPORATOR-FAN COMPONENTS

A. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect, and discharge drain pans with drain connection.

1. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
2. Drain Pan and Drain Connection: Comply with ASHRAE 62.1-2004.

B. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.

C. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements with refractory ceramic support bushings; automatic-reset thermal cutout; built-in magnetic contactors; manual-reset thermal cutout; airflow proving device; and one-time fuses in terminal box for overcurrent protection.

D. Fan: Direct drive, centrifugal fan and integral condensate pump.

E. Fan Motors: Multitapped, multispeed with internal thermal protection and permanent lubrication.

F. Filters: Permanent, cleanable, with ASHRAE 52.2 MERV rating of 6 or higher.

2.05 AIR-COOLED, COMPRESSOR-CONDENSER COMPONENTS

A. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.

B. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.

1. Compressor Type: Reciprocating or Scroll.
2. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
3. Refrigerant: R-407C or R-410A.

C. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.

D. Fan: Aluminum-propeller type, directly connected to motor.

E. Motor: Permanently lubricated, with integral thermal-overload protection.

F. Low Ambient Kit: Permits operation down to 45°F.

G. Mounting Base: Polyethylene.

H. Minimum Energy Efficiency: Comply with ASHRAE/IESNA 90.1-2004, "Energy Standard for Buildings except Low-Rise Residential Buildings."

2.06 ACCESSORIES

A. Thermostat: Low voltage with subbase to remotely control compressor and evaporator fan, with the following features:

1. Compressor time delay.
2. 24-hour time control of system stop and start.
3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
4. Fan-speed selection, including auto setting.

B. Automatic-reset timer to prevent rapid cycling of compressor.

C. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.

1. Minimum Insulation Thickness: 3/4 inch thick.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install units level and plumb.

B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Install compressor-condenser components on restrained, spring isolators with a minimum static deflection of 1 inch.

D. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.02 CONNECTIONS

A. Install piping adjacent to unit to allow service and maintenance.

B. Duct Connections: Drawings indicate the general arrangement of ducts. Connect supply and return ducts to split-system air-conditioning units with flexible duct connectors.

C. Ground equipment according to Division 26 Section "Grounding and Bonding."

D. Electrical Connections: Comply with requirements in Division 26 Sections for power wiring, switches, and motor controls.

3.03 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Remove and replace malfunctioning units and retest as specified above.

3.04 DEMONSTRATION

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

END OF SECTION

SECTION 23 83 10 ELECTRIC INFRARED RADIANT HEATERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes electric, infrared and high-intensity infrared radiant heaters.

1.03 SUBMITTALS

A. Product Data: For each type of electric radiant heater indicated. Include rated capacities, operating characteristics, and accessories.

B. Shop Drawings shall 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 shall include power**,** signal, and control wiring.

C. Coordination Drawings for Contractor installation shall include plans, elevations, and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Structural members to which equipment will be attached.

D. Field quality-control test reports.

E. Operation and Maintenance Data for electric radiant heaters to include in emergency, operation, and maintenance manuals.

1.04 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.05 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of electric radiant heater that fails in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 HIGH-INTENSITY INFRARED HEATERS

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

1. Combustion Research Corporation.
2. Electric Products Inc.; Space-Ray Div.
3. Panelbloc, Inc.
4. Reznor/Thomas & Betts Corporation.
5. Roberts-Gordon, Inc.
6. Sterling HVAC Products; Div. of Mestek Technology Inc.

B. Reflector: Polished aluminum.

C. Accessories:

1. Parabolic reflector.
2. Wire grid for increased efficiency.
3. Protective screen.
4. Heat-deflector shield.
5. Stainless-steel flexible connector with manual valve.
6. Hanger chain with "S" hooks.
7. Preassembled chain suspension kit.

2.02 CONTROLS

A. Thermostat: 2-stage, wall-mounting type with 50°F to 90°F operating range and fan on switch.

1. Control Transformer: Integrally mounted.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install and connect electric radiant heaters according to manufacturer's written installation instructions.

B. Suspended Units: Suspend from substrate using chain hanger kits and building attachments.

C. Maintain manufacturers' recommended clearances to combustibles.

3.02 CONNECTIONS

A. Electrical Connections: Comply with applicable requirements in Division 26 Sections.

1. Install electrical devices furnished with heaters but not specified to be factory mounted.

3.03 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports:

1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
2. Verify bearing lubrication.
3. Verify proper motor rotation.
4. Test Reports: Prepare a written report to record the following:
   a. Test procedures used.
   b. Test results that comply with requirements.
   c. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

B. Remove and replace malfunctioning units and retest as specified above.

3.04 ADJUSTING

A. Adjust initial temperature set points.

B. Adjust burner and other unit components for optimum heating performance and efficiency.

3.05 DEMONSTRATION

A. Owner's maintenance personnel to adjust, operate, and maintain electric radiant heaters. Refer to Division 1 Section "Demonstration and Training."

END OF SECTION

SECTION 26 05 00 GENERAL PROVISIONS

PART 1 - GENERAL

1.01 GOVERNING CLAUSE

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

1.02 GENERAL CONDITIONS

A. General Conditions, Supplementary General Conditions, Information to Bidders, General Requirements and Alternates and other pertinent documents issued by the Architect are a part of these specifications and shall be complied with in every respect.

B. This project requires major renovation of existing systems along with additions and modifications. All existing areas and equipment not under modification shall remain in operation. Electrical service shall not be interrupted except with approval of the Architect and interruption shall occur at the convenience of the Owner with proper advance notification. This may require week-end and night work.

C. Where new work or demolition affects existing electrical equipment and/or circuitry which will remain, the equipment shall be removed, relocated as required, and recircuited in accord with these specifications. Any necessary temporary relocation, as determined by the Architect, shall be done at no extra cost and in a safe and secure manner.

D. Demolition of existing equipment noted or required by the new work shall consist of removal of equipment, removal of exposed conduit, removal of wiring back to next in line junction or over-current protection and re-connection and/or rerouting of feed-thru circuits. All equipment removed shall remain the property of the Owner unless the Contractor is otherwise instructed in which case it shall be removed from the site by the Contractor.

E. Prior to beginning work, Contractor shall note (in writing to the Architect) any deficiencies in the existing systems that are to be modified by this project. This shall be used to determine the final operating condition of systems at the completion of this project.

F. Where existing panels/switchboards are shown or noted to be used for new circuits, existing adequate breakers and spaces may be used for the new circuits. All required hardware and accessories necessary for installation of new breaker(s) shall be provided. Where space is inadequate, Contractor shall furnish new panel/enclosure with sufficient pole capacity and serve by tapping bus of existing panel.

1.03 RECORD DRAWINGS

A. The contractor shall provide the Architect at job acceptance the following:

1. Two (2) sets of blue line prints of same scale as original drawings marked in red showing all variations of the work actually installed related to the original drawings. This set of 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 16 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.

1.04 GUARANTEE

A. 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 date of final acceptance by the Architect and the Owner except as hereinafter noted.

1. Remedy within a reasonable period any defects arising during this period at his own expense upon notice of the Owner or his authorized representative.
2. Lamps are hereby exempt from a one-year guarantee as follows:
   a. All lamps are to be operating upon acceptance of the job.
   b. All incandescent lamp burn-outs occurring during the first thirty (30) days after final acceptance shall be reported to the Architect at the end of this thirty-day period. Replacements for these burn-outs shall be furnished and installed by the Contractor upon notice from the Architect.
   c. All gaseous vapor discharge lamp burn-outs occurring during the first one-hundred eighty (180) days after final acceptance shall be reported to the Architect at the end of this one hundred eighty-day period. Replacements for these burn-outs shall be furnished and installed by the Contractor upon notice from the Architect.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 TESTS AND OBSERVATIONS

A. The complete job 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. By Architect's observations and tests conducted by him or for him in his presence. Upon notice, Contractor shall furnish not to exceed two men, one to include the job foreman, and tools to assist and be directed by the Architect for a reasonable amount of time to make such tests and observations as are requested by the Architect.

C. Conductor insulation tests shall be performed in the Architect's presence and shall be subject to his approval. A written report of these tests shall be submitted to the Architect for approval prior to acceptance of the work.

600-Volt Conductor: Using a 500-volt megger, each circuit conductor shall be tested with all splices made but no equipment connected. The ohmic value shall be recorded and results must meet minimum requirements as follows:

Wire Size	Kilohms
#12	1000
#10-#8	250
#6-#3	100
#2-#3/0	50
#4/0-500 MCM	25
750 MCM	12

1. Feeders with paralleled conductors shall have conductors tested separately prior to paralleling.
2. Conductors not meeting these minimum values shall be repaired or replaced as directed by the Architect.

D. By any Federal, State and/or local authority.

E. 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 the Owner's Insurance Carrier's report or subsequent reports lie with the Architect or Owner.

F. Ground Rod Tests: Before any wire is connected to the ground rods, each rod shall be tested for resistance to ground. A direct reading, single test, portable ground-testing megger shall be used to test each ground rod. The auxiliary or reference ground rods shall be 3/4-inch copper clad steel, not less than 4 feet in length and driven 3-l/2 feet deep, and shall be installed in a straight line, a minimum of 20 feet from the ground being tested. No. #14 AWG stranded wire leads with high grade rubber insulation shall be connected to the rod being tested and the two reference rods and to the proper binding post on the instrument. Where there is more than one ground rod within a circle of 10 feet at a particular location, the reference rods as driven for the "first" test shall be used for tests on the other rods without changing their location. A pointer shall indicate the resistance to earth in ohms and fraction of ohms of the ground rod being tested. Tests shall not be made within 48 hours after rainfall nor during foggy weather. Should the ground resistance exceed 25 ohms, the Contractor shall install additional rods as necessary until the overall resistance is reduced to 25 ohms or below. Test results shall be recorded, including ambient conditions, and submitted to the Architect for approval.

G. Special Systems Test: The systems covered by Sections 16600 “Special Systems” shall be tested for proper operation after complete installation in accord with the manufacturer’s recommendations, applicable codes and test guidelines as detailed in the appropriate system’s specifications. The testing shall be done by an independent, third-party company qualified to test the system involved. Testing company qualifications shall be submitted to the Architect and must be approved by the Architect before testing begins.

H. A full report of test results as outlined in the associated system specifications shall be submitted to the Architect in writing prior to substantial completion. Where system(s) operations involve other Divisions of the Specifications, the affected Professional shall verify by signed statement that the operation was correct and complete. Retesting as necessary to achieve a completed report(s) shall be required. The Architect will perform random component testing at substantial completion. Should the system(s) not perform correctly, a complete re-test can be required with no increase in cost to the Owner. If more than one re-check by the Architect is required to verify proper system(s) operation, the Contractor will be billed for the time and expense of the Architect.

END OF SECTION

SECTION 26 05 01 CODES AND STANDARDS

PART 1 - GENERAL

1.01 CODES

A. Strictly comply with the latest edition of the National Electrical Code (NEC), National Fire Protection Association (NFPA), Standard Building Code (SBC), National Electrical Safety Code (ANSI-C2) and all Federal, State and/or local codes. Notify Architect of any conflict between these codes and the drawings and/or specifications before bid date or correct conflicts at his own expense.

1.02 STANDARDS

A. Familiarize himself, coordinate, and cooperate with all other trades in installation of his materials. Layout of Division 16 work shall be the responsibility of this Contractor and all conflicts with Division 16 work and other trades shall be resolved prior to installation.

B. Use only new equipment/materials of current manufacturer which are listed by Underwriters' Laboratories when such listings are issued for the type of equipment/materials, approved by NEMA standards, National Electrical Code standards or other appropriate agency. Equipment/material shall be of current production from manufacturer’s of long experience in the manufacturer of such type equipment/material and who are regularly engaged in the production of this type equipment/material.

C. Equipment/materials shall have local service representation where applicable.

D. Notify Architect prior to installation of conflicts between electrical and structural, architectural, mechanical, etc. work.

E. Equipment/materials installed and connected in strict compliance with manufacturer's recommendations unless these requirements are exceeded as noted on the drawings or specified herein.

F. Equipment/materials shall be installed and connected in a neat and workmanlike manner.

G. Use experienced labor or employ appropriate Sub-Contractor to do all cutting and patching necessary for installation of his materials. Obtain permission from Architect and General Contractor before cutting any structural member.

H. Not to scale electrical drawings. Follow architectural, equipment supplier shop drawings, and manufacturers shop and installation drawings for accuracy.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 26 05 02 ELECTRICAL SYSTEMS SCHEDULE

PART 1 - GENERAL

1.01 SYSTEMS

A. All electrical materials and operations for complete and operative systems as follows:

1. Secondary electrical distribution system
2. Power outlets and connections to all motors and equipment.
3. Lighting system complete with controls and fixtures.
4. Communications cabling systems
5. Fire alarm and detection system
6. Intercommunication system
7. Master time and program control system.
8. Miscellaneous as shown on the drawings and as stated herein.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 26 05 03 BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 GENERAL

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 Architect. Approval will not be considered until after award of contract and only if submitted by the Contractor.

C. The manufacturers name 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 Architect, at no additional cost to the Owner.

E. Architect's approval of shop drawings does not relieve the Contractor from satisfying the requirements of the drawings and specifications. Any equipment or work found in the judgement of the Architect 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 Architect, the Contractor shall submit a scale drawing (scale as directed by Architect) of any electrical equipment area, conduit layout, or the like which in the opinion of the Architect may present difficulty regarding space allocation or clearances.

G. Mounting Heights

1. Mounting heights of various devices, outlets, safety switches, panelboards and the like shall reference the height above the finished floor or grade above which they are mounted. Heights specified shall reference the center of the device, box, breaker or switch operating handle.
2. 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 block coursing so that they will be the same height above the reference.

3. Mounting height shall be as follows:

Description	Mounting Height
Switch Toggle	48" to center
Receptacle	16" to center
Safety Switch	54" to center
Panelboard	78" to top breaker
Enclosed Circuit Breakers	54" to center
Receptacle or Switch above counter top	4" to center above counter / backsplash
Fire Alarm System Audio/Visual Device	80" to center or 6" below ceiling, whichever lower
Fire alarm System Visual Device	80" to center or 6" below ceiling, whichever lower
Fire Alarm system Manual Station	48" to center

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 INSTRUCTIONS

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. 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.

D. 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.

E. Provide complete shop drawings with all pertinent information for the following equipment and/or systems and all required components:

1. Panelboards
2. Conduit and other raceways
3. Wire and cable
4. Wiring devices
5. Lighting fixtures
6. Lamps
7. Fire alarm and detection system components
8. Intercommunication system components
9. Master time & program control system components
10. Communications cabling components

END OF SECTION

SECTION 26 05 04 ELECTRICAL SERVICE SYSTEM

PART 1 - GENERAL

1.01 SECONDARY ELECTRICAL SERVICE

A. See Floor Plans for service voltage at each school

B. Verify the service voltage and service entrance requirements with the Utility Company prior to any rough-in or material purchase and notify the Architect of any required changes. Failure to adhere to this requirement shall make this Contractor responsible for correction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 SECONDARY ELECTRICAL SERVICE

A. Any costs to Owner from the utility company shall be included in bid.

3.02 ELECTRICAL METERING

A. Electrical metering is existing. All new loads will be metered together with existing. Provide all necessary components and/or costs from utility company.

END OF SECTION

SECTION 26 05 06 ELECTRICAL POWER CONNECTIONS

PART 1 - GENERAL

1.01 GENERAL

A. Electrical power connections shall be furnished and installed as shown on the drawings and as specified herein.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 GENERAL

A. Shall be installed in conduit in accordance with SECTION 26 05 33 "RACEWAYS AND FITTINGS".

B. Review architectural drawings and specifications and provide adequate service for and make proper connection to all equipment furnished by General Contractor requiring electrical service.

C. Carefully review plumbing and HVAC drawings and Divisions 22 and 23 of the specifications for mechanical equipment requiring electrical service. Provide adequate service for and make proper connection to all such mechanical equipment requiring electrical service.

D. Electrical connections to equipment shall follow the equipment manufacturer's recommended method. Where 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 Architect, prior to rough-in, or this Contractor shall be responsible for correction.

E. The Division 16 Contractor shall immediately upon notice to proceed and after verification of service with Utility Company, notify in writing the General Contractor and all other affected Contractors the characteristics of the electrical service including voltage and phase. A copy of this notification shall be sent to the Architect.

F. All equipment connections to include a maintenance disconnect of the type indicated or, if not specifically indicated, as recommended by the equipment manufacturer in compliance with the NEC.

G. Where power connections are made out of doors from 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 support of the switches. 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 6 inches of concrete surround all of the framing members.

H. On multi-motor equipment connections (i.e. condensing units, roof-top A/C units, etc.), Division 26 Contractor shall verify with Divisions 22 and 23 Contractor and obtain in

writing the manufacturer's requirements for equipment overcurrent device. Where fuses or HACR breakers are permitted, furnish HACR rated breaker of size required by manufacturer of equipment. Where fuses only are permitted, furnish fusible disconnect with fuse size required by manufacturer of equipment. Obtain written approval of Division 15 Contractor of overcurrent size before energizing equipment.

3.02 INSTRUCTIONS

A. Connections by Division 26 Contractor to equipment furnished under Divisions 22 and 23 of the specifications and the mechanical drawings.

1. Manual motor switch control and final connections to all ventilating fans. Where fans are furnished with speed controls, the Division 26 Contractor shall mount the control where directed 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.
2. Set disconnect switch near (within 5 feet) or other approved device if disconnect switch not indicated, and make final connection to equipment as required in accordance with SECTION 26 05 33, "RACEWAYS AND FITTINGS". Connections to include power wiring to line voltage control device such as magnetic starter, contactor, etc., and from load side of control device through motor terminals. The control devices shall be furnished by the Divisions 22 and 23 Contractor and installed, where directed, by the Division 26 Contractor. Control devices which are integral pre-wired parts of equipment require connection to line side of control device only by Division 26 Contractor unless otherwise indicated. All additional wiring including control wiring shall be furnished and installed by the Divisions 22 and 23 Contractor. Line voltage thermostats and other temperature control devices regardless of voltage shall be furnished, installed, wired and connected by the Divisions 22 and 23 Contractor.

B. Connections by Division 26 Contractor to equipment furnished under other Divisions of the specifications.

1. Set disconnect switch near (within 5') or other approved device, if disconnect switch not shown and make final connection to equipment as required in accord with SECTION 26 05 33 "RACEWAYS AND FITTINGS". Connection to include power wiring to the line side of the equipment controller or to the power connection location as applicable.
2. Division 26 Contractor shall obtain approved rough-in drawing for each item of equipment requiring connection and follow manufacturer's recommendation as to location and method of connections. Additional requirements are as follows:
   a. Laboratory equipment: Connection location and specific wiring requirements to be taken from lab equipment drawings if available or architectural drawings. Connection shall include mounting and connection of accessory items furnished with equipment including but not limited to receptacles, switches, lighting, and motors. The Division 26 Contractor is responsible for connecting to the equipment installed with proper service at the correct location shown on the approved kitchen equipment shop drawings.

END OF SECTION

SECTION 26 05 19 CONDUCTORS

PART 1 - GENERAL

1.01 GENERAL

A. Conductors shall be furnished and installed as shown on the drawings and as specified herein.

PART 2 - PRODUCTS

2.01 INSTRUCTIONS (600 VOLTS)

A. Conductors shall be standard annealed copper rated 600 volts with mechanical strength, insulation, temperature and 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 "THWN" unless shown on drawings or specified herein to be other type.
2. In unwired fixtures where required by National Electrical Code, use approved heat-resistant wire sized for current, voltage and temperature at which fixture operates.
3. Branch circuit conductors within 3 inches of a ballast within the ballast compartment of fluorescent fixtures shall be recognized for use at temperatures not lower than 90℃. Asbestos wire shall not be used for this application.
4. Conductors entering the self-contained ballast compartment of gaseous vapor discharge fixtures shall be rated 600 volts, silicone rubber, fixture wire, #10 AWG, stranded copper conductor, silicone rubber insulation, glass outer-braid, 200℃. rated conductor temperature.

PART 3 - EXECUTION

3.01 INSTRUCTIONS (600 VOLTS)

A. Wire sizes #8 AWG and larger shall be of the stranded type, Class B stranding, and 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 wire regardless of size.

B. Use approved lubricants which are non-injurious to insulation when pulling conductors into raceways.

C. Use #12 AWG minimum wire size with exceptions as noted on the drawings or as stated herein. Homeruns of 20 ampere circuits in excess of 50 feet shall be #10 AWG minimum size even if not shown on the drawings.

D. Use stranded conductors for final connections to motors and all vibrating equipment.

E. The following conductor color coding shall be observed:

DUAL VOLTAGE SYSTEMS

	120/208 Volts	277/480 Volts
1.	Phase A - Black.	Phase A - Brown.
2.	Phase B - Red.	Phase B - Orange.
3.	Phase C - Blue.	Phase C - Purple.
4.	Three way and four way travelers - Yellow.	
5.	Neutral - White.	
6.	Equipment ground - Green.	

3.02 SPLICES AND CONNECTIONS (600 VOLT)

A. Make splices and connections in accessible boxes, gutters or cabinets only. Wire sizes #8 and larger to be spliced only with specific approval of Architect.

B. Use soldered and taped or approved mechanical splice connections on solid wire and pressure type solderless connectors well-taped on stranded conductors. Wire sizes #8 and larger to have irreversible compression-type splice.

C. Use Scotch 3M or approved equal plastic tape over mechanical and/or soldered splices applied in thickness equal to wire insulation.

END OF SECTION

SECTION 26 05 26 GROUNDING AND BONDING SYSTEMS

PART 1 - GENERAL

1.01 GENERAL

A. Grounding and bonding systems shall be furnished and installed as shown on the drawings and as specified herein.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 INSTRUCTIONS

A. Bonding and grounding of electrical service equipment enclosures, raceways and ground terminals as shown on the drawings and in accordance with Article 250 of the National Electrical Code. All cubicles and conduit of the service equipment shall be bonded together.

B. Service equipment system neutral bus and equipment ground bus shall be grounded to electrodes meeting the requirements of Article 250-81 of NEC. Where available and of proper characteristics, the incoming cold water line shall be one of the electrodes.

C. Equipment grounding terminal (green) of all grounding type receptacles shall be bonded to its enclosure with a properly sized bonding conductor (green) unless the receptacle is approved for self-bonding.

D. Pull into all non-metallic raceways and other raceways where shown on drawings one green equipment grounding conductor, sized the same as the branch circuit conductors or as noted on the drawings and bond this conductor to box ground terminal, receptacle ground terminal (green), ground bus of panel, cabinet and/or enclosures.

E. Where conduits enter an enclosure, use bonding type bushing on conduits through 1-1/4 inch trade size with No.10 AWG copper conductors bonded to all conduits thence to equipment enclosure or ground bus. Conduits in excess of 1-1/4 inch trade size shall have bronze ground clamps with bonding conductors sized in accordance with National Electrical Code requirements and/or as shown on the drawings.

F. Ground rods shall be 5/8 inch by 10'-0" copper clad sectional, solid rods. They shall be installed with top 12 inches below finish grade. Resistance to ground shall not exceed 25 ohms. Connections to ground rods to be by exothermic weld. Where multiple ground rods are indicated or required, they shall be driven six (6) feet apart in a straight line and connected with ground conductor sized as shown and/or per N.E.C. Article 250.

END OF SECTION

SECTION 26 05 33 RACEWAYS AND FITTINGS

PART 1 GENERAL

1.01 INSTRUCTIONS (METALLIC RACEWAYS)

A. Size conduits as shown on the drawings or where size not shown follow National Electrical Code. 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 Architect.

PART 2 - PRODUCTS

2.01 INSTRUCTIONS (METALLIC RACEWAYS)

A. All wiring in hot-dipped galvanized rigid steel (GRS) conduit (UL 6), intermediate conduit (IMC) (UL 1242), or electrical metallic tubing (EMT) (UL 797) unless specifically shown otherwise on the drawings or stated herein. Conduit in accordance with the following schedule:

1. In any poured concrete: Hot-dipped galvanized rigid steel conduit or IMC.
2. In masonry walls: Hot-dipped galvanized rigid steel conduit, IMC or EMT.
3. In suspended ceiling construction or non-masonry partitions: Hot-dipped galvanized rigid steel conduit, IMC or EMT.
4. In exposed locations indoors: Hot-dipped galvanized rigid steel conduit, IMC or EMT.
5. In exposed locations out of doors. Hot-dipped galvanized rigid steel conduit or IMC. All conduits in earth shall be hot-dipped galvanized rigid steel coated with polyvinyl, polyethylene or asphaltum. Conduits installed in earth shall be buried a minimum of 24 inches to top below finished grade.
6. All feeders shall be run in hot-dipped galvanized rigid steel conduit or IMC. Feeder routing shall follow shortest route possible within other requirements herein specified.
7. Conduit in excess of 1-1/4 inch trade size shall be hot-dipped galvanized rigid steel conduit or IMC.

2.02 CONDUIT FITTINGS

A. All conduit fittings shall be of steel or malleable iron. Die cast fittings are not acceptable.

B. Rigid Steel and IMC Conduit Fittings:

1. Standard steel or malleable iron threaded couplings, locknuts, bushings, and elbows.
2. Locknuts: Bonding type of steel or malleable iron with sharp edges for digging into the metal wall of an enclosure.
3. Bushings: Insulating type of steel or malleable iron consisting of an insulating insert molded or locked into the metallic body of the fitting. Grounding type with ground lug.

C. EMT Conduit Fittings:

1. Couplings and connectors shall be indentor type or compression type of steel or malleable iron as manufactured by T&B, Appleton or equal. Indentor type shall be secured to each conduit with two operations of tool at right angles.

2.03 INSTRUCTIONS (NON-METALLIC RACEWAYS)

A. Where specifically noted and/or indicated on the drawings, wiring may be installed in PVC conduit. PVC conduit shall be electrical grade Schedule 40 as manufactured by Carlon, Triangle, PWC or equal approved by Architect.

PART 3 - EXECUTION

3.01 INSTRUCTIONS (METALLIC RACEWAYS)

A. Conceal all conduits not shown exposed on drawings. Conceal all conduits in partitions unless specifically shown otherwise on drawings or stated herein.

B. Where conduits are shown concealed in concrete slabs in contact with earth, conduits 1/2 inch through 1-1/4 inch trade size shall be installed in and not under slabs. Conduits in excess of 1-1/4 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.

C. Run conduits parallel and/or perpendicular to walls, ceilings or floors. Homerun conduits shall be combined to form a common routing path and supported from the building structure by trapeze style hangers.

D. Couple conduits together and connect to boxes, fittings and cabinets so as to provide effective electrical continuity. Do not use couplings dependent on screws bearing on conduit.

E. Provide insulating bushing where conductors No.4 or larger enter junction box, gutter, cabinet or cutout box. Bushings to be OZ type "BLG", Steel City, Thomas and Betts or equal approved by the Architect.

F. Conduits shall <u>not</u> be routed horizontally on roof without specific approval from Architect. All roof penetrations shall be weatherproofed by Division 07 Contractor. Division 26 Contractor shall be responsible for procuring and coordinating with Division 07 Contractor to perform roof penetrations.

G. Make field bends in conduits in accordance with table in Article 346 of the National Electrical Code.

H. Plug upturned conduits to prevent entrance of moisture or debris and make certain that conduits are clear of same before pulling in wire.

I. Use not to exceed six (6) feet of flexible metal conduit for connection to motors and/or recessed fixtures unless otherwise specified herein. Flexible conduit shall be steel. 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. All flexible conduit shall have properly sized bonding jumper installed within and shall be sized in accordance with Article 250, Table 250-95 of the National Electrical Code.

J. All final connections to motors, transformers or other vibrating equipment shall be with liquid tight flexible conduit.

K. Amply support conduits in accordance with the NEC and as follows:

1. By one-hole or two-hole straps.
2. By at least three rounds of No.14 B & S gauge galvanized wire twisted around concrete reinforcing rods.
3. By one- or two-hole malleable iron clamps for exposed work held in place by machine screws in expanding lead anchors in concrete or masonry or by screws in wood.
4. By conduit clamps for bar joists.
5. Where groups of conduit occur or for feeder conduits where applicable, by trapeze hangers adequately supported by steel rods attached to concrete inserts, welded supports, bolted supports, etc.
6. Bulb "T" clamps for conduits crossing bulb "T"s.

L. Pull one (1) nylon pull string, minimum 1/8" diameter, into all empty conduits.

M. Openings around electrical penetrations through smoke-stop or fire-resistant rated walls, partitions, floors or ceilings shall be smoke and/or fire-stopped using approved UL listed system designed for the materials encountered to maintain the smoke-stop and/or fire-resistant rating.

N. Expansion fittings in conduits where shown on the drawings or where passing through expansion joints imbedded in concrete. Fittings shall be Crouse-Hinds type XJ complete with type GC100 grounding strap and type GC102 strap clamps or approved equal in Killark or Appleton.

O. Provide seal-off fittings where shown on the drawings or as required by a condition encountered requiring a seal. Seals 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 building exterior. Seals 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. Fittings shall be Crouse-Hinds type EYS for horizontal and vertical runs, or type EYS elbow seals or approved equal in Killark or Appleton. All seals shall be properly installed using "Chico X" fiber and "Chico A" sealing compound.

P. Assure ground continuity on feeder and branch circuits as stipulated in Article 250 of NEC by two locknuts, one inside and one outside of all boxes, cabinets and gutters.

Q. Wiring gutters shall not be used unless specifically shown or noted on the drawings.

3.02 INSTRUCTIONS (NON-METALLIC RACEWAYS)

A. Installation shall follow the applicable provisions of paragraph 16110 "RACEWAYS AND FITTINGS" hereinbefore specified and manufacturer's recommendation unless exceeded by requirements shown on the drawings. All joints shall be made using approved solvent cement.

B. Where used for service conductors and where noted on the drawings, conduits shall be concrete-encased with a minimum of 3 inches coverage on all sides.

C. Rigid steel conduit shall be used where PVC conduits turn angles and/or are exposed.

D. PVC conduit shall not be stored nor have been stored in direct sunlight.

E. PVC boxes of equivalent dimension to those hereinafter specified under paragraph 16160 "BOXES AND FITTINGS" shall be used with PVC box connectors.

F. 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 No.8 copper conductor in each conduit for full length of conduit for future locating purposes.

3.03 INSTRUCTIONS (RACEWAY CONCRETE ENCASEMENT)

A. Raceway concrete encasement where called for on the drawings and/or these specifications shall be poured in a single continuous pour or all joints shall have plywood vertical dam at each pour joint with No.6 bars 4'-0" into each pour. Pour joint shall not occur at conduit couplings, angles, etc. Bars shall be 6 inches on center with 3 inches concrete cover around perimeter of raceway duct bank.

END OF SECTION

SECTION 26 05 34 BOXES AND FITTINGS

PART 1 - GENERAL

A. Boxes and fittings shall be furnished and installed as shown on the drawings and as specified herein.

PART 2 - PRODUCTS

2.01 INSTALLATION PROCEDURES

A. Boxes as manufactured by Steel City, Appleton, Raco or approved equal.

1. Suspended ceiling or wall outlet: 4 inches octagon by 1-1/2 inch depth, cat. No. 54151.
2. Suspended ceiling or wall outlet: 4 inches square by 1-1/2 inch depth, cat. No. 52151.
3. Suspended ceiling or wall outlet: 4 inches square by 2-1/8 inches depth, cat. No. 52171.
4. Suspended ceiling or wall outlet: 4-11/16 inches square by 2-1/8 inches depth, cat. No. 72171.
5. Switch box: 2-1/2 inches depth cat. No. CL.
6. 4 inches octagon concrete box, depth as required: Cat. No. 54500 Series with CBP plate and stud.

B. Floor boxes shall be as manufactured by Hubbell or equal in Steel City with configuration as shown or noted on the drawings.

1. Floor boxes to be cast iron with aluminum trim unless otherwise noted, of proper depth for the floor construction encountered and complete with all required accessories for mounting.
2. Flush floor fittings shall be SA-3925 or SA-3825 for high potential and SA-2725 or SA-3625 for low potential.
3. Pedestal fittings shall be SC-3091 (single outlet), SC-3092 (double outlet) high potential and SC-3190 (single gang), SC-3090 (multi-gang) low potential, each complete with proper cover.
4. Power standpipe fittings shall be horizontal duplex S-6088 satin chrome finish.
5. All floor boxes where installed flush with floor finish or in carpeted area shall have proper flange to cover joint between edge of box and floor finish. Where installed in other floor finish areas such as wood or concrete they shall have finish plate as recommended by manufacturer. All boxes shall be adjustable after installation to level to finished floor.

PART 3 - EXECUTION

3.01 INSTALLATION PROCEDURES

A. Only galvanized stamped steel boxes and covers.

B. Bar hangers or other approved structural supports for all boxes and a 3/8 inch steel fixture stud if required by the fixture type.

C. Close all unused knockout holes and install galvanized blank covers on surface boxes and stainless steel covers on flush boxes having no fixture or device.

D. Mount boxes flush to surface. Install plaster rings or special square corner raised covers for tile or block walls so that fixtures or devices will be perfectly flush mounted. Outlet boxes shall not be installed back to back. Boxes shall not be installed more than 1/4 inch behind finish face of wall. Boxes installed in masonry walls shall be embedded in masonry.

E. Location of outlets is approximate unless dimensioned. See architectural or shop drawings for greater accuracy. Any box may be moved up to ten (10) feet by direction of the Architect if so directed before box has been installed.

F. Junction or pull boxes as required by field conditions whether or not shown on the plans. Use Columbia screw cover pull boxes indoors and Hope cast iron boxes out of doors or approved equal. Consult Architect for size and locations. All junction or pull boxes shall be labeled with plastic impression tape indicating system being served, feeder and/or circuit number(s). Junction or pull boxes for fire alarm system(s) shall be painted “red” in color.

G. Use boxes in accordance with the following schedule and/or in accordance with Article 370 of the National Electrical Code (table below based on use of #12 AWG) whichever is the larger box required:

1. Switch box, 3 inches by 2 inches by 2-1/2 inches, 5 conductors.
2. 4 inches octagon box, 1-1/2 inch depth, 6 conductors.
3. 4 inches square box, 1-1/2 inch depth, 9 conductors.
4. 4 inches square box, 2-1/8 inches depth, 13 conductors.
5. 4-11/16 inches square, 2-1/8 inches depth, 18 conductors.

H. Watertight junction boxes with hubs in outdoor or damp locations.

3.02 PLATES

A. Plates and/or covers on all boxes and outlets with or without devices. Plates to have all corners in contact with finish wall and shall be horizontal and/or vertical to building surfaces.

B. Plates as manufactured by Hubbell, Pass and Seymour, Arrow Hart, or Leviton shall be stainless steel, satin finish, Type 302, 8 percent nickel -18 percent chrome on all flush outlets.

END OF SECTION

SECTION 26 24 16 ELECTRICAL DISTRIBUTION SYSTEM

PART 1 - GENERAL

1.01 GENERAL

A. Electrical distribution system shall be furnished and installed as shown on the drawings and as specified herein.

PART 2 - PRODUCTS

2.01 LIGHTING AND POWER PANELBOARDS

A. Shall be dead front construction with solderless pressure terminals.

B. Main and neutral buses of capacity shown or indicated herein to be completely tin and/or silver plated copper or electrical grade aluminum completely tin plated.

C. Circuit breakers shall have bolted connections and shall have minimum interrupting rating and voltage rating as shown on drawings. 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.

D. Manufacturers shall be General Electric types AQ and SCP or equal in Square D Company, Siemens or Cutler Hammer.

2.02 DISTRIBUTION PANELBOARDS

A. Shall be dead front construction with solderless pressure terminals.

B. Main and neutral busses of capacity shown or indicated herein to be completely tin and/or silver plated copper or electrical grade aluminum completely tin plated.

C. As shown on the drawings and as specified herein the following service entrance equipment specifically approved for that purpose.

1. Circuit breaker type panelboard quick-make/quick-break, of proper voltage for system, with frame sizes and characteristics as shown on the drawings.

D. Manufacturer shall be General Electric Company type SCP or equal in Square D Company, Siemens or Cutler Hammer.

PART 3 - EXECUTION

3.01 LIGHTING AND POWER PANELBOARDS

A. Securely mounted with through bolts anchors or other approved means. Contractor shall provide proper mounting surface if wall of insufficient strength. All wood or other flammable mounting surfaces shall be painted with two coats of flame resistant paint.

B. Complete typewritten directory with transparent plastic cover inside of door. All panels shall be identified as they are designated on the drawings by 3/4 inch plastic nameplate, white with minimum 1/2 inch high black engraved letters, on front face if panel is surface mounted or inside of door if panel is flush mounted.

C. Trim and door with lock and catch with two (2) keys. Keys common to all building panelboards.

D. Mount panelboards with top breaker handle not more than 6'-6" above floor. Installation of flush panels shall not compromise fire rating of walls.

E. Connect the phase wires of homeruns to breakers connected to separate phase busses of the panelboard and maintain approximately equal loads on each bus. Panelboard circuits shall be numbered in sequence vertically down the left side then vertically down the right side and all circuits shall appear in the panel exactly as they are shown on the drawings. Numbering to be consecutive for double or triple section panels. Neutral connections shall be identified by adhesive number tags to identify with their branch circuit phase conductors.

F. Typed copy of circuit directory to be installed for each panelboard and shall be submitted with shop drawing submittal for approval.

G. Lighting and/or power panelboards complete with feeders, branch breakers and branch circuits as scheduled on the drawings.

3.02 DISTRIBUTION PANELBOARD

A. Securely mounted with through bolts anchors or other approved means. Contractor shall provide proper mounting surface if wall of insufficient strength. All wood or other flammable mounting surfaces shall be painted with two coats of flame resistant paint.

B. Cabinets code gauge steel with trim.

C. Each breaker shall be labeled as to load served by 1/2 inch bakelite label, white with minimum 1/4 inch high, black engraved letters. Panel designation as indicated on drawings shall be identified by 3/4 inch bakelite label, white with minimum 1/2 inch high, black engraved letters on face of panel.

D. Bushings on all raceways entering panel. Bushings of substantial insulating type to be OZ type “BLG” or equal approved by Architect.

E. Mount with top over-current unit not over 6'-6" from floor.

END OF SECTION

SECTION 26 27 26 WIRING DEVICES

PART 1 - GENERAL

1.01 GENERAL

A. Wiring devices shall be furnished and installed as shown on the drawings and as specified herein.

PART 2 - PRODUCTS

2.01 WALL SWITCHES (LINE VOLTAGE)

A. Switches to be as manufactured by Hubbell, as stated, or approved equal in Pass and Seymour (P&S), Arrow Hart or Leviton. Contractor shall verify device color with Architect prior to ordering devices.

B. Single pole, 20A, 120/277V: Hubbell Cat. No. HBL1221, P&S Cat. No. 20AC1, Arrow Hart Cat. No. 1991, Leviton Cat. No. 1221-2.

C. Four way, 20A, 120/277V: Hubbell Cat. No. HBL1224, P&S Cat. No. 20AC4, Arrow Hart Cat. No. 1994, Leviton Cat. No. 1224-2.

2.02 MISCELLANEOUS SWITCHES

A. Safety switches and lighting contactors shall be mounted 54" to center of operating handle above the finished floor or finished grade where mounted unless shown or noted otherwise on the drawings. Where safety switch is located behind equipment screen walls, mount switch such that top of the enclosure is 6" below top of screen wall and bottom of enclosure is a minimum of 18" above the finished grade or slab.

B. The following miscellaneous switches/contactors with manufacturer as stated or equal in Square D, Allen Bradley, General Electric or equal approved by Architect:

Item	Mfg.	Cat. No.
Manual motor switch, single pole	Square D	Class 2510, type FO-1
Safety switch, heavy duty with ground lug	Square D	H200-H300 Series
Contactor, multi-pole electrically held, size as indicated with hand-off auto selector switch	Square D Co.	Class 8903, Type L or S

Item	Mfg.	Cat. No.
Time switch, 4 channels w/independent programming, programming keypad, maintained contacts, astro dial, daylight savings/leap year correction, program memory battery back-up.	Paragon	EC74/120D
Photo Cell	Precision	P-2275
Photo cell relay	Precision	MR Series
Photo cell base, 3/4 inch conduit	Precision	M-4

2.03 RECEPTACLES

A. Convenience outlets and receptacles as manufactured by Hubbell, as stated or equal in Pass and Seymour (P&S), Arrow Hart or Leviton. Contractor shall verify device(s) color with Architect prior to ordering.

B. Furnish to Owner at job acceptance a number of plugs (Hubbell Cat. No. 1447) for each duplex device equal to 10% of the number of those devices installed (1 plug minimum). Plugs to be in cartons properly prepared for storage.

C. Duplex grounding receptacle (construction grade), 20A, 125V: Hubbell Cat. No. CR5362, Pass & Seymour Cat. No. 5362, Arrow Hart Cat. No. 5352, Leviton Cat. No. 5362.

D. Duplex grounding receptacle, ground fault interrupter type (construction grade), 20A, 125V: Hubbell Cat. No. GF5352, P&S Cat. No. 2091, Arrow Hart Cat. No. GF5342, Leviton Cat. No. 6899.

E. Duplex grounding receptacle, weatherproof, ground fault interrupter type (construction grade), 20A, 125V, mount in type FD box with plate: 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.

PART 3 - EXECUTION

3.01 WALL SWITCHES (LINE VOLTAGE)

A. Flush A.C. tumbler-type 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. Install switches to cut ungrounded conductors.

C. Wall switches 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. First switch of single or ganged switch bank shall be mounted within 12 inches of door frame and/or edge of door.

D. Lighting control 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 opened door.

3.02 MISCELLANEOUS SWITCHES

A. All devices shall be furnished and installed according to manufacturer's recommendations including NEMA housing suitable for the environment where located.

B. All motor starters shall have thermal overload elements sized to actual motor nameplate amperes or as provided in Article 430, Part C of the National Electrical Code.

C. All safety switches shall be heavy duty as defined by NEMA and shall be of voltage as required by the particular circuit on which they are installed. Each switch shall have indented plastic tape label identifying load served with voltage, horsepower, panel and circuit number. All fused switches shall be fused with Bussman Fusetron dual element type fuse as appropriate to the circuit voltage with size fuse indicated on the drawings.

3.03 RECEPTACLES

A. Convenience outlets and receptacles shall be mounted center line up 16" 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 except where specifically noted. Where receptacle is shown behind equipment, verify proper mounting height with the Architect prior to rough-in.

END OF SECTION

SECTION 26 51 00 LIGHTING FIXTURES

PART 1 - GENERAL

1.01 GENERAL

A. Lighting fixtures shall be furnished and installed as shown on the drawings and as specified herein.

PART 2 - PRODUCTS

2.01 LIGHTING FIXTURE GENERAL REQUIREMENTS

A. Lighting fixture 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 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 8 ounces per square foot.

2.02 LIGHTING FIXTURE LAMPS

A. Provide lamps of proper size and type in each lighting fixture. Lamps shall be as manufactured by Phillips, General Electric, Sylvania, Venture or equal approved by Architect.

1. Incandescent/Quartz/Halogen Lamps, 120V
   a. A lamp, 60W thru 200W, inside frosted
2. Fluorescent Lamps, 3500K, CRI 82 minimum
   a. T8, rapid-start, 32 watts, 2850 lumens.
3. High Intensity Discharge (HID) Lamps
   a. Metal Halide, clear unless otherwise noted, 3200K, CRI 70 minimum.

2.03 FLUORESCENT LIGHTING FIXTURE REQUIREMENTS

A. Fluorescent Lighting Fixture Ballasts. Fluorescent lighting fixtures shall be provided with integral electronic ballasts of the full light output type unless specifically noted otherwise on the drawings. Provide number of ballasts as indicated or as required for lighting fixture switching configurations per the drawings. Ballasts shall be as manufactured by Howard Industries or equal in Magnetek, Advance or Motorola and shall meet the following specifications:

Listing:	U.L. listed, Class P
Lamp Current Crest Factor:	< 1.7
EMI & RFI Limits:	EMI & RFI emissions shall be minimal and shall comply with the limits of FCC Part 18C for non-consumer equipment.
Transient Protection:	Withstand voltage transients in accordance with ANSI C62.41, Category A2.
Operating Frequency:	> 20kHz without visible flicker
Starting Temperature:	0 degrees F

Circuit Configuration:	Instant Start with parallel circuit configuration
Sound Rating:	Class A or better
Power Factor:	> 95%
K-Factor:	< 2.0
Input Voltage Range:	+/- 10% of specified voltage
Total Harmonic Distortion (THD):	< 10%
Ballast Factor (BF) (avg.):	0.88

All ballast serving lighting fixtures utilizing compact fluorescent type and T5 type lamps shall have auto-resetting, end-of-life circuitry to shut off lamp to prevent lamp damage.

B. Emergency Fluorescent Battery Packs. Provide emergency battery packs for fluorescent fixtures as required by the drawings. Battery packs for troffers and surface mounted fluorescent fixtures shall be installed by the fixture manufacturer within the fixture 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 as listed below for ninety (90) minutes after interruption of normal power to the fixture. Battery packs shall be as manufactured by Bodine or approved equal.

Lamp Type	Battery Lumen Output
Linear and U-Tube Fluorescent (T8 & T12)	1100
42 watt Compact Fluorescent	750
32 watt Compact Fluorescent	575
26 watt Compact Fluorescent	450
18 watt Compact Fluorescent	300

2.04 HID LIGHTING FIXTURE REQUIREMENTS

A. HID Lighting Fixture Ballast. All HID ballast serving lamps 100W or greater shall have constant wattage autotransformer (CWA) or SCWA circuit types. All HID ballasts shall have a minimum power factor of 90% and of proper voltage for branch circuit encountered or be multi-tap type. All HID ballast shall be U.L. listed and shall meet all requirements of the N.E.C.

B. All fixtures 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 fixture.

PART 3 - EXECUTION

3.01 LIGHTING FIXTURE GENERAL REQUIREMENTS

A.. Provide all lighting fixtures as shown on the drawings by symbols and as defined in the lighting fixture schedule(s). Fixtures shall be provided with all necessary mounting accessories. The installation of all fixtures shall be complete, safe and in full accordance with manufacturer's recommendations and these specifications. This contractor shall provide additional 1-1/2 inch by 1-1/2 inch x 12 gage channel bridging where necessary to mount lighting fixtures governed by the conditions encountered.

B. Procure fixtures completely factory wired for proper operation in the application shown on the drawings. All fixtures 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 fixtures compatible with the ceiling specified in each area.

C. Substituted fixtures shall meet the performance and functional characteristics and the general appearance and dimensions (+/- 10 percent) of the specified fixtures. Approval of submitted substitute fixture(s) shall not eliminate the Contractor's responsibility to provide fixtures similar in characteristics to the specified fixture(s).

D. Recessed fixtures in accordance with Article 410 of the NEC. All recessed fixtures in accessible ceilings shall be connected with 1/2 inch flexible conduit from accessible junction box with sufficient length to allow fixture to be relocated to any adjacent ceiling panel without disconnecting. 3/8 inch flexible conduit may be used if furnished with the fixture by the manufacturer. All recessed fixtures in non-accessible ceilings, unless otherwise indicated, shall be pre-wired from the factory with junction box for terminating branch circuit conduit.

E. Fixture mounting shall be rigid and independent of the ceiling tile(s) and shall be supported from the major structural elements of the ceiling system. Recessed fluorescent fixtures requiring a ceiling opening in excess of nine (9) square feet shall be supported independent of the ceiling system. Fixtures mounted to concrete shall be anchored with concrete inserts or other means of similar strength as approved by the Architect.

F. Surface fixtures mounted on combustible ceilings or low density acoustical tile ceilings shall be UL approved for such mounting. Where surface fixtures are served by exposed raceway, fixture shall have surface conduit collar furnished by manufacturer. Surface fixtures mounted on LAT ceiling shall be supported from the major tees and connected via flexible conduit similar to recessed fixtures.

G. Recessed fixtures shall be furnished to properly coordinate with the fire rating of the ceiling. Where fire rating requires covering over fixture housing, ballast of proper temperature rating as recommended by manufacturer shall be furnished.

H. 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.

I. Luminaires mounted with bottom edge above finished floor as indicated on the drawings unless specifically noted otherwise. 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.

END OF SECTION

SECTION 31 23 18 EARTHWORK FOR STRUCTURES

PART 1 - GENERAL

1.01 RELATED SECTIONS

A. Division 01 Sections

1.02 REFERENCES

A. ASTM D422 – Standard Test Method for Particle-Size Analysis of Soils.

B. ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).

C. ASTM D1556 – Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

D. ASTM D4318 – Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

E. ASTM D6938 – Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.03 DEFINITIONS

A. Granular Subbase: Fill directly beneath slabs-on-grade.

B. Backfill: Fill immediately behind foundation elements or retaining walls.

C. Structural Fill: Fill under the structure other than the granular subbase.

1.04 SUBMITTALS

A. Submit sufficient data for verification of the vibratory roller.

1.05 QUALITY ASSURANCE

A. Refer to the Structural Quality Assurance Plan in the Structural Drawings.

1.06 SURVEY

A. Prior to construction, have structure location staked and certified by a licensed surveyor. If discrepancies between actual lines and elevations exist, notify Architect/Structural Engineer before proceeding with layout of structure.

1.07 SUBSURFACE CONDITIONS

A. Copies of a subsurface investigation of the site will be made available upon request. The data is not intended as a representation or warranty of the continuity of such conditions. Owner will not be responsible for interpretation or conclusions drawn by the Contractor. The data is made available for the convenience of the Contractor and is not guaranteed to represent all conditions that may be encountered.

B. Contractor may examine the site and make his own subsurface explorations at no additional cost to the Owner. Notify Owner prior to making any subsurface explorations.

1.08 EXISTING UTILITIES

A. Locate existing underground utilities by careful hand excavation. If utilities are to remain in place, provide protection from damage during construction operations.

B. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Do not interrupt existing utility service facilities occupied and used by Owner or others, unless written permission is given by the Architect and then only after temporary utility services have been provided.

C. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult the Architect immediately for directions.

D. Repair damaged utilities to satisfaction of utility owner.

1.09 NOTICE

A. Notify the Architect/Structural Engineer 48 hours prior to the beginning of any excavation work.

PART 2 - PRODUCTS

2.01 GRANULAR SUBBASE

A. Granular Subbase: Sound and free-draining, such as sand, gravel or crushed stone with less than 10% passing the 200 sieve. Maximum diameter shall be 1-1/2 inches.

2.02 BACKFILL

A. Backfill: Sound and free-draining, such as sand, gravel or crushed stone with less than 10% passing the 200 sieve. Maximum diameter shall be 1-1/2 inches.

2.03 STRUCTURAL FILL

A. Structural Fill: Low plasticity silty clay (CL) or sandy clay (CL) with a plasticity index between 10 and 25, at least 50% passing the No. 200 sieve, and a maximum liquid limit of 45.

B. Structural Fill shall be free of organics, debris and deleterious materials.

2.04 GEOTEXTILE FABRIC

A. Geotextile Fabric: See specifications provided in geotechnical report.

B. Securing Pins: 3/16-inch diameter steel bars, 18-inch long, pointed at one end and fabricated with a head to retain a steel washer having a minimum outside diameter of 1.5 inches.

PART 3 - EXECUTION

3.01 STRIPPING

A. Strip vegetation, topsoil, roots, and other unsuitable material to a depth determined by the Special Inspector but not less than one foot, nor less than 10 feet outside the perimeter of the structure.

B. Stockpile sufficient amounts of topsoil as required to cover areas to be landscaped with a minimum of six inches of material.

3.02 EXCAVATION

A. Excavation shall be considered unclassified. Excavations shall comply with U.S. Department of Labor, Occupation Safety and Health Administration (OSHA) regulations.

B. Perform excavation to the depths and limits in the Structural Drawings and as specified herein.

C. Do not excavate to full depth when there is probability of frost forming or ground freezing in excavation before concrete is placed.

D. Under-cut the entire building area to remove all wet and unstable soils. It is estimated that the depth of the required cut will be 10 to 12 feet below the floor slab. The undercut area shall extend ten feet outside perimeter walls of all structures at the base of the cut.

E. Ground water may be encountered during the foundation excavation. Provide a system for controlling the ground water to a level at least three feet below the lowest point of the excavation.

F. Keep excavations dry by sloping ground away from holes and trenches.

3.03 PROOFROLLING

A. After stripping or excavation and before any fill placement, fill areas shall be proofrolled with a minimum of two coverages of a loaded dump truck or scraper in each of two perpendicular directions.

B. Areas found to be soft or pumping shall have the soft soil removed and replaced with structural fill and compacted as outlined herein.

C. Should earthwork occur during extended rainy periods and a stable working platform is difficult to establish, it is recommended that the top 2 feet of extremely wet materials be removed and a layer of geotextile fabric be placed over the soft and pumping area. An 18-inch thick layer of sand having a maximum of 15% passing the No. 200 seive should be placed over the fabric by backdumping. The sand should be spread and compacted to at least 70% relative density (ASTM D 4254). Select structural fill material can then be placed to bring the site to the desired finish grade elevation.

3.04 PLACEMENT OF GEOTEXTILE FABRIC

A. Geotextile fabric shall be installed over the entire building site and extending a minimum of 5 feet beyond the building perimeter.

B. Lap fabric edges a minimum of 18 inches.

C. Securing pins shall be used when necessary to ensure proper anchoring of the geotextile fabric.

3.05 PLACEMENT OF STRUCTURAL FILL

A. Do not place structural fill on subgrade that contains frost, mud or is frozen.

B. Structural fill shall be placed and compacted in 9-inch thick loose layers.

C. Compact structural fill to 95 percent of the maximum dry density as measured by Standard Proctor, ASTM D698, with water content within +3/-3 percent of the optimum moisture content.

D. Scarify each lift of compacted fill prior to placement of the subsequent lift.

3.06 PLACEMENT OF BACKFILL

A. Backfill behind wall shall be placed in layers of six inches.

B. Compact backfill behind walls to 95 percent of the maximum dry density as measured by Standard Proctor, ASTM D698, with water content within +3/-3 percent of the optimum moisture content.

3.07 PLACEMENT OF GRANULAR SUBBASE

A. Do not place granular subbase on subgrade that contains frost, mud or is frozen.

B. Compact granular subbase to 95 percent of the maximum dry density as measured by Standard Proctor, ASTM D698, with the water content within +3/-3 percent of the optimum moisture content.

3.08 CLEAN UP

A. Remove excess excavated materials from job site and upon completion leave site in clean condition.

END OF SECTION

SECTION 31 31 16 SOIL TREATMENT FOR TERMITE CONTROL

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Soil treatment for control of all species of subterranean termites including Formosan termites.

1.02 SUBMITTALS

A. Submit manufacturer's technical product data and application instructions prior to application for Project Engineer's approval. DO NOT submit Material Safety Data Sheets for approval.

B. 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 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. 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. 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.

C. 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.

D. Comply with Mississippi Regulations Governing Pest Control Operators in following the labels of the termiticide.

1.04 PROJECT CONDITIONS

A. Do not apply soil treatment solution until excavating, filling and grading operations are completed, except as otherwise required in construction operations.

B. To insure penetration, do not apply soil treatment to frozen or excessively wet soils or during inclement weather. Comply with other handling and application instructions of the soil toxicant manufacturer.

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.

1.04 GUARANTEE

A. Furnish 3 copies of written guarantee 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 any damage caused by termite infestation WITHOUT EXPENSE to the Owner. Provide guarantee for a period of 5 YEARS from the date of treatment, signed by the Applicator and the Contractor.

PART 2 - PRODUCTS

2.01 SOIL TREATMENT SOLUTION

A. 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 diligent. 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 INSPECTION

A. Applicator must examine the areas and conditions under which soil treatment for termite control is to be installed 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.

3.02 APPLICATION

A. Remove foreign matter, which could decrease effectiveness of treatment on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and foundations. Toxicants may be applied before placement of compacted fill under slabs, if recommended by toxicant manufacturer.

B. Application Rates: Under slab-on-grade, suspended slab, foundation footings and other similar structures, treat the soil before concrete slabs are poured using either power sprayer or tank-type garden sprayer. Apply soil treatment solution, USING COLOR DYE MARKING AGENT to insure the area is treated, as follows:

1. Termiticide applied for the prevention of termites shall comply with the manufacturer's label and shall not be applied at concentrations or volumes less than specified on the label.
2. Reapply soil treatment solution to areas disturbed by subsequent excavation or other construction activities following application.

C. Allow a minimum of 12 hours for drying after application, before beginning concrete placement or other construction activities.

3.03 PROTECTION

A. 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.

B. Post signs in the areas of application warning workers that soil poisoning has been applied. Remove signs when areas are covered by other construction.

END OF SECTION

SECTION 41 22 24 CEILING MOUNTED CHAIN HOIST

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes ceiling mounted steel monorail including hanger assemblies with sway bracing, electric chain hoist and trolley and electrification system.

B. Related sections

1. Division 05 for overhead support structure from which the ceiling mounted monorail is suspended.
2. Division 26 for electrical supply, disconnect switches, conduit, wiring, and miscellaneous electrical components for power to the monorail mainline power electrification system.

1.02 REFERENCES

A. American Institute of Steel Construction (AISC): Manual of Steel Construction, Part 5, Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts

B. NFPA70: National Electric Code (NEC)

C. American National Standards Institute (ANSI):

1. ANSI B30.11 - Monorails and Underhung Cranes
2. ANSI B30.16 – Safety Standard for Overhead Hoists
3. ANSI/ASME HST-4M – Performance Standards for Electric Chain Hoists

D. ASTM International:

1. ASTM A 36 - Carbon Structural Steel.
2. ASTM A 325 - Structural Bolts, Steel, Heat Treated, 120/150 ksi Minimum Tensile Strength.
3. ASTM A 490 - Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.

E. American Welding Society (AWS):

1. AWS D1.1 - Structural Welding Code.
2. AWS D14.1 – Specification for Welding Industrial and Mill Cranes

F. Occupational Safety and Health Administration (OSHA): OSHA Specification 1910.179 - Overhead and Gantry Cranes.

1.03 PERFORMANCE REQUIREMENTS

A. Monorail shall provide linear coverage of length indicated on Drawings and shall consist of the following:

1. Overhead hanger assemblies leaving monorail operating area free of support structures.
2. Rigid monorail.

B. Modular, pre-engineered design: Crane system shall be capable of expansion, disassembly and relocation.

C. Monorail track: Track shall be a structural S-beam with maximum deflection of 1/450 span based on capacity plus dead load for lifting device.

D. Monorail operating temperature: 55 to 110 degrees F., indoor.

E. Monorail shall be designed to withstand the following:

1. Hoist/trolley dead load.
2. Live load capacity equal to rated hook load: 5-Ton (10,000 lb.)
3. Inertia forces from hoist and load movement.

1.04 SUBMITTALS

A. Product data for monorail and accessories. Describe capacities, performance, operation, and applied forces to structure.

B. Shop drawings showing monorail configuration, dimensions, wiring diagrams, and construction and installation details.

C. Manufacturer installation instructions, and operation and maintenance manual.

1.05 QUALITY ASSURANCE

A. Manufacturer: Firm specializing in designing and manufacturing monorails with 5 years successful experience.

B. Installer: Firm experienced in assembly and installation of monorail with 5 years successful experience and acceptable to crane manufacturer.

C. Monorail shall be designed, fabricated, and installed in accordance with AISC.

D. Base monorail structural design to include full rated load capacity plus hoist and trolley dead loads and 25 percent impact factor for speed of lifting device and weight of tooling (as applicable).

E. Perform welding by certified operators in accordance with AWS D14.1.

F. Bolted connections shall be in accordance with torque tightening procedures specified in AISC Manual, Part 5.

G. Clearly label monorail with rated load capacity. Place label at height and location easily read from floor level and loading position.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Newell Equipment Company

B. Demag Cranes & Components, Houston, TX

C. Or Approved Equal

D. Chain hoist supplier:

1. ACI Hoist and Crane
2. Demag Cranes & Components.
3. Harrington Chain Hoists.

2.02 CEILING MOUNTED MONORAIL

A. Type: Ceiling mounted structural monorail with overhead hanger assemblies, S-beam track, electric chain hoist and motorized trolley, mainline electrification system and bumpers.

B. Monorail length: As indicated.

C. Construction: Fabricate from ASTM A 36 steel sections with finished ends.

1. Hanger assemblies: Provide number and type of hanger assemblies required for suspending monorail from overhead steel beam support structure.

a. Rigid type stools for clamping or bolting directly to the support steel.
b. Monorail track shall be direct bolted to the bottom stool section.
c. Suspension mounting hardware shall be ASTM A 325 mounting bolts.

2. Monorail: Fabricated from structural S-beam shapes.

a. Track: ASTM A 36 structural steels sections with bottom flange of monorail to allow smooth trolley operation.
b. Splice joint: Provide bolted type splice plates to provide flush and level connections at the operating tread of the track.
c. Track and end stops shall be of the bolted type and capable of withstanding the impact of a fully loaded trolley traveling at 50 percent of full load speed.
d. Track curve: Curves shall permit operation of the trolley without binding. Intermediate support locations, as required to be determined by the total trolley load. Curve track sections shall be formed for accuracy and matched up with adjoining track sections.

3. Track electrification: Provide 4-bar enclosed conductor bar electrification.

2.03 MOTORIZED TROLLEY

A. Provide electric trolley for motorized traverse operation.

B. Hoist trolley: Hoist manufacturer's standard motor-geared trolley provided with drop lugs both sides of trolley to limit trolley drop to 1-inch in the event of wheel axle failure.

C. Speed: Variable Frequency Control with 2-Speeds @ 80 & 20 FPM.

D. Motor: 240V/3ph/60Hz with thermal overload protection.

2.04 ELECTRIC CHAIN HOIST

A. Hoist: 5-ton (10,000 lb.) electric chain hoist with lug mount. Lug mount design shall easily attach to manual push-pull enclosed track trolley.

1. Lift: 25 feet minimum lift.
2. Speed: 2-speed with a Hi & Lo Speed, approximately 20/5 FPM.
3. Gearing: Gearbox shall incorporate helical gearing and be bathed in an oil bath.
4. Motor: High performance motor having multi-pole stator, winding class F insulation with a high to low speed ratio of 4:1.
5. Chain and chain container: Chain shall be of high-strength, hardened age-resistant steel and shall have a minimum safety factor of 5:1. Chain container shall be provided suspended from a pivoting connection, made of tough, flexible and impact-resistant plastic with enough capacity to hold the entire length of chain.
6. Chain sprocket: Chain sprocket shall consist of a minimum of 5 pockets for smooth even lifts.
7. Hoist shall be furnished with a push-button control pendant station with strain relief protection.
8. Electric chain hoist shall comply with all requirements of ANSI B30.11, ANSI B30.16 and N.E.C.

B. Controls: 24-volt control package with transformer, terminal strips, fusing, enclosure, and mounting brackets to be wired to electric chain hoist.

C. Power pick-up collector with tow arm to be mounted and wired to hoist/trolley assembly.

2.05 SHOP FINISHING

A. Clean material of loose rust, mill scale and foreign matter.

B. Paint tracks, hoists, trolleys and hanger assemblies shall be painted one shop coat of manufacturer’s standard finish.

C. Provide matching color of air-drying paint for field touchup.

PART 3 - EXECUTION

3.01 PREPARATION

A. Coordinate provision of monorail with:

1. Design and construction of overhead support structure and building framing to receive ceiling mounted monorail as detailed on Drawings and specified in other sections. Ensure that accurate monorail applied forces are provided for structural support design.
2. Provision of electrical supply, conduit, wiring, and other electrical components for powering electrically operated chain hoist and motorized trolley.

B. Prior to installation:

1. Verify that overhead support structure is ready to receive ceiling mounted monorail. Overhead support shall be level and plumb with necessary slotted attachment holes.
2. Verify type and location of power supply.
3. Verify all required components are available and undamaged.

C. Correct other conditions detrimental to the proper or timely completion of this work before proceeding with installation.

3.02 INSTALLATION

A. Install monorail and accessories in accordance with their manufacturer's instructions and approved shop drawings.

B. Do not modify monorail components without advance, written approval from crane manufacturer.

C. Clearances for moving monorail components:

1. Three-inches minimum vertical clearance from any overhead obstruction.
2. Two-inches minimum horizontal clearance from any lateral obstruction.

D. Mark hanger placement on overhead support structure and on monorail in accordance with shop drawings.

E. Hanger assemblies: Assemble rigid support stools with beam clips to monorail track sections. Align and shim as required to ensure monorail is straight and level. Attach lower hanger brackets to monorail.

F. Lift monorail into place and temporarily support. Attach rigid support stool to support structure.

G. Prior to torquing bolts, ensure monorail is:

1. Level to within plus or minus 1/8-inch in 20 feet.
2. Track splice transitions are smooth with no raised areas to inhibit hoist trolley operation.

H. End stops: Bolt stops onto monorail track.

I. Make electrical connections from hoist power pick-up collector to power source.

3.03 FIELD QUALITY CONTROL

A. Move hoist trolley through entire travel to ensure hoist is clear of obstructions and the trolley moves freely and smoothly.

B. Inspect installed monorail to verify that all bolts are torqued.

C. Test hoist trolley and accessories for operating functions. Ensure trolley movement is smooth and proper. Verify electric chain hoist operation and controls function properly. Adjust as required and correct deficiencies.

D. Load test system at 125 percent in field and provide Cal-OSHA certificate.

E. Clean surfaces. If necessary, touch-up paint damage, scratches and blemishes with manufacturer provided matching paint.

F. Protect monorail from other construction operations.

3.04 DEMONSTRATING AND TRAINING

A. Provide demonstration and training session for University's Representative covering operation and maintenance of ceiling mounted work station bridge crane.

END OF SECTION

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-246-3 **CODE: (SP)**

DATE: 11/08/2010

SUBJECT: Sandbags and Rockbags

Section 907-246, Sandbags and Rockbags, is hereby added to and made a part of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-246 -- SANDBAGS AND ROCKBAGS

907-246.01--Description. This item of work shall consist of the furnishing, installing, and maintaining sandbags and rockbags for the purpose of temporary erosion control by intercepting and slowing the flow of sediment-laden runoff water, or for use as a temporary dam.

907-246.02--Materials. The filler material for sandbags shall consist of a fine aggregate meeting the requirements of Subsection 703.02. The filler material for rockbags shall consist of a size 57 aggregate meeting the requirements of Subsection 703.03.

The bag material shall be woven polypropylene, polyethylene or polyamide fabric with a minimum unit weight of four (4) ounces per square yard. The bags shall be a minimum of 21 inches in length, 12 inches in width, and four (4) in thickness when filled.

907-246.03--Construction Requirements. Sandbags and rockbags shall be used to construct a berm/dam which will intercept sediment-laden storm water runoff from disturbed areas, create a retention pond, detain sediment, and release water in sheet flow. Sand or rock shall be placed in the bag so that at least the top six (6) inches of the bag is unfilled to allow for proper tying of the open end. Any subsequent rows of bags shall be offset one-half the length of the preceding row to provide a layered brick-type arrangement.

The sandbag and rockbag berm/dam installation shall be maintained in good condition by the Contractor. All necessary work and materials to maintain the integrity of the installation shall be provided until earthwork construction is complete and permanent erosion-control features are in place. The maintenance of the bags will not be paid for separately and will be included in the cost for sandbags or rockbags.

907-246.04--Method of Measurement. Sandbags and rockbags will be measured per linear foot or each.

Sandbags and rockbags measured by the linear foot shall be in accordance with the details in the erosion control drawing. The length of the sandbag or rockbag berm/dam will be measured end-to-end along the cross-section of the ditch in accordance with the erosion control drawing.

907-246.05--Basic of Payment. Sandbags and rockbags, measured as prescribed above, will be

paid for per linear foot or each, which prices shall be full compensation for furnishing bags, fine aggregate, size 57 aggregate, placement of bags, maintenance of the installation, removal and disposal of the sediment deposits and removal after construction has been completed, and for all labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

907-246-A: Sandbags	- per linear foot or each
907-246-B: Rockbags	- per linear foot or each

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-262-3 **CODE: (SP)**

DATE: 07/31/2012

SUBJECT: Utility Work (Sewer)

PROJECT: BWO-9030-25(002) / 502352301, BWO-9041-25(001) / 502400301, BWO-9721-25(001) / 502353301 & LWO-9002-25(006) / 501560303 – Hinds County

Section 907-262, Utility Work, is hereby added to and becomes a part of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-262 -- UTILITY WORK

907-262.01--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.

907-262.01.1--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.

907-262.01.1.1--Related Requirements. The following are related requirement.

- Construction Plans
- Special Provision 907-262 entitled Manholes
- Local governing authority and code requirements.
- All necessary construction permits.
- MDOT Standard Specifications for Road and Bridge Construction.

907-262.01.1.2--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

907-262.01.1.3--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.

907-262.01.1.4--Coordination. Coordination shall be performed with termination of sanitary sewer connection outside building, connection to municipal sewer utility service, and trenching.

907-262.01.2--Monolithic Manhole Surfacing System. 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.

907-262.01.2.1--Quality Assurance. 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

907-262.01.2.2--Submittals. 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.

907-262.01.2.3--Deliver, Storage, and Handling. Materials shall be kept dry, protected from weather, stored under cover and stored between 50ºF and 100ºF. Material shall not be stored near flame, heat, or strong oxidants.

Protective coating materials shall be handled according to their material safety data sheets.

907-262.01.3--Crystalline Concrete Waterproofing.

907-262.01.3.1--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

907-262.01.3.2--Storage, Delivery And Handling. The manufacturer's sealed and labeled material containers shall be stored in a dry, protected environment off the ground.

907-262.01.4--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 907-262.02. 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.

907-262.01.4.1--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.

907-262.01.4.2--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.

907-262.02--Materials.

907-262.02.1--Sanitary Sewer System.

907-262.02.1.1--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.

907-262.02.1.2--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 Ttype 305 stainless steel.
4. Model and Manufacturer:
   a. Inserta Tee by Inserta Fittings Company.
   b. Or approved equal.

907-262.02.1.3--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.

907-262.02.1.4--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.

907-262.02.2--Monolithic Manhole Surfacing System.

907-262.02.2.1--Existing Products. 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.

907-262.02.2.2--Manufacturer And Equipment Supplier. The manufacturer and equipment supplier shall be Warren Environmental, Inc., Raven 404, Poly Spec Corp, or an approved equal.

907-262.02.2.3--Repair Materials. 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.

907-262.02.2.4--Monolithic Surfacing System. 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 percent	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.

907-262.02.2.5--Protective Coating Application Equipment. 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.

907-262.02.3--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.

907-262.02.3.1--Manufacturers. Waterproofing material shall be manufactured by Xypex Chemical Corporation, or an approved equal.

907-262.02.3.2--Admixture. Xypex Admix C-1000-T shall contain red dye to ensure detection in the concrete.

907-262.02.3.3--Mixes. The dosage rate for the Xypex Admix C-1000-T shall be 3.5 percent by weight of cement.

907-262.02.4--Manholes.

907-262.02.4.1--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.

All manhole sections shall be lined with an approved epoxy coating in accordance with Special Provision 907-262, entitled Monolithic Manhole Surfacing System.

All pre-cast manholes and wet-wells shall be waterproofed in accordance with Special Provision 907-262, entitled Crystalline Concrete Waterproofing.

907-262.02.4.2--Miscellaneous Metals. Metal frames, covers, toe pockets and similar required items shall be provided as shown and in accordance with the plans.

907-262.02.4.3--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.

907-262.02.4.4--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.

907-262.02.4.5--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.

907-262.02.4.6--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.

907-262.03--Construction Requirements.

907-262.03.1--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.

907-262.03.1.1--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.

907-262.03.1.2--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.

Manholes requirements shall meet the requirements of Special Provision 907-262, entitled Manholes.

Installed sleeves shall be used to connect to building sanitary sewer outlet and municipal sewer system.

907-262.03.1.3--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.

907-262.03.1.4--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.

907-262.03.2--Monolithic Manhole Surfacing System.

907-262.03.2.1--Pre-Coat Inspection. All structures to be coated shall be readily accessible to the applicator.

Appropriate actions shall be taken to comply with local, state, and federal regulatory and other applicable agencies with regard to the environment, health, and safety.

All surfaces including benches, inverts, joints, lift holes and walls shall be made smooth and suitable for application of the interior surfacing system. All benches and inverts shall be in place and complete.

Active flows shall be dammed, plugged, or diverted as required to ensure that the liquid flow is maintained below the surfaces to be coated.

Installation of the protective coating shall not commence until the concrete substrate has properly cured in accordance with this Section.

907-262.03.2.2--Surface Preparation. 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.

907-262.03.2.3--Application Of Repair Materials. 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.

907-262.03.2.4--Application Of Monolithic Surfacing System. 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.

907-262.03.2.5--Testing And Inspection. 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.

907-262.03.2.6--Cleaning. 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.

907-262.03.3--Crystalline Concrete Waterproofing.

907-262.03.3.1--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.

907-262.03.3.2--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.

907-262.03.4--Manholes.

907-262.03.4.1--Laying Masonry. Each grading ring shall be laid in a full bed of mortar and shall be thoroughly bonded.

907-262.03.4.2--Plastering. The outside of grading rings shall be neatly plastered with ½ of an inch of cement mortar as the work progresses.

907-262.03.4.3--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.

907-262.03.4.4--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.

907-262.03.4.5--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.

907-262.03.4.6--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.

907-262.03.4.7--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.

907-262.03.4.8--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.

907-262.03.4.9--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.

907-262.03.4.10--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.

907-262.04--Method of Measurement. Sanitary Sewer Pipe will be measured per linear foot, regardless of depth placed.

Monolithic Manhole Surfacing System will be measured per each.

Crystalline Concrete Waterproofing will be measured per each, regardless of depth.

Manhole will be measured per each, regardless of the depth.

907-262.05--Basic of Payment. Sanitary Sewer Pipe, measured as prescribed above, will be paid for at the contract bid price per linear foot, which price shall include the costs for all labor, materials, tests, and all incidentals necessary to complete the work.

Monolithic Manhole Surfacing System, measured as prescribed above, will be paid for at the contract bid price per each regardless of depth, which price shall include the costs for all labor, materials, any testing, and all incidentals necessary to complete the work.

Crystalline Concrete Waterproofing, measured as prescribed above, will be paid for at the contract bid price per each, regardless of depth, which price shall include the costs for all labor, materials, any testing and all incidentals necessary to complete the work.

Manhole, measured as prescribed above,will be paid for per each regardless of depth as installed and accepted, which price shall be full compensation for furnishing and installation manholes, including straddle manholes, castings, boots, manhole vent, and appurtenances, and all labor, materials, and incidentals to complete the work.

Payment will be made under:

907-262-A: 8" Sanitary Sewer Pipe (All Depths)	- per linear foot
907-262-I: Monolithic Manhole Surfacing System	- per each
907-262-J: Crystalline Concrete Waterproofing	- per each
907-262-K: Manhole	- per each

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-265-4 **CODE: (SP)**

DATE: 07/31/2012

SUBJECT: Utility Work (Water)

PROJECT: BWO-9030-25(002) / 502352301, BWO-9041-25(001) / 502400301, BWO-9721-25(001) / 502353301 & LWO-9002-25(006) / 501560303 – HINDS COUNTY

Section 907-265, Utility Work, is hereby added to and becomes a part of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-265 -- UTILITY WORK

907-265.01--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.

907-265.01.1--Water Distribution Systems.

907-265.01.1.1--Related Sections. The following related sections shall be followed.

- 907-242, entitled Sanitary Sewer System
- Local Governing Authority and Code Requirements
- All Necessary Construction Permits
- Standard Specifications for Road and Bridge Construction

902-265.01.1.2--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

907-265.01.1.3--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.

907-265.01.1.4--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.

907-265.01.1.5--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.

907-265.01.2--Ductile-Iron Pipe And Fittings.

907-265.01.2.1--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

907-265.01.2.2--Submittals. The Contractor shall submit detailed drawings and data on pipe, fittings, gaskets and appurtenances.

907-265.01.3--Valves and Appurtenances.

907-265.01.3.1--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

907-265.01.3.2--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.

907-265.01.3.3--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.

907-265.02--Materials.

907-265.02.1--Water Distribution System.

907-265.02.1.1--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. Ductile-Iron Pipe and Fittings:
   a. Pipe:
      i. Flanged:
         (1) Standard: AWWA C115 (ANSI A21.15)
         (2) Thickness: Comply with Schedule in Section 31 23 33.01, Buried Piping Installation. If not shown, use Pressure Class 350.
      ii. Non-Flanged:
         (1) Standard: AWWA C115 (ANSI A21.15)
         (2) Thickness: Comply with Schedule in Section 31 23 33.01, Buried Piping Installation. If not shown, use Pressure Class 250. Piping with grooved joints shall have adequate wall thickness to maintain the pressure rating specified for fittings and for the associated pipe class specified.
   b. 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)

c. 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

d. Coatings and Linings:

i. Inside Wall of Pipe and Fittings (Except Sewer Pipe):

(1) Standard: AWWA C104 (ANSI A21.4)

(2) Cement-Mortar Lining Thickness: Standard

(3) Seal Coat: Asphaltic

ii. Inside Wall of Pipe and Fittings (Sewer Pipe):

(1) Coating Required: Factory-applied ceramic epoxy

(2) Thickness: 40 dry mils

(3) Surface Preparation: Per coating manufacturer recommendations

iii. Outside Wall of Pipe and Fittings:

(1) Buried:

(a) Coating: Bituminous

(b) Thickness: 1 mil approximate

(2) 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.

4. Polyethylene Encasement:
   a. Provide polyethylene encasement on all buried ductile iron pipe, fittings and accessories.
      i. For Potable Water: Blue
      ii. For Pressure Sewer: Green
   b. Thickness: 8 mils
   c. In accordance with ANSI/AWWA C105 (ANSI A21.5).

907-265.02.1.2--Valves And Appurtenances. Valves and appurtenances shall meet the requirements of Special Provision 907-265, entitled Valves and Appurtenances

907-265.02.1.3--Accessories. Joint Restraint Pieces: EBAA Iron Sales Megalug Series 1100 or approved equal. Install joint restraints on all fittings, specials, valves, and hydrants in accordance with manufacturer's recommended spacing.

Meter Box shall be as required by Utility Owner.

907-265.02.2--Ductile-Iron Pipe And Fittings. Ductile-Iron pipe and fittings shall comply with the following:

1. Joints: Push-on or mechanical joints shall be used for buried piping.

2. Ductile-Iron Pipe and Fittings:
   a. Pipe:
      i. Flanged:
         (1) Standard: AWWA C115 (ANSI A21.15)
         (2) Thickness: If not shown, Pressure Class 350 shall be used.
      ii. Non-Flanged:
         (1) Standard: AWWA C115 (ANSI A21.15)
         (2) Thickness: If not shown, Pressure Class 250 shall be used. Piping with grooved joints shall have adequate wall thickness to maintain the pressure rating specified for fittings and for the associated pipe class specified.
   b. 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)

c. 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

d. Coatings and Linings:
i. Inside Wall of Pipe and Fittings (Except Sewer Pipe):
(1) Standard: AWWA C104 (ANSI A21.4)
(2) Cement-Mortar Lining Thickness: Standard
(3) Seal Coat: Asphaltic

ii. Inside Wall of Pipe and Fittings (Sewer Pipe):
(1) Coating Required: Factory-applied ceramic epoxy
(2) Thickness: 40 dry mils
(3) Surface Preparation: Per coating manufacturer recommendations

iii. Outside Wall of Pipe and Fittings:
(1) Buried:
(a) Coating: Bituminous
(b) Thickness: 1 mil approximate

(2) 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.

3. Restrained Joints:
   a. Megalug by EBAA Iron Sales, Inc.
   b. Or approved equal.

4. 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.

5. Polyethylene Encasement:
   a. Provide polyethylene encasement on all buried ductile iron pipe, fittings and accessories.
      i. For Potable Water: Blue
      ii. For Pressure Sewer: Green
   b. Thickness: 8 mils
   c. In accordance with ANSI/AWWA C105 (ANSI A21.5).

907-265.02.3--Valves and Appurtenances.

907-265.02.3.1--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: (Not Used)
   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: (Not Used)
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: (not used)
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: (not used)
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:

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 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 Owner 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: (Not Used)
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: (Not Used)
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: (Not Used)
1. Manufacturer: American flow control or approved equal.
2. Series A240-Field adjustable to fit various trench depths.

L. Backflow Preventor:
1. Type: Reduced Pressure Principle
2. Components:
a. Reduced Pressure Zone Assembly
b. Two Gate Valves
c. All other components recommended by the manufacturer.
3. Required Features:
a. Max working pressure: 175 psi
b. Temp. Range: 33ºF to 140ºF
4. Manufacturer and Model:
a. Watts Series 909
b. or approved equal
5. Installation:
a. According to Manufacturer unless noted on plans.
b. Provide insulated aluminum box for temperatures to -30ºF.
6. Standard: AWWA C 506

907-265.02.3.2--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.

907-265.03--Construction Requirements.

907-265.03.1--Water Distribution System.

907-265.03.1.1--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.

907-265.03.1.2--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.

907-265.03.1.3--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.

907-265.03.1.4--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.

907-265.03.1.5--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.

907-265.03.1.6--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 will be present which is a result of line disinfection.

Complete disinfection shall be defined as no confluent growth for samples taken on two consecutive days.

907-265.03.1.7--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.

907-265.03.1.8--Field Quality Control. The Contractor shall test the water distribution system pipe sized installed below grade and outside building in accordance with following procedures.

All pipework shall be tested at the pressure and leakage tests equal to the design working pressure of the pipe and maintain said pressure for not less than two hours.

The Contractor shall furnish, install, and operate the necessary connections, pump, meter, and gauges. Leakage shall not exceed that permitted by AWWA C600-64 for mechanical joint and push-on joint pipe. Prior to running any filed test, meter shall be tested, sealed, and approved by applicable governing authority at no additional cost to the State.

All leaks shall be located and repaired and repeatedly tests until test results are satisfactory and in compliance with this specification.

A copy of results of meter test and hydrostatic pressure test shall be furnished to the Engineer upon completion of water distribution backfilling operations.

907-265.03.2--Ductile-Iron Pipe and Fittings. Ductile-Iron pipe and fittings shall be installed in accordance with this special provision and the plans.

907-265.03.3--Valves and Appurtenances.

907-265.03.3.1--Installation. All valves and appurtenances shall be installed in accordance with manufacturer's instructions.

Suitable corporation stops shall be installed at all points shown and required where air binding of pipe lines might occur.

Unless otherwise approved, all valves shall be installed plumb and level. Valves shall be installed free from distortion and strain caused by misaligned piping, equipment or other causes.

Valve boxes shall be set plumb, and centered with the bodies directly over the valves. Earth fill shall be carefully tamped around each valve box to a distance of four feet on all sides of the box, or to the undisturbed trench face, if less than four feet.

Hydrants and connecting pipe shall have at least the same depth of cover as the distributing pipe. The hydrants shall be set upon a slab of concrete not less than four inches (4") thick and 15 inches square. Where restrained hydrants are not used, the side of hydrant opposite the pipe connections shall be firmly blocked against the vertical face of the trench with a concrete thrust block. Not less than ½ cubic yard of washed gravel shall be placed around the base of the hydrant at the location of the drain holes.

907-265.03.3.2--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.

907-265.04--Method of Measurement. Water pipe and tubing of the type specified will be measured per linear foot, regardless of depth of placement. Connection to existing water line and proposed building sewer line will be an absorbed item with no separate pay item.

Ductile-Iron Pipe and Fittings will be measured per each.

Gate Valve and Backflow Preventer with cover box will be measured per each.

907-265.05--Basic of Payment. Water pipe and tubing of the type specified, measured as prescribed above, will be paid for at the contract bid price per linear foot, which price shall be full compensation for testing, all labor, materials, and all incidentals necessary to complete the work. No separate pay item will be made for water connection to existing water lines or proposed building service lines.

Ductile-Iron Pipe and Fittings, measured as prescribed above, will be paid for at the contract bid price per each, which price shall include the costs for all labor, materials, testing, and all incidentals necessary to complete the work.

Gate Valve and Backflow Preventer, measured as prescribed above, will be paid for at the contract bid price per each, which price shall include the costs for all labor, materials, testing, and all incidentals necessary to complete the work.

Payment will be made under:

907-265-A: 1½" Copper Tubing "K" Service Tubing	- per linear foot
907-265-B: 6" Ductile Iron Water Pipe	- per linear foot
907-265-C: Ductile-Iron Pipe and Fittings	- per each
907-265-D: 1½" Gate Valve	- per each
907-265-D: 6" Gate Valve	- per each
907-265-N: Backflow Preventer with Box	- per each

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-401-2

DATE: **07/19/2011**

SUBJECT: **Hot Mix Asphalt (HMA)**

Add the following before 907-401.02.6.2 on page 1.

907-401.02.4--Substitution of Mixture. Delete the table in Subsection 401.02.4 on page 242, and substitute the following:

Mixture	Single Lift Laying Thickness Inches	
	Minimum	Maximum
25 mm	3	4
19 mm	2 ¼	3 ½
12.5 mm	1 ½	2 ½
9.5 mm	1	1 ½
4.75 mm	½	¾

After Subsection 907-401-02.6.2 on page 2, add the following:

907-401.02.6.4.1--Roadway Density. Delete subparagraphs 1., 2., & 3. on page 251 and substitute the following:

1. For all leveling lifts, when full lane width and with a thickness as specified in the table in Subsection 401.02.4, the required lot density shall be 92.0 percent of maximum density.

2. For all single lift overlays, with or without leveling and/or milling, the required lot density shall be 92.0 percent of maximum density.

3. For all multiple lift overlays of two (2) or more lifts excluding leveling lifts, the required lot density of the bottom lift shall be 92. 0 percent of maximum density. The required lot density for all subsequent lifts shall be 93.0 percent of maximum density.

4. For all pavements on new construction, the required lot density for all lifts shall be 93.0 percent of maximum density.

907-401.02.6.5--Acceptance Procedure for Pavement Smoothness. Delete the third sentence of the sixth paragraph of Subsection 401.02.6.5 on page 254, and substitute the following.

The wheel paths shall be designated as being located three feet (3') and nine feet (9') from centerline or longitudinal joint, respectively.

907-401.03.1.2--Tack Coat. Delete the three sentences of Subsection 401.03.1.2 on page 259, and substitute the following:

Tack coat shall be applied to previously placed HMA and between lifts, unless otherwise directed by the Engineer. Tack coat shall be applied with a distributor spray bar. A hand wand will only be allowed for applying tack coat on ramp pads, irregular shoulder areas, median crossovers, turnouts, or other irregular areas. Bituminous materials and application rates for tack coat shall be as specified in Table 410-A on page 293. Construction requirements shall be in accordance with Subsection 407.03 of the Standard Specifications.

907-401.03.1.4--Density. Delete the first sentence of the first paragraph of Subsection 401.03.1.4 on page 259 and substitute the following:

The lot density for all dense graded pavement lifts, except as provided below for preleveling, wedging [less than fifty percent (50%) of width greater than minimum lift thickness], ramp pads, irregular shoulder areas, median crossovers, turnouts, or other areas where the established rolling pattern cannot be performed, shall not be less than the specified percent (92.0% or 93.0%) of the maximum density based on AASHTO Designation: T 209 for the day's production. For all leveling lifts, when full lane width and with a thickness as specified in the table in Subsection 401.02.4, the required lot density shall be 92.0 percent of maximum density.

907-401.03.9--Material Transfer Equipment. Delete the paragraph in Subsection 401.03.9 on page 264 and substitute the following:

Excluding the areas mentioned below, the material transferred from the hauling unit when placing the top lift, or the top two (2) lifts of a multi-lift HMA pavement with density requirements, shall be remixed prior to being placed in the paver hopper or insert by using an approved Materials Transfer Device. Information on approved devices can be obtained from the State Construction Engineer. Areas excluded from this requirement include: leveling courses, temporary work of short duration, detours, bridge replacement projects having less than 1,000 feet of pavement on each side of the structure, acceleration and deceleration lanes less than 1,000 feet in length, tapered sections, transition sections for width, shoulders less than 10 feet in width, crossovers, ramps, side street returns and other areas designated by the Engineer.

After Subsection 401.03.13 on page 266, add the following:

907-401.03.14--Shoulder Wedge. The Contractor shall attach a device to the screed of the paver that confines the material at the end gate and extrudes the asphalt material in such a way that results in a compacted wedge shape pavement edge of approximately 30 degrees, but not steeper than 35 degrees. The device shall maintain contact between itself and the road shoulder surface and allow for automatic transition to cross roads, driveways, and obstructions. The device shall be used to constrain the asphalt head reducing the area by 10% to 15% increasing the density of the extruded profile. Conventional single plate strike off shall not be used.

The device shall be TransTech Shoulder Wedge Maker, the Advant-Edge, or a similar approved equal device that produces the same wedge consolidation results. Contact information for these wedge shape compaction devices is the following:

1. TransTech Systems, Inc.
   1594 State Street
   Schenectady, NY 12304
   800-724-6306
   www.transtechsys.com

2. Advant-Edge Paving Equipment, LLC
   P.O. Box 9163
   Niskayuna, NY 12309-0163
   518-280-6090
   Contact; Gary D. Antonelli
   Cell: 518-368-5699
   email: garya@nycap.rr.com
   Website: www.advantedgepaving.com

Before using a similar device, the Contractor shall provide proof that the device has been used on previous projects with acceptable results, or construct a test section prior to the beginning of work and demonstrate wedge compaction to the satisfaction of the Engineer. Short sections of handwork will be allowed when necessary for transitions and turnouts, or otherwise authorized by the Engineer.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-401-2 **CODE: (IS)**

DATE: 11/04/2005

SUBJECT: Hot Mix Asphalt (HMA)

Section 401, Hot Mix Asphalt (HMA) - General, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

Delete in toto Subsection 401.02.6.2 on pages 248 and 249, and substitute:

907-401.02.6.2--Assurance Program for Mixture Quality. The Engineer will conduct a quality assurance program. The quality assurance program will be accomplished as follows:

1) Conducting verification tests.
2) Validate Contractor test results.
3) Periodically observing Contractor quality control sampling and testing.
4) Monitoring required quality control charts and test results.
5) Sampling and testing materials at any time and at any point in the production or laydown process.

The rounding of all test results will be in accordance with Subsection 700.04.

The Engineer will conduct verification tests on samples taken by the Contractor under the direct supervision of the Engineer at a time specified by the Engineer. The frequency will be equal to or greater than ten percent (10%) of the tests required for Contractor quality control and the data will be provided to the Contractor within two asphalt mixture production days after the sample has been obtained by the Engineer. At least one sample shall be tested from the first two days of production. All testing and data analysis shall be performed by a Certified Asphalt Technician-I (CAT-I) or by an assistant under the direct supervision of the CAT-I. Certification shall be in accordance with the *MDOT HMA Technician Certification Program* chapter in the Materials Division Inspection, Testing, and Certification Manual. The Department shall post a chart giving the names and telephone numbers for the personnel responsible for the assurance program.

The Engineer shall be allowed to inspect Contractor testing equipment and equipment calibration records to confirm both calibration and condition. The Contractor shall calibrate and correlate all testing equipment in accordance with the latest versions of the Department's Test Methods and AASHTO Designation: R 18.

Random differences between the Engineer's verification tests and the current running average of four quality control tests at the time of obtaining the verification sample will be considered acceptable if within the following limits:

Item	Allowable Differences
Sieve - % Passing	
3/8-inch and above	6.0
No. 4	5.0
No. 8	4.0
No. 16, for 4.75 mm mixtures ONLY	3.5
No. 30	3.5
No. 200	2.0
AC Content	0.4
Specimen Bulk SG, Gmb @ N_{Design}	0.030
Maximum SG, Gmm	0.020

If four quality control tests have not been tested prior to the time of the first verification test, the verification test results will be compared to the average of the preceding quality control tests. If the verification test is the first material tested on the project or if a significant process adjustment was made just prior to the verification test, the verification test results will be compared to the average of four subsequent quality control test results. For all other cases after a significant process adjustment, the verification test results will be compared to the average of the preceding quality control tests (taken after the adjustment) as in the case of a new project start-up when four quality control tests are not available.

In the event that; 1) the comparison of the Contractor's running average quality control data and Engineer's quality assurance verification test results are outside the allowable differences in the above table, or 2) if a bias exists between the results, such that one of the results is predominately higher or lower than the other, and the Engineer's results fail to meet the JMF control limits, the Engineer will investigate the reason immediately. As soon as the need for an investigation becomes known, the Engineer will increase the quality assurance sampling rate to the same frequency required for Contractor testing. The additional samples obtained by the Engineer may be used as part of the investigation process or for routine quality assurance verification tests. The Engineer's investigation may include testing of the remaining quality control split samples, review and observation of the Contractor's testing procedures and equipment, and a comparison of split sample test results by the Contractor quality control laboratory, Department quality assurance laboratory and the Materials Division laboratory. The procedures outlined in the latest edition of MDOT's Field Manual for HMA may be used as a guide for the investigation. In the event that the Contractor's results are determined to be incorrect, the Engineer's results will be used for the quality control data and the appropriate payment for the mixture will be based on the procedures specified in Subsection 401.02.5.8(j).

The Engineer will periodically witness the sampling and testing being performed by the Contractor. The Engineer, both verbally and in writing, will promptly notify the Contractor of any observed deficiencies. When differences exist between the Contractor and the Engineer which cannot be resolved, a decision will be made by the State Materials Engineer, acting as the referee. The Contractor will be promptly notified in writing of the decision. If the deficiencies are not corrected, the Engineer will stop production until corrective action is taken.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-401-4

DATE: 10/05/2010

SUBJECT: Warm Mix Asphalt

Delete Subsection 907-401.03.8 on page 2 and substitute the following:

907-401.03.8--Preparation of Mixture. After the sentence in Subsection 401.03.8 on page 264, add the following:

Warm mix asphalt is defined as a plant produced asphalt mixture that can be produced and constructed at lower temperatures than typical hot mix asphalt. Typical temperature ranges of non-polymer modified, WMA produced by foaming the asphalt binder at the plant are typically 270ºF to 295ºF at the point of discharge of the plant. Typical temperature ranges of polymer modified, WMA produced by foaming the asphalt binder at the plant are typically 280ºF to 305ºF at the point of discharge of the plant. WMA produced by addition of a terminal blended additive may allow the producer to reduce the temperatures below 270ºF as long as all mixture quality and field density requirements are met. Production temperatures at the plant may need to be increased or decreased due to factors such as material characteristics, environmental conditions, and haul time to achieve mixture temperatures at the time of compaction in which uniform mat density can be achieved.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-401-4 **CODE: (SP)**

DATE: 03/22/2010

SUBJECT: Warm Mix Asphalt (WMA)

Section 401, Hot Mix Asphalt (HMA) - General, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as amended by this special provision is applicable to Warm Mix Asphalt Only.

907-401.01--Description. Delete the first and second paragraphs of Subsection 401.01 on page 236, and substitute the following:

These specifications include general requirements for all types of WMA.

This work consists of the construction of one or more lifts of WMA in accordance with these specifications and the specific requirements for the mixture to be produced and in reasonably close conformity with the lines, grades, thicknesses and typical sections shown on the plans or established by the Engineer.

907-401.02--Materials. Delete Subsection 401.02.2 on page 239, and substitute the following:

907-401.02.2--WMA Products and Processes. The Department will maintain a list of qualified WMA products and processes. No product or process shall be used unless it appears on this list.

The Contractor may propose other products or processes for approval by the Product Evaluation Committee. Documentation shall be provided to demonstrate laboratory performance, field performance, and construction experience.

907-401.03--Construction Requirements.

907-401.03.1.1--Weather Limitations. Delete the second sentence of the first paragraph and the Temperature Limitation Table in Subsection 401.03.1.1 on page 258, and substitute the following:

The air and pavement temperature at the time of placement shall equal or exceed 40ºF, regardless of compacted lift thickness.

907-401.03.1.2--Tack Coat. Delete the first sentence of the first paragraph of Subsection 401.03.1.2 on page 259 and substitute the following:

Tack coat shall be applied to previously placed WMA and between lifts, unless otherwise directed by the Engineer.

907-401.03.8--Preparation of Mixture. Delete the sentence in Subsection 401.03.8 on page 264, and substitute the following:

The temperature of the WMA mixture, when discharged from the mixer, shall not exceed 280º F.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-403-4

DATE: **03/15/2012**

SUBJECT: **Hot Mix Asphalt (HMA)**

Before Subsection 907-403.05.2 on page 1, add the following:

907-403.03--Construction Requirements.

907-403.03.2--Smoothness Tolerances. Delete the fourth paragraph of Subsection 403.03.2 on page 267 and substitute the following.

Where only a surface lift is required, the finished surface lift shall have a profile index of not more than 60.0 inches per mile.

Delete the last paragraph of Subsection 403.03.2 at the bottom of page 268, and the table at the top of page 269 and substitute the following:

Except for a single lift overlay, when the Profile Index for the final surface lift is less than or equal to eighteen inches per mile (18.0 inches / mile) per segment, a unit price increase will be added. The following schedule lists the Profile Index range and the corresponding contract price adjustment:

Profile Index inches / mile / segment	Contract Price Adjustment percent of unit bid price
less than 6.0	108
6.0 to 10.0	106
10.1 to 14.0	104
14.1 to 18.0	102
18.1 to Required P.I.	100
over Required P.I.	100 (with correction to Required P.I.)

For a single lift overlay, when the Profile Index for the final surface lift is less than or equal to eighteen inches per mile (18.0 inches / mile) per segment, a unit price increase will be added. The following schedule lists the Profile Index range and the corresponding contract price adjustment:

Profile Index inches / mile / segment	Contract Price Adjustment percent of unit bid price
less than or equal to 18.0	103
18.1 to Required P.I.	100
over Required P.I.	100 (with correction to Required P.I.)

Delete the first full paragraph of Subsection 403.03.2 on page 269 and substitute the following:

Contract price adjustments for rideability shall only be applicable to the surface lift and furthermore to only the segment(s) or portions of the segments(s) of the surface lift that require smoothness be determined by using a profilograph.

Delete the third full paragraph of Subsection 403.03.2 on page 269 and substitute the following:

Any contract price adjustment for rideability will be applied on a segment to segment basis on the theoretical tonnage based on 12-foot lanes, determined in accordance with Subsections 401.02.6.5 and 403.04, for the segment(s) or portions thereof for which an adjustment is warranted.

Delete Subsection 403.03.5.5 on page 273 and substitute the following:

907-403.03.5.5--Preliminary Leveling. All irregularities of the existing pavement, such as ruts, cross-slope deficiencies, etc., shall be corrected by spot leveling, skin patching, feather edging or a wedge lift in advance of placing the first overall lift.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-403-4 **CODE: (IS)**

DATE: 11/04/2005

SUBJECT: Hot Mix Asphalt (HMA)

Section 403, Hot Bituminous Pavement, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-403.05.2--Pay Items. Add the "907" prefix to the pay items listed on page 275 & 276.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-403-9

DATE: 10/26/2011

SUBJECT: Warm Mix Asphalt (WMA)

Delete Subsection 403.05 on page 1 and substitute the following.

907-403.04--Method of Measurement. WMA pavement, complete in place and accepted, will be measured by the ton. The weight of the composite mixture shall be determined in accordance with the provisions of Subsection 401.03.2.1.11.

907-403.05--Basis of Payment. Subject to the adjustments set out in Subsections 401.02.6.3, 401.02.6.4, 401.02.6.5 & 403.03.2, warm mix asphalt pavement, complete-in-place, accepted, and measured as prescribed above, will be paid for at the contract unit price per ton for each lift of pavement specified in the bid schedule and shall be full compensation for completing the work.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-403-9 **CODE: (SP)**

DATE: 03/15/2010

SUBJECT: Warm Mix Asphalt (WMA)

Section 403, Hot Bituminous Pavement, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as amended by this special provision is applicable to Warm Mix Asphalt Only.

907-403.01--Description. Delete the first sentence of Subsection 403.01 on page 266, and substitute the following:

This work consists of constructing one or more lifts of WMA pavement meeting the requirements of Section 401 on a prepared surface in accordance with the requirements of this section and in reasonably close conformity with the lines, grade, thicknesses, and typical cross sections shown on the plans or established by the Engineer.

907-403.05--Basis of Payment.

907-403.05.2--Pay Items. After the last pay item listed on page 276, add the following:

907-403-M: Warm Mix Asphalt, (1) (Type), (2) (Mixture) - per ton

907-403-N: Warm Mix Asphalt, (1) (Type), (3) (Mixture), Leveling - per ton

907-403-O: Warm Mix Asphalt, (1) (Type), (4) (Mixture), Trench Widening - per ton

907-403-P: Warm Mix Asphalt, HT, (3) (Mixture), Polymer Modified - per ton

907-403-Q: Warm Mix Asphalt, HT, (3) (Mixture), Polymer Modified, Leveling - per ton

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-407-1 **CODE: (SP)**

DATE: 02/26/2008

SUBJECT: Tack Coat

Section 407, Tack Coat, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-407.02.1--Bituminous Material. Delete the second sentence of the first paragraph of Subsection 407.02.1 on page 281, and substitute the following:

When not specified, the materials shall be as specified in Table 410-A on page 293.

907-407.03.3--Application of Bituminous Material. Delete the first paragraph of Subsection 407.03.3 on page 281, and substitute the following.

Tack coat shall be applied with a distributor spray bar. A hand wand will only be allowed for applying tack coat on ramp pads, irregular shoulder areas, median crossovers, turnouts, or other irregular areas. Bituminous materials and application rates for tack coat shall be as specified in Table 410-A on page 293. Tack coat shall not be applied during wet or cold weather, after sunset, or to a wet surface. Emulsions shall be allowed to "break" prior to superimposed construction.

907-407.05--Basis of Payment. Delete the pay item at the end of Subsection 407.05 on page 282, and substitute the following:

907-407-A: Asphalt for Tack Coat * - per gallon

* Grade may be specified

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-601-1 **CODE: (IS)**

DATE: 08/29/2007

SUBJECT: Structural Concrete

Division 600, Incidental Construction, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

After the heading **DIVISION 600 - INCIDENTAL CONSTRUCTION**, add the following:

Unless otherwise specified, all testing of Portland cement concrete in Division 600 shall be in accordance with the requirements of Subsection 907-601.02.1.

907-601.02--Materials.

907-601.02.1--General. Delete the second and third sentence of the first paragraph of Subsection 601.02.1 on page 348, and substitute the following:

Sampling and testing will be in accordance with TMD-20-04-00-000 or TMD-20-05-00-000, as applicable.

907-601.03.6.3--Removal of Falsework, Forms, and Housing. Delete the first paragraph, the table and second paragraph of Subsection 601.03.6.3 on pages 349 and 350, and substitute the following:

The removal of falsework, forms, and the discontinuance of heating, shall be in accordance with the provisions and requirements of Subsection 907-804.03.15, except that the concrete shall conform to the following compressive strength requirements:

Wingwall and Wall Forms not Under Stress	1000 psi
Wall Forms under Stress	2200 psi
Backfill and Cover clear	2400 psi

In lieu of using concrete strength cylinders to determine when falsework, forms, and housings can be removed, an approved maturity meter may be used to determine concrete strengths by inserting probes into concrete placed in a structure. The minimum number of maturity meter probes required for each structural component shall be in accordance with Subsection 907-804.03.15. Procedures for using the maturity meter and developing the strength/maturity relationship shall follow the requirements of Subsection 907-804.03.15. Technicians using the maturity meter or calculating strength/maturity graphs shall meet the requirements of Subsection 907-804.03.15.

907-601.05--Basis of Payment. Add the "907" prefix to the pay items listed on page 352.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-603-8 **CODE: (IS)**

DATE: 05/12/2008

SUBJECT: Culverts and Storm Drains

Section 603, Culverts and Storm Drains, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-603.03--Construction Requirements.

907-603.03.2--Bedding. After the first paragraph of the Subsection 603.03.2 on page 356, add the following:

Non-rigid pipe used in cross drains and storm drains shall have a Class B bedding. Non-rigid pipe used in side drains shall have a Class C bedding. No separate measurement will be made for pipe bedding. Costs associated with pipe bedding shall be included in the cost of the pipe.

907-603.03.4--Joining Conduit.

907-603.03.4.1--Storm Drainage. Delete the first sentence of the seventh paragraph of Subsection 603.03.4.1 on page 358, and substitute the following:

Flexible steel conduits shall be firmly joined by coupling bands.

907-603.03.7--Backfilling. After the first paragraph of the Subsection 603.03.7 on page 360, add the following:

Backfill of non-rigid corrugated polyethylene and poly (vinyl chloride) (PVC) pipe used in cross drains and storm drains shall be performed using one of the following methods:

1. Flowable fill meeting the requirements of Section 631 of the Standard Specifications. If flowable fill is used, care shall be taken to prevent the pipe from "floating".
2. Crushed stone aggregate meeting the requirements of Subsection 703.04.3 of the Standard Specification.

No separate measurement will be made for backfilling pipe. Costs associated with backfilling pipe will be included in the cost of the pipe.

907-603.05--Basis of Payment. Add the "907" prefix to pay item nos. 603-ALT, 603-MA thru 603-MH, 603-NA thru 603-NL, 603-PE, and 603-PVC on pages 364 thru 366.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-607-4 **CODE: (SP)**

DATE: 07/20/2012

SUBJECT: Barrier Fence Gate

PROJECT: BWO-9030-25(002) / 502352301, BWO-9041-25(001) / 502400301, BWO-9721-25(001) / 502353301 & LWO-9002-25(006) / 501560303 – Hinds County

Section 607, Gate, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as modified by the special provision is applicable to Barrier Fence Gates only.

907-607.01--Description. This work shall include furnishing all labor, materials, equipment and appliances necessary to complete all Heavy Duty Cantilever Slide Gate System(s) required for this project in strict accordance with this specification section and drawings. The gate and operator shall be specifically designed to complement each other as a system and be provided by a single manufacturer. Components (operator from one source and gate panel from another) assembled at the job site to form a system will not be approved.

907-607.01.1--References. The gate system shall meet the follow.

UL 325 Gate Operator Requirements. Automated / operated vehicular gates are not to be used for pedestrian traffic. Separate pedestrian gates must always be provided if pedestrian traffic is expected. See Subsection 907-607.02 for more information.

ASTM F 2200-05, Standard Specification for Automated Vehicular Gate Construction. See Subsection 907-607.02 for more information.

ASTM F 1184-05, Standard Specification for Industrial and Commercial Horizontal Slide Gates, Type II, Class 2. See Subsection 907-607.03.1 for more information.

American Welding Society AWS D1.2 Structural Welding Code. See Subsection 907-607.02 for more information.

ASTM B 117-07, Standard Specification for Salt Spray Testing. See Subsection 907-607.02.2 for more information.

907-607.01.2--Submittals. The Contractor shall meet the following when submittal requirements.

Product Data. The Contractor shall provide manufacturer's catalog cuts with printed specifications and installation instructions. The Contractor shall deliver two copies of operation

and maintenance data covering the installed products. The Manual shall include a parts list showing manufacturer's names and part numbers for the gate operator.

Shop Drawings. The Contractor shall supply shop drawings showing the relationship of operating systems with gate components, including details of all major components. The shop drawings shall include complete details of gate construction, gate height and post spacing dimensions.

Certification of Performance Criteria. The manufacturer of the gate system shall provide certification stating the gate system includes the following material components that provide superior performance and longevity. Alternate designs built to minimum standards that do not include these additional structural features shall not be accepted.

The gate track system shall be keyed to interlock into gate frame member by providing 200 percent additional strength when compared to weld only keyless systems. When interlocked with and welded to the "keyed" frame top member, the gate track shall form a composite structure.

Gate shall have a minimum counterbalance length of 50 percent opening width which provides a 36 percent increase in lateral resistance when compared to ASTM minimum of 40 percent counterbalance. If gate is ever to be automated, counterbalance section shall be filled with fabric or other specified material.

To provide superior structural integrity, major vertical members shall be spaced at intervals less than the gate frame height and each vertical member, including pickets, shall be welded in place.

The entire gate frame, including counterbalance section, shall include two adjustable stainless steel cables (minimum 3/16-inch) per bay to allow complete gate frame adjustment to maintain strongest structural square and level orientation.

The gate truck assemblies shall be tested for continuous duty and shall have plated steel bearings meeting ASTM B 117-07 salt spray test with no red rust after 790 hours (see Subsection 907-607.01.1 for more information). Bearings shall be specifically designed for roller applications with full compliment ball bearings, shock resistant outer races, and captured seals.

The gate truck assemblies shall be supported by a minimum 5/8-inch plated steel bolt with self aligning capability, rated to support a 2,000 pound reaction load.

Hanger brackets shall be hot dipped galvanized steel with a minimum 3/8-inch thickness that is also gusseted for additional strength.

The gate top track and supporting hangar bracket assemblies shall be certified by a licensed Professional Engineer to withstand a 2,000-pound vertical reaction load without exceeding allowable stresses.

Certifications. The gate shall be in compliance with ASTM F 2200-05, Standard Specification for Automated Vehicular Gate Construction per Subsection 907-607.02 for more information.

If operated gate system, gate operator shall be in compliance with UL 325 as evidenced by UL listing label attached to gate operator.

The aluminum welders and welding process must be certified per Subsection 907-607.02.2 for more information.

Manufacturer shall supply gate design performance certification as per Subsection 907-607.01.2 for more information.

907-607.02--Cantilever Slide Gate System Manufacturers. The cantilever sliding gate system shall be manufactured by Tymetal Corp., 2549 State Route 40, Greenwich, NY 12834, (800) 328-4283, or other approved equal.

Gate manufacturer shall provide independent certification as to the use of a documented Welding Procedure Specification and Procedure Qualification Record to insure conformance to the AWS D1.2 welding code. Upon request, Individual Certificates of Welder Qualification documenting successful completion of the requirements of the AWS D1.2 code shall also be provided. See Subsection 907-607.01.1 for more information.

Gate manufacturer shall certify that the gate is manufactured in compliance with ASTM F2200-05, Standard Specification for Automated Vehicular Gate Construction and the operators are UL 325 compliant. See Subsection 907-607.01.2 for more information.

907-607.02.1--Vehicular Slide Gate Operator TYM-2000 or Approved Equal. The slide gate operator shall open and close cantilever, overhead, or track gates, to provide convenience and security. The slide gate operator shall function with most accessories including: radio controls, electro-mechanical locks, single and three button control stations, digital keypads, coded cards, sensing loops, telephone entry systems, and revenue control equipment. The operator shall utilize 230 Volt AC single phase power. The control voltage in each case shall be 5 Volt DC.

The gate operator shall include an APeX Controller with integrated radio receiver, plug-in loop detector capability, surge protection, and easy to read labeling standard.

Capacity. The gate operator shall be rated to operate a gate weighing up to 2000 pounds. The gate operator shall be UL 325 compliant for Class I, II, III, and IV.

Design Criteria. Operation shall be by means of a one (1) horsepower single phase instant reversing motor, transferring power to a four-inch diameter pulley, to a right angle oil bath gear reducer using another four-inch diameter pulley and V-belt. Then, power shall be transferred through a sliding collar disconnect system to the output drive shaft equipped with a No. 40 drive sprocket and roller chain which attaches to the gate with heavy-duty gate attachment brackets.

Intermediate chain supports with anti-catch design shall also be supplied.

The operator shall open the gate at a rate of approximately 11 inches per second.

The No. 40 chain shall be coated with "Armor Coat" corrosive resistant chain coating.

Components. Standard mechanical components shall include the following as a minimum.

- 3/16-inch thick, weather resistant UV-stabilized polyethylene one piece cover which is fully removable and lockable.
- Heavy-duty, plated frame with mounting legs for pad mounting standard.
- Pedestal to raise operator from ground level and protect from high water.
- 20:1 right-angle oil bath gear reducer.
- Arctic package with immersion heater.
- One inch solid steel output drive shaft.
- Spring loaded manual disconnect.
- Steel "critter" plate to prevent entry of ground pests.

Standard electrical components shall include the following as a minimum.

- 1-HP motor with thermal overload protection in 230 VAC single phase.
- Solid state logic controls featuring 15 diagnostic L.E.D. indicators and auto-close timer (1 second to 9 minutes).
- Inherent, fully adjustable motor over-current sensing to detect obstructions via precision 24 turn potentiometer, with separate adjustments for opening and closing directions.
- Controller housed in zinc plated control box with separate box provided for connection of field power.
- Power On/Off switch.
- Contacts for opening, closing and reversing accessories, as well as contact and non-contact obstruction sensing devices. 24 VAC and 24 VDC available on terminal strip to power accessory devices, provided by non-circuit board mounted transformer with minimum 40 VA rating.
- Four adjustable limits with precision snap-action type limit switches to control gate position, mounted inside a separate four switch limit box.
- Master/slave or stand alone capable with dip switch selection. Three wire twisted pair shielded cable required.

Access Control.
For Entry, a proximity card reader with 3-inch read range shall be installed on the unsecure side of gate opening and shall function as the primary entry / ingress device. This is to be installed by MDOT.

For Exit, a free exit loop (loop detector) shall be embedded in pavement on the secure side of the gate opening and shall function as the primary exit / egress device. This is to be installed by MDOT.

For Safety and Reversing Devices, a reversing loop (loop detector) shall be embedded in pavement on the unsecure side of the gate opening. Photoelectric through beams / photo eyes shall be installed to span the clear opening and gate panel path at the tail section. These are to be installed by MDOT.

Factory Inspection and Testing. The manufacturer shall test each operator at factory to assure smooth, quiet operation. The manufacturer shall test all control inputs to ensure proper function. The manufacturer shall certify that operator has been tested as part of a complete gate system in excess of 50,000 cycles.

907-607.02.2--Cantilever Slide Gate. Heavy Duty Gate may be used for clear openings up to 30 feet wide.

The gate frame shall be fabricated from 6063-T6 aluminum alloy extrusions. The top member shall be a 3 inches x 5 inches aluminum structural channel/tube extrusion weighing not less than 3.0 lb/lf for Internal Picket designs or 2.6 lb/lf for External Picket designs. To maintain structural integrity this frame member shall be "keyed" to interlock with the "keyed" track member. If fabricated as a single horizontal piece, the bottom member shall be a 2 inches x 5 inches aluminum structural tube weighing not less than 2.0 lb/lf. If fabricated in two horizontal pieces, the bottom member shall be a 5-inch aluminum structural channel weighing not less than 2.6 lb/lf. When the gate frame is manufactured in two horizontal pieces or sections, they shall be spliced in the field. The gate frame shall be fabricated in one or multiple sections depending on size requirements or project constraints).

The vertical members (chain link) at the ends of the gate frame shall be "P" shaped in cross section with a nominal base dimension of no less than 2" x 2" and weighing not less than 1.6 lb/lf. Major 2" x 2" vertical members weighing not less than 1.1 lb/lf shall separate each bay and shall be spaced at less than gate height intervals. Intermediate 1" x 2" vertical members weighing not less than 0.82 lb/lf shall alternate between 2" x 2" major members.

The gate frame shall have a separate semi-enclosed "keyed" track, extruded from 6005A-T61 or 6105-T5 aluminum alloy, weighing not less than 2.9 lb/lf. The track member shall be located on only one side of the top primary. Welds shall be placed alternately along the top and side of the track at 9-inch centers with welds being a minimum of two (2) inches.

All welds on the gate frame shall conform to Welding Procedure Specification and Procedure Qualification Record to insure conformance to the AWS D1.2 Structural Welding Code. All individual welders shall be certified to AWS D1.2 welding code.

The gate frame for gate mounting shall be supported from the track by two swivel type, self-aligning, 4-wheeled, sealed lubricant, ball-bearing truck assemblies. The bottom of each support post shall have a bracket equipped with a pair of 3-inch UHMW guide wheels. Wheel cover protectors shall be included with bottom guides to comply with UL325. Gap protectors shall be provided and installed, compliant with ASTM F 2200-05.

Diagonal "X" bracing of 3/16-inch minimum diameter stainless steel aircraft cable shall be installed throughout the entire gate frame.

The gate shall be completed by installation of approved filler as specified.

2" x 2" x 9" gauge aluminized steel chain link fabric shall extend the entire length of the gate. If operated gate, counterbalance shall also have fabric to prevent reach through and comply with ASTM F2200, see 1.03 C.1. Fabric shall be attached at each end of the gate frame by standard fence industry tension bars and tied at each 2" x 2" vertical member with standard fence industry ties. ASTM F2200 requires attachment method that leaves no leading or bottom edge protrusions which cannot exceed 0.5 inch.

A single set of support posts shall be minimum 4-inch O.D. round Schedule 40 or 4 inches x 4 inches x 3/16 inch wall square steel tubing, grade 500. Gate posts shall be galvanized or coated and supported in concrete footings as specified by the design team.

Gate shall be mill finish aluminum or color coated with polyester powder as specified. If powder coated, the gate, including track member, and all accessories shall be pretreated chemically by sand blasting or other acceptable method to ensure proper coating adherence.

907-607.02.3--Warranty. The cantilever slide gate and operator system shall be warranted by the manufacturer against manufacturing defects for a period of three years from date of sale. The truck assembly shall be warranted against manufacturing defects by the manufacturer for a period of five years from date of sale.

907-607.03--Construction Requirements. The final grades and installation conditions shall be examined for compliance. Work shall not begin until all unsatisfactory conditions are corrected.

907-607.03.1--Installation. All equipment of this section shall be installed in strict accordance with the company's printed instructions unless otherwise shown on the contract drawings. The gate and installation shall conform to ASTM F 1184-05 standards for aluminum cantilever slide gates, Type II, Class 2. The gate system shall comply with ASTM F2200-05 and UL 325

The inherent motor current sensors are part of the gate operator system and shall not be removed or bypassed.

The Contractor shall be responsible to ensure that appropriate external secondary entrapment protection devices be installed for the specific site conditions to protect against all potential entrapment zones. Proper operation of these safety devices shall be verified and training as to the operation and maintenance of these devices for the users and owners shall be documented.

907-607.03.2--System Acceptance and Validation. Acceptance tests shall be performed on each system function. The Contractor shall supply all equipment necessary for system adjustment and testing.

The warning signs shipped with the gate operator shall be installed in prominent position on both sides of the gate.

The complete system shall be adjusted to assure it is performing properly. The system shall be operated for a sufficient period of time to determine that the system is in proper working order.

Installer and customer shall complete Operated Gate System Installation Checklist.

907-607.04--Method of Measurement. Gate, Barrier Fence, will be measured per each.

907-607.05--Basic of Payment. Gate, Barrier Fence, measured as prescribed above, will be paid for at the contract bid price per each, which price shall include the costs for all testing, labor, materials, and all incidentals necessary to complete the work.

Payment will be made under:

907-607-G: Gate, Barrier Fence - per each

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-625-1 **CODE: (SP)**

DATE: 05/21/2004

SUBJECT: Painted Traffic Markings

Section 625, Painted Traffic Markings, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-625.04--Method of Measurement. After the last paragraph of Subsection 625.04 on page 442, add the following:

Four-inch traffic stripe markings shall be measured in accordance with Subsection 619.04 for temporary stripe.

907-625.05--Basis of Payment. Add the following pay items to the list of pay items on pages 442 & 443.

907-625-A:	Traffic Stripe, Skip White, 4" Width	- per linear foot or mile
907-625-B:	Traffic Stripe, Skip Yellow, 4" Width	- per linear foot or mile
907-625-C:	Traffic Stripe, Continuous White, 4" Width	- per linear foot or mile
907-625-D:	Traffic Stripe, Continuous Yellow, 4" Width	- per linear foot or mile
907-625-E:	Detail Traffic Stripe, 4" Equivalent Length	- per linear foot
907-625-F:	Legend, 4" Equivalent Length	- per square foot or linear foot

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-625-5 **CODE: (SP)**

DATE: 12/14/2010

SUBJECT: Painted Traffic Markings – Blue-ADA

Section 626, Thermoplastic Traffic Markings, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-626.02--Materials. After the first paragraph of Subsection 626.02.1 on page 443, add the following:

Blue-ADA marking material shall meet the requirements of Section 710 with the exception that the color shall be blue-ADA.

907-626.05--Basis of Payment. Add the following pay items to the list of pay items on pages 442 and 443.

907-625-E: Detail Traffic Stripe, Blue-ADA - per linear foot

907-625-F: Legend, Blue-ADA - per square foot or linear foot

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-631-1 **CODE: (SP)**

DATE: 05/04/2010

SUBJECT: Flowable Fill

Section 631, Flowable Fill, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is deleted in toto and replaced as follows:

SECTION 907-631 - FLOWABLE FILL

907-631.01--Description. This work shall consist of furnishing and placing a flowable fill material. Uses include, but are not limited to, placement under existing bridges, around or within box culverts or pipe culverts, or at other locations shown on the plans.

907-631.02--Materials. All materials shall meet the requirements of the following Subsections, or as stated herein:

Fine Aggregate	*
Portland Cement	701.01 and 701.02
Fly Ash	714.05
Air Entraining Admixtures **	713.02
Water	714.01.1 and 714.01.2
Calcium Chloride **	714.02

* The gradation of the fine aggregate shall be fine enough for the fine aggregate to stay in suspension in the mortar to the extent required for proper flow and shall conform to the following grading:

Sieve Size	% Passing
1/2 inch	100
No. 200	< 1

** High air generators shall be used, as required, in order to increase the total air content to 25 – 35%. Only approved high air generators shall be used to obtain the required air content. Either a Type C or E chemical admixture or maximum 1.0% calcium chloride by weight of the total cementitious materials may be added as required by the application and with the approval of the Engineer. Calcium chloride may not be used where the flowable fill comes into contact with metal. Adding the Type C or E chemical admixture or calcium chloride does not require a different or new mixture design from one previously approved.

907-631.02.1--Mixture Design. Flowable fill is a mixture of Portland cement, fine aggregate, water, and, as required to obtain the required total air content, either high air generators or air

entraining admixtures. Fly ash shall be used for Non-Excavatable applications. Flowable fill contains a low cementitious content for reduced strength development.

At least 30 days prior to production of flowable fill, the Contractor shall submit to the Engineer proposed flowable fill mixtures design following the mixture design submittal procedures listed in the Department's *Concrete Field Manual*.

The concrete producer shall assign a permanent unique mixture number to each flowable fill mixture design. All flowable fill mixture designs will be reviewed by the Materials Division prior to use. Flowable fill mixture designs disapproved will be returned to the Contractor with a statement explaining the disapproval.

Once approved, a flowable fill mixture design may be transferred to other projects without additional testing provided the material sources have not changed. Allowable changes in material sources shall meet the requirements of the Department's *Concrete Field Manual*, Section 5.7. For allowable changes in material sources, the mixture design shall be re-verified following the requirements of Subsection 907-631.02.1.2.

907-631.02.1.1--Proportioning of Mixture Design. The mixture design proportions shall be determined based on batches mixed using production equipment.

Table 1, "Flowable Fill Mixture Design Proportioning Guide", is a guide for proportioning flowable fill, except where noted.

Table 1
Flowable Fill Mixture Design Proportioning Guide

	Excavatable	Non-Excavatable
Material	Amount (lbs/yd^3)	
Cement	75 – 150 *	75 – 150 *
Fly Ash	-	150 – 600 *
Fine Aggregate	**	**
Water	***	***

* Guideline for proportioning. The actual amount may vary from the amount listed the Table 1.

** Fine aggregate shall be proportioned to yield one cubic yard of mixture as verified by unit weight.

*** Mixture designs shall produce a consistency that will result in a flowable self-leveling product at time of placement.

Each mixture design shall be verified using production equipment prior to submittal of the mixture design for review. During the verification, the mixture design shall meet the

requirements of the "Performance Requirements Flowable Fill Design" listed in Table 2. The verification performance data and the corresponding batch ticket shall be submitted with the mixture design.

Table 2
Performance Requirements for Verification of Flowable Fill Mixture Designs

Mixture Property	Performance Requirement		Required Test Method
	Excavatable	Non-Excavatable	
Consistency	Approximate 8-inch spread		(see below)
Total Air Content (%)	25 – 35	5 – 15	AASHTO T121
28 Day Compressive Strength (psi)	–	Minimum 125	AASHTO T22 and T23
Unit Weight (lbs/ft^3)	90 – 110	100 – 125	AASHTO T121

The consistency of the fresh mixture shall be that of a thin slurry. The consistency shall be tested by filling to the top a three-inch diameter by six-inch high cylinder which is open on both ends. With the mixture in the cylinder, immediately pull the cylinder straight up. The correct consistency of the mixture will produce a spread meeting the requirements in Table 2 with no segregation.

907-631.02.1.2--Verification of Mixture Design. The verification shall be performed by the Contractor prior to submittal of the mixture design proportions for review. The verification performance data and the corresponding batch ticket shall be submitted with the mixture design. The verification shall be performed using the batching and mixing equipment anticipated to be used during production of the mixture for the project. In addition to the performance requirements listed in Table 2, the verification shall meet the batching tolerance requirements for the material weights listed in the Department's *Concrete Field Manual*.

Adjustments of the proportions of fine aggregate and/or water shall be made to achieve suspension of the fine aggregate.

The requirements in Table 2 for consistency, percent total air content, compressive strength, and unit weight are for verification of the mixture design proportion purposes only and are not intended for jobsite acceptance requirements.

907-631.02.2--Acceptance of Mixture. The acceptance of the mixture at the job site will be based on the performance of the flowable fill mixture placed and will be at the discretion of the Engineer. For acceptance of the mixture at the job site, the mixture shall be self-leveling and shall not settle, segregate, or have excessive bleed water.

907-631.02.3--Manufacturing. Flowable fill will be batched, mixed, and transported in accordance with the requirements of Section 804.

907-631.02.4--Sampling and Testing. The yield shall be determined by testing the first load

placed on each production day in accordance with AASHTO Designation: T121. If adjustments are made to the mixture design proportions to correct for yield, the yield shall be determined on the next load with the adjusted proportions.

907-631.03--Construction Requirements. Prior to placing flowable fill, each end of the structure shall be plugged leaving an opening at each end no larger than necessary to accommodate the filling equipment. Flowable fill shall be discharged from the mixer by any reasonable means into the area to be filled. Unless otherwise approved by the Engineer, filling will begin on the downstream end of the structure and continue until no further material will enter the structure. The flowable fill will then be continued from the upstream end of the structure.

907-631.04--Method of Measurement. Flowable fill will be measured by the cubic yard which will be determined from the yield in accordance with the requirements of Subsection 907-631.02.4. The yield will be calculated by dividing the actual batch weights of each load by the unit weight of the mix, which will be determined by testing the first load placed on each production day.

907-631.05--Basis of Payment. Flowable fill, measured as prescribed above, will be paid for at the contract unit price per cubic yard, which price shall be full compensation for furnishing all labor, equipment, tools and materials to complete the work.

Payment will be made under:

907-631-A: Flowable Fill, Excavatable - per cubic yard

907-631-B: Flowable Fill, Non-Excavatable - per cubic yard

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-699-4 **CODE: (IS)**

DATE: 02/15/2012

SUBJECT: Construction Stakes

Section 699, Construction Stakes, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-699.01--Description. After the first paragraph of Subsection 699.01 on page 585, add the following:

This work may be performed utilizing Automated Machine Guidance technologies and systems in accordance with the standard specifications and contract documents. Automated Machine Guidance (AMG) is defined as the utilization of positioning technologies such as Global Positioning Systems (GPS), Robotic Total Stations, lasers, and sonic systems to automatically guide and adjust construction equipment according to the intended design requirements. The Contractor may use any type of AMG system(s) that result in compliance with the contract documents and applicable Standard Specifications.

Automated Machine Guidance (AMG) is not a mandatory requirement. Automated Machine Guidance (AMG), conventional staking, or a combination of both may be used at the Contractor's option for staking on this project.

907-699.02--Materials. After the last sentence of the first paragraph of Subsection 699.02 on page 585, add the following.

All equipment required to accomplish automated machine guidance shall be provided by the Contractor. The Contractor may use any type of AMG equipment that achieves compliance with the contract documents and applicable Standard Specifications.

907-699.03--Construction Requirements. Delete the first sentence of Subsection 699.03 on page 585 and substitute the following:

The Department will establish, one time only, secondary control points with elevations at distances not to exceed 1500 feet or that minimum distance necessary to maintain inter-visibility.

Delete the third sentence of the fourth paragraph of Subsection 699.03 on page 587, and substitute the following.

The duties performed by said Registrant shall conform to the definitions under the "practice of engineering" and practice of "land surveying" in Mississippi Law and the latest edition of the MDOT Survey Manual. The MDOT Survey Manual can be obtained online at the following address.

http://www.gomdot.com/Divisions/Highways/Resources.aspx?Div=RoadwayDesign.

After the last paragraph of Subsection 699.03 on page 587, add the following.

907-699.03.1--Automated Machine Guidance.

907-699.03.1.1--Automated Machine Guidance Work Plan. The Contractor shall submit a comprehensive written Automated Machine Guidance Work Plan to the Engineer for review at least 30 days prior to use. The submittal of a AMG Work Plan shall be an indication of the Contractor's intention to utilize AMG instead of conventional methods on the project areas and elements stated in the Work Plan. The Engineer shall review the Automated Machine Guidance Work Plan to ensure that the requirements of this special provision are addressed. The Contractor shall assume total responsibility for the performance of the system utilized in the Work Plan. Any update or alteration of the Automated Machine Guidance Work Plan in the course of the work shall be approved and submitted to MDOT for determination of conformance with requirements of this special provision.

The Automated Machine Guidance Work Plan shall describe how the automated machine guidance technology will be integrated into other technologies employed on the project. This shall include, but not limited to, the following:

1. A description of the manufacturer, model, and software version of the AMG equipment.
2. Information on the Contractor's experience in the use of Automated Machine Guidance system (or Related Technologies) to be used on the project, including formal training and field experience of project staff.
3. A single onsite staff person as the primary contact, and up to one alternate contact person for Automated Machine Guidance technology issues.
4. A definition of the project boundaries and scope of work to be accomplished with the AMG system.
5. A description of how the project proposed secondary control(s) is to be established. It shall also include a list and map detailing control points enveloping the site.
6. A description of site calibration procedures including, but not limited to, equipment calibration and the frequency of calibration as well as how the equipment calibration and information will be documented to MDOT and the Project Engineer. The documentation shall contain a complete record of when and where the tests were performed and the status of each equipment item tested within or out of the ranges of required tolerances.
7. A description of the Contractor's quality control procedures for checking mechanical calibration and maintenance of equipment. It shall also include the frequency and type of checks to be performed.
8. A description of the method and frequency of field verification checks and the submission schedule of results to the Project Engineer.
9. A description of the Contractor's contingency plan in the event of failure/outage of the AMG system.
10. A schedule of Digital Terrain Models (DTM) intended for use on the project. This shall be submitted to the Engineer for review, feedback, and communication.

The Contractor and MDOT will agree on the quantity and schedule of Contractor-provided training on the utilized AMG system required under Subsection 907-699.03.1.3.

907-699.03.1.2--State's Responsibilities. The District Surveyor will set the primary horizontal

and vertical control points in the field for the project as per latest edition of the MDOT Survey Manual. The control points shall be in Mississippi State Plane coordinate system.

MDOT will provide an electronic alignment file and primary control file for the project. This file will be based on the appropriate Mississippi State Plane Coordinate Zone either West or East. These files will be created with the computer software applications MicroStation (CADD software) and GEOPAK (civil engineering software). The data files will be provided in the native formats. The Contractor shall perform necessary conversion of the files for their selected grade control equipment, field verify the data for accuracy, and immediately report any errors to MDOT.

MDOT will provide design data, if available, in an electronic format to the Contractor. These files will be created with the computer software applications MicroStation (CADD software) and GEOPAK (civil engineering software). The data files will be provided in the native formats as specified in the Data Format section of this specification. No guarantee is made to the data accuracy or completeness, or that the data systems used by MDOT will be directly compatible with the systems used by the Contractor. Information shown on the paper plans marked with the seal (official plans as advertised) shall govern.

The Engineer will perform spot checks as necessary of the Contractor's machine control grading results, surveying calculations, records, field procedures, and actual staking. If the Engineer determines that the work is not being performed in accordance with the Specifications, the Engineer shall order the Contractor to re-construct the work to the requirements of the contract documents at no additional cost to the Department.

907-699.03.1.3--Contractor's Responsibilities The Contractor shall provide formal training, if requested, on the use of the Automated Machine Guidance Equipment and the Contractor's systems to MDOT project personnel prior to the start of construction activities utilizing AMG. This training is for providing MDOT project personnel with an understanding of the equipment, software, and electronic data being used by the Contractor.

The Contractor shall use the alignment and control data provided by MDOT.

The Contractor shall bear all costs, including but not limited to the cost of actual reconstruction work that may be incurred due to errors in application of Automated Machine Guidance techniques or manipulation of MDOT design data in Digital Terrain Models (DTM).

The Contractor shall be responsible for converting the information on the plans and/or electronic data file provided by MDOT into a format compatible with the Contractor's AMG system.

The Contractor shall establish secondary control points at locations along the length of the project and outside the project limits and/or where work is performed beyond the project limits as required by the Automated Machine Guidance system utilized. The Contractor shall establish this secondary control using survey procedures as outlined in the latest edition of the MDOT Survey Manual. A copy of all new control point information shall be provided to the Engineer prior to construction activities. The Contractor shall be responsible for all errors resulting from their efforts and shall correct deficiencies to the satisfaction of the Engineer and at no additional cost to the State.

The Contractor shall preserve all reference points and monuments that are established by the District Surveyor outside the construction limits. If the Contractor fails to preserve these items, they shall be re-established by the Contractor to their original quality at no additional cost to the State.

The Contractor shall set grade stakes at the top of the finished sub-grade and base course at all hinge points on the typical sections at 2000-foot maximum intervals on mainline, critical points such as, but not limited to, PC's, PT's, beginning and ending super elevation transition sections, middle of the curve, and at least two locations on each of the side roads and ramps, and at the beginning and end of each cross slope transition where Automated Machine Guidance is used. These grade stakes shall be established using conventional survey methods for use by the Engineer to check the accuracy of the construction.

The Contractor shall meet the same accuracy requirements as detailed in the Mississippi Standard Specifications for Road and Bridge Construction. Grade stakes shall be established as per Section 699 of the Mississippi Standard Specifications for Road and Bridge Construction for use by the Engineer to check the accuracy of the construction.

The Contractor shall be responsible for implementing the AMG system using the Mississippi State Plane Coordinate System. No localization methods will be accepted.

907-699.03.1.4--Data Format. It is the Contractor's responsibility to produce the Digital Terrain Model(s) and/or 3D line work needed for Automated Machine Guidance. MDOT does not produce this data in its design process. MDOT does provide CADD files created in the design process to the Contractor. The CADD files provided by MDOT are provided in the native software application formats in which they are created with no conversions, and their use in developing 3D data for machine guidance is at the discretion of the Contractor. The CADD files that may be available are listed below. Cross-Sections are one of the items provided but are not necessarily created at critical design locations. Therefore their use in Digital Terrain Models (DTM) for AMG is limited.

1. Project Control - Microstation DGN file and ASCII file
2. Existing Topographic Data - Microstation DGN file(s)
3. Preliminary Surveyed Ground Surface - GeoPak TIN, if available
4. Horizontal and Vertical alignment information - GeoPak GPK file and/or Microstation DGN file(s)
5. 2D Design line work (edge of pavement, shoulder, etc.) - Microstation DGN file(s)
6. Cross sections - Microstation DGN file(s), GeoPak format
7. Superelevation - Microstation DGN file(s), GeoPak format
8. Form Grades - Microstation DGN file(s)
9. Design Drainage - Microstation DGN file(s)

It is expressly understood and agreed that MDOT assumes no responsibility in respect to the sufficiency or accuracy of these CADD files. These files are provided for convenience only and the contract plans are the legal document for constructing the project.

907-699.05--Basis of Payment. Add the "907" prefix to the pay items listed on page 588.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-701-4 **CODE: (IS)**

DATE: 11/09/2010

SUBJECT: Hydraulic Cement

Section 701, Hydraulic Cement, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

Delete Subsection 701.01 on pages 595 & 596, and substitute the following:

907-701.01--General. The following requirements shall be applicable to hydraulic cement:

Only hydraulic cements conforming to Section 701 shall be used. Hydraulic cements shall not be listed or designated as meeting more than one AASHTO or Department type.

Different brands of hydraulic cement, or the same brand of hydraulic cement from different mills, shall not be mixed or used alternately in any one class of construction or structure, without written permission from the Engineer; except that this requirement will not be applicable to hydraulic cement treatment of design soils, or bases.

The Contractor shall provide suitable means for storing and protecting the hydraulic cement against dampness. Hydraulic cement, which for any reason, has become partially set or which contains lumps of caked hydraulic cement will be rejected. Hydraulic cement salvaged from discarded or used bags shall not be used.

The temperature of bulk hydraulic cement shall not be greater than l65°F at the time of incorporation in the mix.

Acceptance of hydraulic cement will be based on the certification program as described in the Department's Materials Division Inspection, Testing, and Certification Manual and job control sampling and testing as established by Department SOP.

Retests of hydraulic cement may be made for soundness and expansion within 28 days of test failure and, if the hydraulic cement passes, it may be accepted. Hydraulic cement shall not be rejected due to failure to meet the fineness requirements if upon retests after drying at 212°F for one hour, it meets such requirements.

Delete Subsection 701.02 on page 596, and substitute the following:

907-701.02--Portland Cement.

907-701.02.1--General.

907-701.02.1.1--Types of Portland Cement. Portland cement (cement) shall be either Type I or Type II conforming to AASHTO Designation: M85 or Type I(MS), as defined by the description below Table 1. Type III cement conforming to AASHTO Designation: M85 or Type III(MS), as defined by the description below Table 1, may be used for the production of precast or precast-prestressed concrete members.

907-701.02.1.2--Alkali Content. All cement types in this Subsection shall meet the Equivalent alkali content requirement for low-alkali cements listed in AASHTO Designation: M85, Table 2.

907-701.02.2--Replacement by Other Cementitious Materials. The maximum replacement of cement by weight is 25% for fly ash or 50% for ground granulated blast furnace slag (GGBFS). The minimum tolerance for replacement shall be 5% below the maximum replacement content. Replacement contents below this minimum tolerance by fly ash or GGBFS may be used, but shall not be given any special considerations, like the maximum acceptance temperature for Portland cement concrete containing pozzolans. Special considerations shall only apply for replacement of cement by fly ash or GGBFS.

907-701.02.2.1--Portland Cement Concrete Exposed to Soluble Sulfate Conditions or Seawater. When Portland cement concrete is exposed to moderate or severe soluble sulfate conditions, or to seawater, cement types and replacement of cement by Class F fly ash, GGBFS, or silica fume shall be as follows in Table 1.

Table 1- Cementitious Materials for Soluble Sulfate Conditions

Sulfate Exposure	Water-soluble sulfate (SO_4) in soil, % by mass	Sulfate (SO_4)in water, ppm	Cementitious material required*
Moderate and Seawater	0.10 - 0.20	150 - 1,500	Type II **, ***, **** cement, or Type I cement with one of the following replacements of cement by weight: 25% Class F fly ash, 50% GGBFS, or 8% silica fume
Severe	0.20 - 2.00	1,500 - 10,000	Type I cement with a replacement by weight of 50% GGBFS, or Type II ** cement with one of the following replacements of cement by weight: 25% Class F fly ash, 50% GGBFS, or 8% silica fume

* The values listed in this table for replacement of Portland cement by the cementitious materials listed are maximums and shall not be exceeded. The minimum tolerance for replacement shall be 0.5% below the maximum replacement content. Replacement contents below this minimum tolerance by the cementitious materials listed in this table do not meet the requirements for the exposure conditions listed and shall not be allowed.

** Type I cement conforming to AASHTO Designation: M85 with a maximum 8% tricalcium aluminate (C_3A) may be used in lieu of Type II cement; this cement is given the designation "Type I(MS)". Type III cement conforming to AASHTO Designation: M85 with a maximum 8% tricalcium aluminate (C_3A) may be used in lieu of Type II cement as allowed in Subsection 907-701.02.1; this cement is given the designation "Type III(MS)".

*** Blended cement meeting the sulfate resistance requirements of Subsection 907-701.04 may be used in lieu of Type II as allowed in Subsection 907-701.04. No additional cementitious materials shall be added to or as a replacement for blended cement.

**** Class F fly ash or GGBFS may be added as a replacement for cement as allowed in Subsection 907-701.02.2.

Class C fly ash shall not be used as a replacement for cement in any of the sulfate exposure conditions listed above.

907-701.02.2.2--Cement for Soil Stabilization Exposed to Soluble Sulfate Conditions or Seawater. When Portland cement for use in soil stabilization is exposed to moderate or severe soluble sulfate conditions, or to seawater, cement types and replacement of cement by Class F fly ash or GGBFS shall meet the requirements of Subsection 907-701.02.2.1. Neither metakaolin nor silica fume shall be used to bring the cementitious materials into compliance with the requirements of Table 1.

Delete Subsection 701.03 on page 596, and substitute the following:

907-701.03--Masonry Cement. Masonry cement shall conform to ASTM Designation: C 91 and shall only be used in masonry applications.

Delete Subsection 701.04 on page 596, and substitute the following:

907-701.04--Blended Hydraulic Cement.

907-701.04.1--General.

907-701.04.1.1--Types of Blended Cement. Blended hydraulic cements (blended cements) shall be of the following types and conform to AASHTO Designation: M 240:

Type I(SM) – Slag-modified Portland cement
Type IS – Portland blast-furnace slag cement
Type I(PM) – Pozzolan-modified Portland cement
Type IP – Portland-pozzolan cement

Blended cement for use in Portland cement concrete or soil stabilization exposed to the moderate soluble sulfate condition or exposure to seawater as defined in Table 1 shall meet the Sulfate resistance requirement listed in AASHTO Designation: M 240, Table 2 and the "(MS)" suffix shall be added to the type designation.

907-701.04.1.2--Alkali Content. All blended cement types in this Subsection shall meet the Mortar expansion requirements listed in AASHTO Designation: M 240, Table 2.

907-701.04.2--Replacement by Other Cementitious Materials. No additional cementitious materials, such as Portland cement, performance hydraulic cement, fly ash, GGBFS, metakaolin, or others, shall be added to or as a replacement for blended cement.

907-701.04.3--Exposure to Soluble Sulfate Conditions or Seawater. When Portland cement concrete or blended cement for soil stabilization is exposed to moderate soluble sulfate conditions or to seawater, where the moderate soluble sulfate condition is defined in Table 1, the blended cement shall meet the sulfate resistance requirement listed in AASHTO Designation: M 240, Table 2.

When Portland cement concrete or blended cement for soil stabilization is exposed to severe soluble sulfate conditions, where the severe soluble sulfate condition is defined in Table 1, blended cements shall not be used.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-702-3 **CODE: (SP)**

DATE: 05/08/2012

SUBJECT: Polyphosphoric Acid (PPA) Modification of Petroleum Asphalt Cement

Section 702.05, Petroleum Asphalt Cement, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-702.05--Petroleum Asphalt Cement. Delete the third paragraph of Subsection 702.05 on page 598, and substitute the following.

The bituminous material used in all types of asphalt mixtures shall conform to AASHTO Designation: M 320, Performance Grade PG 67-22, as modified in the table below, except that Polyphosphoric Acid (PPA) may be used at low dosage rates as a modifier to enhance the physical properties of a base binder to meet the requirements for Performance Grade PG 67-22. In addition, PPA may be used as a catalyst or mixing agent at low dosage rates in the production of Polymer Modified, Performance Grade PG 76-22.

When PPA is used as a modifier, in no case shall the PPA modifier be used to adjust the physical properties of the binder a full binder grade. For example: the base binder (unmodified) is graded as a PG 64-22 and should only be modified by the addition of PPA to a modified binder grade of PG 67-22.

When petroleum asphalt cement is modified by PPA, the following dosage limits shall be applied.

Grade	Dosage Limit
PG 67-22	0.75% by weight of binder
PG 76-22	0.50% by weight of binder

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-703-10 **CODE: (SP)**

DATE: 06/06/2012

SUBJECT: Aggregates

Section 703, Aggregates, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-703.03.2.4--Gradation. Delete the last sentence of the last paragraph of Subsection 703.03.2.4 on page 611.

907-703.04--Aggregate for Crushed Stone Courses.

907-703.04.1--Coarse Aggregate. Delete the first paragraph of Subsection 703.04.1 on page 611, and substitute the following.

Coarse aggregate, defined as material retained on No. 8 sieve, shall be either crushed limestone, steel slag, granite, concrete, or combination thereof. Crushed concrete is defined as recycled concrete pavement, structural concrete, or other concrete sources that can be crushed to meet the gradation requirements for Size No. 825 B as modified below. In no case shall waste from concrete production (wash-out) be used as a crushed stone base.

907-703.04.2--Fine Aggregate. Delete the first sentence of the first paragraph of Subsection 703.04.2 on page 612, and substitute the following.

Fine aggregate, defined as material passing No. 8 sieve, shall be material resulting from the crushing of limestone, steel slag, granite, concrete, or combination thereof.

Delete the third paragraph of Subsection 703.04.2 on page 612.

907-703.04.3--Gradation. After the table in Subsection 703.04.3 on page 613, add the following.

If crushed concrete is used, the crushed material shall meet the gradation requirements of Size No. 825 B with the exception that the percent passing by weight of the No. 200 sieve shall be 2 – 18.

907-703.06--Aggregates for Hot Mix Asphalt.

907-703.06.1.2--Fine Aggregates. Delete the last sentence of Subsection 703.06.1.2 on page 614.

907-703.20.3--Gradation. Delete the table and notes in Subsection 703.20.3 at the top of page 626, and substitute the following.

PERCENT PASSING BY WEIGHT

Square Mesh Sieves	Shell	Coarse			Medium	Fine
		Size I	Size II Note (1)	Size III Note (3)		
3 inch				100		
2 1/2 inch	90-100			90-100		
2 inch		100				
1 1/2 inch		90-100	100	25-60		
1 inch		80-100	97-100			
3/4 inch		55-100	55-100	0-10		
1/2 inch		35-85	35-85	0-5	100	
3/8 inch		12-65	12-65		97-100	
No. 4, Note (2)		0-30	0-30		92-100	
No. 10		0-8	0-8		80-100	100
No. 40					10-40	80-100
No. 60					0-20	30-100
No. 100						15-80
No. 200	0-5	0-4	0-4		0-5	0-30
PI Material Passing No. 40					6 or less	0

Note (1): Size II is intended for use in bases in which portland cement is used.
Note (2): Ground shell shall contain at least 97% passing the No. 4 sieve.
Note (3): Size III is intended for use in stabilized construction entrances.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-708-5

DATE: 04/11/2012

SUBJECT: Non-Metal Drainage Structures

After Subsection 907-708.02.1.2 on page 1, add the following.

907-708.02.1.4--Coarse Aggregate. Delete the last sentence of Subsection 708.02.1.4 on page 639.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-708-5 **CODE: (IS)**

DATE: 05/12/2008

SUBJECT: Non-Metal Drainage Structures

Section 708, Non-Metal Structures and Cattlepasses, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-708.02.1.2--Fly Ash. In the first sentence of Subsection 708.02.1.2 on page 639, change "20 percent" to "25%".

907-708.02.3.2--Marking. Delete the second sentence of Subsection 708.02.3.2 on page 640, and substitute the following:

Machine made pipe shall be marked in accordance with one of the following methods: 1) the pipe shall be inscribed on the outside of the pipe and stenciled on the inside of the pipe, or 2) the pipe shall be inscribed on the inside of the pipe, only. All other pipe may be stenciled.

907-708.17--Corrugated Plastic Pipe Culverts.

907-708.17.1--Corrugated Polyethylene Pipe Culverts. Delete the first sentence of the first paragraph of Subsection 708.17.1 on page 645 and substitute the following.

Corrugated polyethylene pipe shall conform to the requirements of AASHTO Designation: M 294, Type S and/or SP, as applicable, and shall have soil tight joints, unless otherwise specified.

Delete the last sentence of the second paragraph of Subsection 708.17.1 on page 645.

After Subsection 708.17.1 on page 645, add the following:

907-708.17.1.1--Inspection and Final Acceptance of Corrugated Polyethylene Pipe Culverts. Approximately 50% of the installed length of corrugated polyethylene pipe shall be inspected for excess deflection no sooner than 30 days after the embankment material over the pipe is placed to the required subgrade elevation or the maximum required fill height. The inspection shall be performed using either electronic deflectometers, calibrated television or video cameras, or a "go, no-go" mandrel that has an effective diameter of 95% of the nominal inside diameter of the pipe.

Pipe found to have deflection values greater than 5% shall be removed and replaced at no cost to the State.

907-708.17.2--Corrugated Poly (Vinyl Chloride) (PVC) Pipe Culverts. Delete the first sentence of the first paragraph of Subsection 708.17.2 on page 645 and substitute the following.

Corrugated poly (vinyl chloride) (PVC) pipe shall conform to the requirements of AASHTO Designation: M 304 and shall have soil tight joints, unless otherwise specified. Non-perforated PVC pipe used in underdrains shall either be manufactured with an ultra-violet light inhibitor or be fully coated with an ultra-violet light inhibitor.

After Subsection 708.17.2 on page 645, add the following:

907-708.17.2.1--Inspection and Final Acceptance of Poly (Vinyl Chloride) (PVC) Pipe Culverts. Approximately 50% of the installed length of PVC pipe shall be inspected for excess deflection no sooner than 30 days after the embankment material over the pipe is placed to the required subgrade elevation or the maximum required fill height. The inspection shall be performed using either electronic deflectometers, calibrated television or video cameras, or a "go, no-go" mandrel that has an effective diameter of 95% of the nominal inside diameter of the pipe.

Pipe found to have deflection values greater than 5% shall be removed and replaced at no cost to the State.

907-708.18--Sewer Pipe Used for Underdrains.

907-708.18.1--General. After the second paragraph of Subsection 708.18.1 on page 645 add the following:

In lieu of the pipe listed in this subsection, pipe meeting the requirements of Subsection 708.19 may also be used for plastic underdrain pipe.

907-708.18.3--Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe. After the first sentence of Subsection 708.18.3 on page 645, add the following.

Non-perforated PVC pipe shall either be manufactured with an ultra-violet light inhibitor or be fully coated with an ultra-violet light inhibitor.

907-708.18.4--Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe. Delete the paragraph in Subsection 708.18.4 on page 645 and substitute the following.

This pipe shall conform to the following requirements. For pipe sizes less than or equal to six inches (≤ 6"), the pipe shall be Class PS46 meeting the requirements of AASHTO Designation: M 278. For pipe sizes greater than six inches (> 6"), the pipe shall meet the requirements of AASHTO Designation: M 304. Non-perforated PVC pipe shall either be manufactured with an ultra-violet light inhibitor or be fully coated with an ultra-violet light inhibitor.

Delete Subsection 708.19 on page 645 and substitute the following:

907-708.19--Corrugated Polyethylene Pipe. This pipe shall be high density polyethylene pipe or drainage tubing meet the requirements of AASHTO Designation: M 294, Type S or SP, or

AASHTO Designation: M 252, Type S or Type SP, as applicable.

907-708.22.2--Exceptions to AASHTO. Delete the sixth paragraph of Subsection 708.22.2 on page 647.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-709-1 **CODE: (IS)**

DATE: 05/05/2008

SUBJECT: Metal Pipe

Section 709, Metal Pipe, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

After Subsection 709.02 on page 649, add the following:

907-709.02.1--Aluminized Corrugated Metal Culvert Pipe and Pipe Arches. All aluminized metal pipe and arches shall be manufactured from Type 2 corrugated metal pipe and arches in accordance with the requirements of Subsection 709.02.

907-709.03--Bituminous Coated Corrugated Metal pipe and Pipe Arches.

907-709.03.1--Materials. Delete the first sentence of the first paragraph of Subsection 709.03.1 on page 649, and substitute the following:

Bituminous coated corrugated metal pipe and arches shall conform to the requirements of AASHTO Designation: M 190 and be completely coated inside and out with an asphalt cement which will meet the performance requirements hereinafter set forth.

907-709.05--Polymer Coated Corrugated Metal Pipe and Pipe Arches. Delete the first sentence of the first paragraph of Subsection 709.05 on pages 649 and 650, and substitute the following:

Polymer coated corrugated metal pipe and arches shall conform to the requirements of AASHTO Designation: M 245, except the minimum gauge thickness shall be as shown on the plans or in the contract; however, corrugated metal pipe manufactured from sheets thicker than that specified will be acceptable when approved by the Engineer. The internal diameter of corrugated metal pipe will be determined by inside measurement between the crests of the corrugations. Corrugations greater than 3" x 1" will not be allowed in arch pipe.

907-709.06--Corrugated Metal Pipe for Underdrains. Delete the sentence in Subsection 709.06 on page 650, and substitute the following:

Corrugated metal pipe shall conform to AASHTO Designation: M 36, Type III. Type I pipe which has been perforated to permit the in-flow or out-flow of water may be used in lieu of Type III pipe.

907-709.06.1--Aluminized Corrugated Metal Culvert Pipe For Underdrains. All aluminized corrugated metal pipe for underdrains shall be manufactured from Type 2 corrugated metal pipe

and arches in accordance with the requirements of AASHTO Designation: M 36, Type III. Manufacturer must repair any damaged coating caused from perforating the pipe.

907-709.07--Bituminous Coated Corrugated Metal Pipe for Underdrains. Delete the sentence in Subsection 709.07 on page 650, and substitute the following:

Bituminous coated corrugated metal pipe shall conform to the requirements of AASHTO Designation: M 190, Type A with a bituminous coating applied in accordance with the requirements of Subsection 709.03. Manufacturer must repair any damaged coating caused from perforating the pipe.

907-709.08--Polymer Coated Corrugated Metal Pipe for Underdrains. Delete the sentence in Subsection 709.08 on page 650, and substitute the following:

The metal pipe for underdrains shall conform to the requirements of AASHTO Designation: M 245, Type III and the polymer coating shall conform to the requirements of Subsection 709.05. Type I pipe which has been perforated to permit the in-flow or out-flow of water may be used in lieu of Type III pipe. Manufacturer must repair any damaged coating caused from perforating the pipe.

907-709.09--Corrugated Aluminum Alloy Culvert Pipe and Arches. Delete the first sentence in Subsection 709.09 on page 650, and substitute the following:

Corrugated aluminum culvert pipe and arches shall conform to the requirements of AASHTO Designation: M l96, Type IA.

907-709.10--Corrugated Aluminum Alloy Pipe for Underdrains. Delete the first sentence in Subsection 709.10 on page 650, and substitute the following:

Corrugated aluminum pipe underdrains shall conform to the requirements of AASHTO Designation: M 196, Type III. Type I pipe which has been perforated to permit the in-flow or out-flow of water may be used in lieu of Type III pipe.

907-709.11--Bituminous Coated Corrugated Aluminum Alloy Culvert Pipe and Arches. Delete the sentence in Subsection 709.11 on page 650, and substitute the following:

Bituminous coated aluminum culvert pipe and arches shall conform to AASHTO Designation: M 196, Type IA, and in addition shall be coated inside and out as specified in Subsection 709.03. Manufacturer must repair any damaged coating caused from perforating the pipe.

907-709.13--Bituminous Coated Corrugated Aluminum Alloy Pipe for Underdrains. Delete the sentence in Subsection 709.13 on page 650, and substitute the following:

This pipe shall conform to AASHTO Designation: M 196, Type III, and shall be coated with bituminous material conforming to AASHTO Designation: M 190, type coating as specified. Manufacturer must repair any damaged coating caused from perforating the pipe.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-710-1 **CODE: (SP)**

DATE: 06/24/10

SUBJECT: Fast Dry Solvent Traffic Paint

Section 710, Paint, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is amended as follows:

After Subsection 710.05 on Page 661, add the following:

907-710.06--Fast Dry Solvent Traffic Paint. Fast dry solvent traffic paints intended for use under this specification shall include products that are single packaged and ready mixed. Upon curing, these materials shall produce an adherent, reflective pavement marking capable of resisting deformation by traffic. The manufacturer shall have the option of formulating the material according to their own specifications. However, the requirements delineated in this specification, Section 619 and Section 710 shall apply regardless of the formulation used. The material shall be free from all skins, dirt and foreign objects.

907-710.06.1--Composition.

907-710.06.1.1--Percent Pigment. The percent pigment by weight shall be not less than 51% nor more than 58% when tested in accordance with ASTM D 3723.

907-710.06.1.2--Viscosity. The consistency of the paint shall be not less than 75 nor more than 95 Krebs Units (KU) when tested in accordance with ASTM D 562.

907-710.06.1.3--Weight per Gallon. The paint shall weigh a minimum 11.8 pounds per gallon and the weight of the production batches shall not vary more than +/- 0.5 pounds per gallon from the weight of the qualification samples when tested in accordance with ASTM D 1475.

907-710.06.1.4--Total Solids. The percent of total solids shall not be less than 70% by weight when tested in accordance with ASTM D 2369.

907-710.06.1.5--Dry Time (No pick-up). The paint shall dry to a no tracking condition in a maximum of 10 minutes.

907-710.06.1.6--Volatile Organic Content. The volatile organic content (VOC) shall contain a maximum of 1.25 pounds of volatile organic matter per gallon of total non-volatile paint material when tested in accordance with ASTM D 3960.

907-710.06.1.7--Bleeding. The paint shall have a minimum bleeding ratio of 0.95 when tested in accordance with Federal Specification TT-P-115D.

907-710.06.1.8--Color. The initial daytime chromaticity for yellow materials shall fall within the box created by the following coordinates:

Initial Daytime Chromaticity Coordinates (Corner Points)

	1	2	3	4
x	0.53	0.51	0.455	0.472
y	0.456	0.485	0.444	0.4

The initial daytime chromaticity of white materials shall fall within the box created by the following coordinates:

Initial Daytime Chromaticity Coordinates (Corner Points)

	1	2	3	4
x	0.355	0.305	0.285	0.355
y	0.355	0.305	0.325	0.375

907-710.06.2--Environmental Requirements. All yellow materials using lead chromate pigments shall meet the criteria of non-hazardous waste as defined by 40 CFR 261.24 when tested in accordance with EPA Test Method 1311, Toxicity Characteristics Leaching Procedures (TCLP). The striping and marking material , upon preparation and installation, shall not exude fumes which are toxic, or detrimental to persons or property. All material using lead free pigments shall NOT contain either lead or other Resource Conservation and Recovery Act (RCCA) materials in excess of the standard defined by EPA Method 3050 and 6010.

907-710.06.3--Acceptance Procedures. Acceptance of all fast dry solvent based traffics paint will be based on the Manufacturer's Certification and Certified Test Results. The Contractor shall furnish the Engineer with three copies of the manufacturer's certification stating that each lot of material in a shipment complies with the requirements of this contract. In addition, the Contractor shall provide Certified Test Reports for all tests required by this specification. The test results shall be representative of the material contained with the shipment.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-711-4 **CODE: (IS)**

DATE: 06/26/2009

SUBJECT: Synthetic Structural Fiber Reinforcement

Section 711, Reinforcement and Wire Rope, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

After Subsection 711.03.4.3 on page 665, add the following:

907-711.04--Synthetic Structural Fiber. The synthetic structural fibers shall be approved for listing in the Department's "Approved Sources of Materials" prior to use. The synthetic structural fibers shall be added to the concrete and mixed in accordance with the manufacturer's recommended methods.

907-711.04.1--Material Properties. The fibers shall meet the requirements of ASTM Designation: C 1116, Section 4.1.3. The fibers shall be made of polypropylene, polypropylene/polyethylene blend, nylon, or polyvinyl alcohol (PVA).

907-711.04.2--Minimum Dosage Rate. The dosage rate shall be such that the average residual strength ratio ($R_{150,3.0}$) of fiber reinforced concrete beams is a minimum of 20.0 percent when the beams are tested in accordance with ASTM Designation: C 1609. The dosage rate for fibers shall be determined by the following.

The fiber manufacturer shall have the fibers tested by an acceptable, independent laboratory acceptable to the Department and regularly inspected by the Cement and Concrete Reference Laboratory of the National Institutes of Standards and Technology and approved to perform ASTM Designations: C 39, C 78, and C192.

The laboratory shall test the fibers following the requirements of ASTM Designation: C 1609 in a minimum of three (3) test specimens cast from the same batch of concrete, molded in 6 x 6 x 20-inch standard beam molds meeting the requirements of ASTM Designation: C 31. The beams shall be tested on an 18-inch span. The tests for $R_{150,3.0}$ shall be performed when the average compressive strength of concrete used to cast the beams is between 3500 and 4500 psi. The tests for compressive strength shall follow the requirements of ASTM Designation: C 39. The average compressive strength shall be determined from a minimum of two (2) compressive strength cylinders.

The value for $R_{150,3}$ shall be determined using the following equation:

$$R_{150,3.0} = \frac{f_{150,3.0}}{f_1} \times 100$$

The residual flexural strength ($f_{150,3.0}$) shall be determined using the following equation:

$$f_{150,3.0} = \frac{P_{150,3.0} \times L}{b \times d^2}$$

where:

$f_{150,3.0}$ is the residual flexural strength at the midspan deflection of $L/150$, (psi),

$P_{150,3.0}$ is the residual load capacity at the midspan deflection of $L/150$, (lbf),

L is the span, (in),

b is the width of the specimen at the fracture, (in), and

d is the depth of the specimen at the fracture, (in).

For a 6 x 6 x 20-inch beam, the $P_{150,3.0}$ shall be measured at a midspan deflection of 0.12 inch.

Additionally, $R_{150,3.0}$, $f_{150,3.0}$, and $P_{150,3.0}$ may also be referred to as R_{150}^{150}, f_{150}^{150}, and P_{150}^{150} respectively.

At the dosage rate required to achieve the minimum $R_{150,3}$, the mixture shall both be workable and the fibers shall not form clumps.

The manufacturer shall submit to the State Materials Engineer certified test reports from the independent laboratory showing the test results of each test specimen.

907-711.04.3--Job Control Requirements. The synthetic structural fibers shall be one from the Department's "Approved Sources of Materials."

At the required dosage rate, the mixture shall both be workable and the fibers shall not form clumps to the satisfaction of the Engineer. If the mixture is determined by the Engineer to not be workable or have clumps of fibers, the mixture may be rejected.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-713-2

DATE: 04/04/2012

SUBJECT: Admixtures for Concrete

After the last sentence of the first paragraph of Subsection 907-713.02 on page 1, add the following.

Admixtures providing a specific performance characteristic(s) other than those of water reduction or set retardation shall meet the minimum requirements for Type S. For admixtures meeting the requirements for Type S, the manufacturer shall provide data to substantiate the specific performance characteristic(s) to the satisfaction of the State Materials Engineer.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-713-2 **CODE: (IS)**

DATE: 11/09/2010

SUBJECT: Admixtures for Concrete

Section 713, Concrete Curing Materials and Admixtures, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

After the second paragraph of Subsection 713.01.2 on page 676, add the following.

Type 1-D compound may be used on bridge rails, median barriers, and other structures requiring a spray finish. When Type 1-D compound is used, it will be the Contractor's responsibility to assure that the compound has dissipated from the structure prior to applying the spray finish and that the spray finish adheres soundly to the structure.

Delete Subsection 713.02 on pages 676 & 677, and substitute the following:

907-713.02--Admixtures for Concrete. Air-entraining admixtures used in Portland cement concrete shall comply with AASHTO Designation: M 154. Set-retarding, accelerating, and/or water-reducing admixtures shall comply with AASHTO Designation: M 194. Water-reducing admixture shall meet the minimum requirements for Type A. Set-retarding admixtures shall meet the minimum requirements for Type D.

In order to obtain approval of an admixture, the State Materials Engineer shall have been furnished certified test reports, made by an acceptable independent laboratory regularly inspected by the Cement and Concrete Reference Laboratory of the National Institutes of Standards and Technology, which show that the admixture meets all the requirements of the applicable AASHTO Standard Specification.

The Department reserves the right to sample, for check tests, any shipment or lot of admixture delivered to a project.

The Department reserves the right to require tests of the material to be furnished, using the specific cement and aggregates proposed for use on the project, as suggested in AASHTO Designation: M 154 and outlined in AASHTO Designation: M 194.

After an admixture has been approved, the Contractor shall submit to the State Materials Engineer, with each new lot of material shipped, a certification from the manufacturer in accordance with the requirements of Subsection 700.05.1 and stating the material is of the same composition as originally approved and has not been changed or altered in any way. The requirement in Subsection 700.05.1(b) is not required on the certification from the manufacturer.

Admixtures containing chlorides will not be permitted.

Failure to maintain compliance with any requirement of these specifications shall be cause for rejection of any previously approved source or brand of admixture.

Admixtures shall only be used in accordance with the manufacturer's recommended dosage range as set forth in the manufacturer's approval request correspondence. When an admixture is used in Portland cement concrete, it shall be the responsibility of the Contractor to produce satisfactory results.

907-713.02.1--Source Approval. In order to obtain approval of an admixture, the Producer/Suppliers shall submit to the State Materials Engineer the following for review: certified test reports, made by an acceptable independent laboratory regularly inspected by the Cement and Concrete Reference Laboratory of the National Institutes of Standards and Technology, which show that the admixture meets all the requirements of the applicable AASHTO or Department Specification for the specific type and the dosage range for the specific type of admixture.

907-713.02.2--Specific Requirements. Admixtures containing chlorides will not be permitted.

907-713.02.3--Acceptance. The Department reserves the right to sample, for check tests, any shipment or lot of admixture delivered to a project.

The Department reserves the right to require tests of the material to be furnished, using the specific cement and aggregates proposed for use on the project, as suggested in AASHTO Designation: M 154 and outlined in AASHTO Designation: M 194.

Failure to maintain compliance with any requirement of these specifications shall be cause for rejection of any previously approved source or brand of admixture.

With each new lot of material shipped the Contractor shall submit to the State Materials Engineer, a notarized certification from the manufacturer showing that the material complies with the requirements of the applicable AASHTO or Department Specification.

When an admixture is used, it shall be the responsibility of the Contractor to produce satisfactory results.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-714-6 **CODE: (IS)**

DATE: 11/09/2010

SUBJECT: Miscellaneous Materials

Section 714, Miscellaneous Materials, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-714.05--Fly Ash. Delete Subsections 714.05.1 & 714.05.2 on pages 680 & 681, and substitute the following:

907-714.05.1--General. The fly ash source must be approved for listing in the Department's "Approved Sources of Materials" prior to use. The acceptance of fly ash shall be based on certified test reports, certification of shipment from the supplier, and tests performed on samples obtained after delivery in accordance with the Department's Materials Division Inspection, Testing, and Certification Manual and Department SOP.

Different classes of fly ash or different sources of the same class shall not be mixed or used in the construction of a structure or unit of a structure without written permission from the Engineer.

The Contractor shall provide suitable means for storing and protecting the fly ash from dampness. Separate storage silos, bins, or containers shall be provided for fly ash. Fly ash which has become partially set or contains lumps of caked fly ash shall not be used.

The temperature of the bulk fly ash shall not be greater than 165°F at the time of incorporation into the work.

All classes of fly ash shall meet the supplementary option chemical requirement for available alkalies listed in AASHTO Designation: M 295, Table 2. Class F fly ash shall have a calcium oxide (CaO) content of less than 6.0%. Class C fly ash shall have a CaO content of greater than or equal to 6.0%.

The replacement of Portland cement with fly ash shall be in accordance with the applicable replacement content specified in Subsection 907-701.02.2.

In addition to these requirements, fly ash shall meet the following specific requirements for the intended use.

907-714.05.2--Fly Ash for Use in Concrete. When used with Portland cement in the production of concrete or grout, the fly ash shall meet the requirements of AASHTO Designation: M 295, Class C or F, with the following exception:

The loss on ignition shall not exceed 6.0 percent.

No additional cementitious materials, such as blended hydraulic cement, GGBFS, metakaolin, or others, shall be added to or as a replacement for Portland cement when used with fly ash.

907-714.06--Ground Granulated Blast Furnace Slag (GGBFS). Delete Subsection 714.06.1 on page 681, and substitute the following:

907-714.06.1--General. The GGBFS source must be approved for listing in the Department's "Approved Sources of Materials" prior to use. The acceptance of GGBFS shall be based on certified test reports, certification of shipment from the supplier, and tests performed on samples obtained after delivery in accordance with the Department's Materials Division Inspection, Testing, and Certification Manual and Department SOP.

The Contractor shall provide suitable means for storing and protecting the GGBFS against dampness and contamination. Separate storage silos, bins, or containers shall be provided for GGBFS. GGBFS which has become partially set, caked or contains lumps shall not be used.

The State Materials Engineer shall be notified in writing of the nature, amount and identity of any processing or other additions made to the GGBFS during production.

GGBFS from different mills shall not be mixed or used alternately in any one class of construction or structure without written permission from the Engineer; except that this requirement will not be applicable to cement treatment of design soils or bases.

No additional cementitious materials, such as blended hydraulic cement, fly ash, metakaolin, or others, shall be added to or as a replacement for Portland cement when used with GGBFS in the production of concrete. The replacement of Portland cement with GGBFS shall be in accordance with the applicable replacement content specified in Subsection 907-701.02.2.

Delete Subsection 714.07 on page 682, and substitute the following:

907-714.07--Additional Cementitious Materials.

907-714.07.1--Metakaolin.

907-714.07.1.1--General. Metakaolin shall only be used as a supplementary cementitious material in Portland cement concrete for compliance with the requirements for cementitious materials exposed to soluble sulfate conditions. Metakaolin from different sources shall not be mixed or used alternately in any one class of construction or structure without written permission from the Engineer. No additional cementitious materials, such as blended hydraulic cement, fly ash, GGBFS, or others, shall be added to or as a replacement for Portland cement when used with metakaolin in the production of concrete.

The State Materials Engineer shall be notified in writing of the nature, amount and identity of any processing, or other additions made to the metakaolin during production.

907-714.07.1.2--Source Approval. The approval of each metakaolin source shall be on a case by case basis as determined by the State Materials Engineer. In order to obtain approval of a metakaolin source, the Producer/Suppliers shall submit to the State Materials Engineer the

following for review: certified test reports, made by an acceptable, independent laboratory regularly inspected by the Cement and Concrete Reference Laboratory of the National Institutes of Standards and Technology, which show that the metakaolin meets all the requirements of AASHTO Designation: M295, including the Effectiveness in contributing to sulfate resistance, Procedure A, listed in AASHTO Designation: M295, Table 4 for Supplementary Optional Physical Requirements, and other requirements listed herein.

In order to demonstrate effectiveness in contributing to sulfate resistance, included in this test data shall be results of metakaolin from the proposed source tested in accordance with ASTM Designation: C 1012. There shall be two sets of test specimens per the following:

a. One set of test specimens shall be prepared using a Type I Portland cement meeting the requirements of AASHTO Designation: M85 and having a tricalcium aluminate (C_3A) content of more than 8.0%,

b. One set of test specimens shall be prepared using a Type II Portland cement meeting the requirements of AASHTO Designation: M85.

c. The proposed metakaolin shall be incorporated at the rate of 10% cement replacement in each set of test specimens and shall meet both of the acceptance criteria listed below for source approval.

The requirement for acceptance of the test sample using Type I Portland cement is an expansion of 0.10% or less at the end of six months. The requirement for acceptance of the test sample using Type II Portland cement is an expansion of 0.05% or less at the end of six months.

907-714.07.1.3--Storage. The Contractor shall provide suitable means for storing and protecting the metakaolin against dampness and contamination. Metakaolin which has become partially set, caked, or contains lumps shall not be used.

907-714.07.1.4--Specific Requirements. Metakaolin shall meet the requirements of AASHTO Designation: M 295, Class N with the following modifications:

1. The sum of $SiO_2 + Al_2O_3 + Fe_2O_3$ shall be at least 85%. The Material Safety Data Sheet shall indicate that the amount of crystalline silica, as measured by National Institute of Occupation Safety and Health (NIOSH) 7500 method, after removal of the mica interference, is less than 1.0%.
2. The loss on ignition shall be less than 3.0%.
3. The available alkalies, as equivalent Na_2O, shall not exceed 1.0%.
4. The amount of material retained on a No. 325 mesh sieve shall not exceed 1.0%.
5. The strength activity index at seven (7) days shall be at least 85%.

907-714.07.1.5--Acceptance. With each new lot of material shipped the Contractor shall submit to the State Materials Engineer a certified test report from the manufacturer showing that the material meets the requirements AASHTO Designation: M295, Class N and the requirements of this Subsection.

The Department reserves the right to sample, for check tests, any shipment or lot of metakaolin delivered to a project.

907-714.07.2--Silica Fume.

907-714.07.2.1--General. Silica fume shall only be used as a supplementary cementitious material in Portland cement concrete for compliance with the requirements for cementitious materials exposed to soluble sulfate conditions. Silica fume from different sources shall not be mixed or used alternately in any one class of construction or structure without written permission from the Engineer. No additional cementitious materials, such as blended hydraulic cement, performance hydraulic cement, fly ash, GGBFS, or others, shall be added to or as a replacement for Portland cement when used with silica fume in the production of concrete.

The State Materials Engineer shall be notified in writing of the nature, amount and identity of any processing, or other additions made to the silica fume during production.

907-714.07.2.2--Source Approval. The approval of each silica fume source shall be on a case by case basis as determined by the State Materials Engineer. In order to obtain approval of a silica fume source, the Producer/Suppliers shall submit to the State Materials Engineer the following for review: certified test reports, made by an acceptable, independent laboratory regularly inspected by the Cement and Concrete Reference Laboratory of the National Institutes of Standards and Technology, which show that the silica fume meets all the requirements of AASHTO Designation: M307, Table 3, including the Sulfate resistance expansion, listed in the table for Optional Physical Requirements, and other requirements listed herein.

In order to demonstrate effectiveness in contributing to sulfate resistance, included in this test data shall be results of silica fume from the proposed source tested in accordance with ASTM Designation: C 1012. There shall be two sets of test specimens per the following:

a. One set of test specimens shall be prepared using a Type I Portland cement meeting the requirements of AASHTO Designation: M85 and having a tricalcium aluminate (C_3A) content of more than 8.0%,

b. One set of test specimens shall be prepared using a Type II Portland cement meeting the requirements of AASHTO Designation: M85.

c. The proposed silica fume shall be incorporated at the rate of 8% cement replacement in each set of test specimens and shall meet both of the acceptance criteria listed below for source approval.

The requirement for acceptance of the test sample using Type I Portland cement is an expansion of 0.10% or less at the end of six months. The requirement for acceptance of the test sample using Type II Portland cement is an expansion of 0.05% or less at the end of six months.

907-714.07.2.3--Storage. The Contractor shall provide suitable means for storing and protecting the silica fume against dampness and contamination. Silica fume which has become partially set, caked, or contains lumps shall not be used.

907-714.07.2.4--Acceptance. With each new lot of material shipped, the Contractor shall submit to the State Materials Engineer a certified test report from the manufacturer showing that the material meets the Chemical and Physical Requirements of AASHTO Designation: M307.

The Department reserves the right to sample, for check tests, any shipment or lot of silica fume

delivered to a project.

Delete Subsection 714.11.6 on pages 690 and 691, and substitute the following:

907-714.11.6--Rapid Setting Cementitious Patching Compounds for Concrete Repair. Rapid setting concrete patching compounds must be approved for listing in the Department's "Approved Sources of Materials" prior to use. Upon approval, a product must be recertified every four (4) years to remain on the "Approved Sources of Materials" list. Each product shall be pre-measured and packaged dry by the manufacturer. All liquid solutions included by the manufacturer as components of the packaged material shall be packaged in a watertight container. The manufacturer may include aggregates in the packaged material or recommend the addition of Contractor furnished aggregates.

The type, size and quantity of aggregates, if any, to be added at the job site shall be in accordance with the manufacturer's recommendations and shall meet the requirements of Subsection 703.02 for fine aggregate and Subsection 703.03 for coarse aggregate. Required mixing water to be added at the job site shall meet the requirements of Subsection 714.01.2.

Only those bonding agents, if any, recommended by the manufacturer of the grout or patching compounds may be used for increasing the bond to old concrete or mortar surfaces.

Patching compounds containing soluble chlorides will not be permitted when in contact with steel.

Site preparation, proportioning of materials, mixing, placing and curing shall be performed in accordance with the manufacturer's recommendation for the specific type of application, and the Contractor shall furnish a copy of these recommendations to the Engineer.

Rapid setting cementitious concrete patching compounds, including components to be added at the job site, shall conform to the following physical requirements:

Non-shrink cementitious grouts shall not be permitted for use.

Compressive strength shall equal or exceed 3000 psi in 24 hours in accordance with ASTM C 928 for Type R2 concrete or mortar.

Bond strength shall equal or exceed 1000 psi in 24 hours in accordance with ASTM C 928 for Type R2 concrete or mortar.

The material shall have a maximum length change of ±0.15% in accordance with ASTM C 928 for Type R2 concrete or mortar.

The Contractor shall furnish to the Engineer three copies of the manufacturer's certified test report(s) showing results of all required tests and certification that the material meets the specifications when mixed and place in accordance with the manufacturer's instructions. When the mixture is to be placed in contact with steel, the certification shall further state that the packaged material contains no chlorides. Certified test report(s) and certification shall be furnished for each lot in a shipment.

The proportioning of materials must be approved by the State Materials Engineer and any subsequent change in proportioning must also be approved. A sample of each component shall be submitted to the Engineer along with the quantity or percentage of each to be blended. At least 45 days must be allowed for initial approval.

The proportioning of materials for subsequent lots may be approved by the State Materials Engineer upon receipt of certification from the manufacturer that the new lot of material is the same composition as that originally approved by the Department and that the material has not been changed or altered in any way.

907-714.11.7--Commercial Grout for Anchoring Doweled Tie Bars in Concrete. Before Subsection 714.11.7.1 on page 691, add the following:

Approved Non-"Fast Set" Epoxy anchor systems as specified below may be used for the repair of concrete pavements that do not involve permanent sustained tension applications or overhead applications.

"***Fast Set Epoxy***" may not be used for any Adhesive Anchor Applications. Adhesive Anchor Systems (Fast Set epoxy or otherwise) shall not be used for permanent sustained tension applications or overhead applications. "Fast Set Epoxy" refers to an epoxy produced by the Sika Corporation called Sikadur AnchorFix-3 and repackaged for sale under a variety of names/companies listed at the Federal Highway Administration web site at the following link:

http://www.fhwa.dot.gov/Bridge/adhesives.cfm

907-714.11.7.4--Acceptance Procedure. After the last sentence of the first paragraph of Subsection 714.11.4 on page 691, add the following:

Upon approval, a product must be recertified every four (4) years to remain on the "Approved Sources of Materials" list.

907-714.11.8--Epoxy Joint Repair System.

907-714.11.8.1--General. After the last sentence of the first paragraph of Subsection 714.11.8.1 on page 692, add the following:

Upon approval, a product must be recertified every four (4) years to remain on the "Approved Sources of Materials" list.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-804-13

DATE: 06/05/2012

SUBJECT: Concrete Bridges And Structures

After the second paragraph of Subsection 907-804.02.10 on page 2, add the following.

After the first paragraph of Subsection 804.02.10 on page 850, add the following.

If the Contractor chooses to cure the concrete in accordance with the requirements listed under **Length of Time Defined by Development of Compressive Strength** in Subsection 907-804.03.17, the compressive strength/maturity relationship shall be developed for the mixture design for a minimum of 28 days following the requirements of Subsection 907-804.03.15. The compressive strength/maturity relationship information shall be submitted with the mixture design information.

In the ** Note of Subsection 907-804.02.10 on page 2, delete "metakaolin" from the list of other cementitious materials.

After the first sentence of the last paragraph of Subsection 907-804.02.10 on page 3, add the following.

Mixture designs containing accelerating admixtures will not be approved. Admixtures providing a specific performance characteristic other than those of water reduction or set retardation may be used in accordance with the manufacturer's recommended dosage range.

After Subsection 907-804.02.10.1.1 on page 3, add the following.

907-804.02.10.1.2--Proportioning on the Basis of Laboratory Trial Mixtures. Delete subparagraph d) of Subsection 804.02.10.1.2 on pages 852 & 853, and substitute the following.

d) For each proposed mixture, at least three compressive test cylinders shall be made and cured in accordance with AASHTO Designation: T 126. Each change of water-cementitious ratio shall be considered a new mixture. The cylinders shall be tested for strength in accordance with AASHTO Designation: T 22 and shall be tested at 28 days.

After Subsection 907-804.02.10.3 on page 4, add the following.

After Subsection 804.02.10.3 on page 853, add the following.

907-804.02.10.3.1--Slump Retention of Class DS Concrete Mixture Designs. Prior to concrete placement, the Contractor shall provide test results of a slump loss test using approved methods to demonstrate that the mixture meets the four hour requirement in Subsection 907-803.02.7.1. These tests shall be conducted successfully by an approved testing laboratory within

30 days prior to installation of the trial shaft, with personnel from the Department's Central Laboratory present. The slump loss test shall be conducted at temperatures and conditions similar to those expected at the job site at the time of the installation of the trial shaft. The sample for the slump loss test shall be from a minimum batch size of four cubic yards of concrete. If the time between the previous successful slump loss test and the installation of the trial shaft exceeds 30 days, another successful slump loss test shall be performed on the first truckload of concrete as part of the installation of the trial shaft. This requirement limiting the time between the previous slump loss test and an installation of the trial shaft also applies to Class DS concrete mixture designs being transferred from another project. During any shaft installation a slump loss test shall be conducted by the Contractor at the direction of the Engineer from the concrete at the site for verification of slump loss requirements using a sample from a minimum batch size of four cubic yards of concrete.

Before Subsection 907-804.02.12.3 on page 5, add the following.

907-804.02.12.1.1--Elements of Plan. After item 3) in Subsection 804.02.12.1.1 on page 855, add the following.

4) Job Site Batch Adjustments by Addition of Chemical Admixtures:

   The Plan shall address if the Contractor intends to adjust either the slump and/or total air content of a batch on the job site by adding chemical admixture(s) to a batch. The Contractor shall include the names of the personnel designated to perform this batch adjustment, the equipment used to add the chemical admixture(s), and the procedure by which the batch adjustment will be accomplished. Only the Contractor's designated personnel shall adjust a batch. Only calibrated dispensing equipment shall be used to add chemical admixture(s) to a batch. Only the procedure described in section of the Plan shall be utilized.

   If the maximum permitted slump or total air content is exceeded after the addition of admixtures at the job site, the concrete shall be rejected.

   If the Contractor elects to utilize Job Site Batch Adjustments by Addition of Chemical Admixture within Item 2, Procedures for Corrective Actions for Non Compliance of Specifications, to adjust batches which do not meet the minimum specification requirements for slump and/or total air content, no more than three batches on any one project shall be allowed to be adjusted.

5) Construction of Concrete Bridge Decks, including the following:

   - the description of the equipment used for placing concrete on the bridge deck in accordance with Subsection 907-804.03.6 and, as applicable, Subsections 907-804.03.7 and 907-804.03.8 including any accessories added to the pump to ensure the entrained air in the concrete mixture remains entrained during pumping and depositing of the concrete mixture,
   - the description of and the number of pieces of equipment used to consolidate the concrete in accordance with Subsection 907-804.03.6.2,

- the description of the equipment used to finish the bridge deck in accordance with Subsection 907-804.03.19.7,
- the plan for ensuring a continuous rate of finishing the bridge deck without delaying the application of curing materials within the time specified in Subsection 907-804.03.17, including ensuring a continuous supply of concrete throughout the placement with an adequate quantity of concrete to complete the deck and filling diaphragms and end walls in advance of deck placement,
- the plan for applying the curing materials within the time specified in Subsection 907-804.03.17,
- the description of the powered fogging equipment in accordance with Subsection 907-804.03.17,
- a sample of the documentation used as the daily inspection report for ensuring maintenance of the continuous wet curing in accordance with Subsection 907-804.03.17, as required,
- the description of the equipment used to apply the liquid membrane, including but not limited to, the nozzles, pumping/pressurization equipment, and liquid membrane tanks, in accordance with Subsection 907-804.03.17,
- the method for determining the rate of applied liquid membrane meets the application rate requirements in accordance with Subsection 907-804.03.17,
- a sample of the documentation used for the application rate verification of the liquid membrane in accordance with Subsection 907-804.03.17.

After Subsection 907-804.03.6.2 on page 7, add the following.

907-804.03.8--Pumping Concrete. Delete the second paragraph of Subsection 804.03.8 on page 866, and substitute the following.

Where concrete mixture is conveyed and placed by mechanically applied pressure (pumping), the equipment shall be suitable in kind and adequate in capacity for the work. The Contractor shall select concrete mixture proportions such that the concrete mixture is pumpable and placeable with the selected equipment.

The pumping equipment shall be thoroughly cleaned prior to concrete placement. Excess form release agent shall be removed from the concrete pump hopper. The Contractor shall prime the pump at no additional cost to the Department by pumping and discarding enough concrete mixture to produce a uniform mixture exiting the pump. At least 0.25 cubic yard of concrete mixture shall be pumped and discarded to prime the pump. This shall be accomplished by using the pump to fill a commercially-available six (6) cubic foot wheelbarrow to overflowing or filling a commercially-available eight (8) cubic foot wheel barrow to level. Only concrete mixture shall be added directly into the concrete pump hopper after placement has commenced. If anything other than concrete mixture is added to the concrete pump hopper, all concrete mixture in the concrete pump hopper and pump line shall be discarded and the pump re-primed at no additional cost to the Department.

The discharge end of the pump shall be of such a configuration that the concrete does not move in the pump line under its own weight. The intent of this requirement is to ensure that entrained air in the concrete mixture remains entrained during pumping and depositing the concrete mixture. This shall be accomplished with one or both of the following:

- a minimum 10-foot flexible hose attached to the discharge end of a steel reducer having a minimum length of three (3) feet and a minimum reduction in area of 20% which is attached to the discharge end of the pump line, or
- a flexible reducing hose to the discharge end of the pumpline with a minimum reduction in area of 20% over a minimum 10-foot hose length.

Regardless of the configuration chosen, the Contractor shall ensure that the concrete is pumped and does not free-fall more than five (5) feet within the entire length of pump line and after discharge from the end of pump line.

The Contractor shall not have any type of metal elbow, metal pipe, or other metal fitting within five (5) feet of any person during discharge of concrete mixture.

Boom pumps shall have a current Concrete Pump Manufacturers Association's ASME/ANSI B30.27 certification. Equipment added to the boom and pump line shall meet the pump manufacturer's specifications and shall not exceed the manufacturer's maximum recommended weight limit for equipment added to the boom and pump line.

The operation of the pump shall be such that a continuous stream of concrete without air pockets is produced. When pumping is completed, the concrete remaining in the pipe line, if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients. After this operation, the entire equipment shall be thoroughly cleaned.

Delete Table 6 of Subsection 907-804.03.15 on page 8, and substitute the following.

Table 6
Minimum Compressive Strength Requirements for Form Removal

Forms:	
Columns	1000 psi
Side of Beams	1000 psi
Walls not under pressure	1000 psi
Other Parts	1000 psi
Centering:	
Under Beams	2400 psi
Under Bent Caps	2000 psi
Limitation for Placing Beams on:	
Pile Bents, pile under beam	2000 psi
Frame Bents, two or more columns	2200 psi
Frame Bents, single column	2400 psi

Forms for bridge deck slabs overhead and bridge deck slabs between beams shall be removed with the approval of the Engineer, between two weeks and four weeks after the removal of the

wet burlap applied in accordance with Subsection 907-804.03.17.1, or application of liquid membrane applied in accordance with Subsection 907-804.03.17.2.

Delete the second paragraph of Subsection 907-804.03.16.1 on page 9, and substitute the following.

At the option of the Contractor with the approval of the Engineer, when concrete is placed during cold weather and there is a probability that the ambient temperatures will be lower than 40°F, an approved maturity meter may be used to determine concrete strengths by inserting probes into concrete placed in a structure. The minimum number of maturity meter probes required for each structural component shall be in accordance with Table 7. An approved insulating blanketing material shall be used to protect the work when ambient temperatures are less than 40°F and shall remain in place until the required concrete strength in Table 6 is achieved. Within 30 minutes of removal of the insulating blanketing material in any area, the Contractor shall have curing of the concrete established in accordance with the requirements in Subsection 907-804.03.17. Procedures for using the maturity meter and developing the strength/maturity relationship shall follow the requirements of AASHTO Designation: T 325 and ASTM Designation: C 1074 specifications. Technicians using the maturity meter or calculating strength/maturity graphs shall be required to have at least two hours of training prior to using the maturity equipment.

Before Subsection 907-804.03.19 on page 9, add the following.

907-804.03.17--Curing Concrete. Delete Subsection 804.03.17 on pages 874 & 875, and substitute the following.

Curing is defined as all actions taken to ensure the moisture and temperature conditions of freshly placed concrete exist so the concrete may develop its potential properties. Curing shall take place from the time of placement until its potential properties have developed. The Contractor shall use the guidance in ACI 308R-01 to:

a) cure the concrete in such a manner as to prevent premature moisture loss from the concrete,
b) supply additional moisture to the concrete as required in order to ensure sufficient moisture within the concrete, and
c) maintain a concrete temperature beneficial to the concrete.

Curing in accordance with the requirements in either Subsection 907-804.03.17.1 or Subsection 907-804.03.17.2 shall be completely established within 20 minutes after finishing, except as noted for bridge decks. Finishing is complete when the pan drag, burlap drag, or other is complete.

The length of time for curing shall be maintained in accordance with either of the following:

1. **Prescribed Length of Time:**
   a) Curing following the requirements of Subsection 804.03.17.1 shall continue uninterrupted for at least 14 days.

b) Curing following the requirements of Subsection 804.03.17.2 shall continue uninterrupted for at least 10 days.

OR

2. Length of Time Defined by Development of Compressive Strength:
Curing following the application requirements of Subsection 907-804.03.17.1 or Subsection 907-804.03.17.2 shall continue uninterrupted for each day's production until the compressive strength of the concrete exceeds 75% of the 28-day compressive strength submitted as the Basis of Proportioning per Subsection 907-804.02.10.1. Therefore, if an area is being cured in accordance with Subsection 907-804.03.17.1, the curing by wet burlap shall continue until the concrete in that area has attained a minimum of 75% of the 28-day compressive strength submitted as the Basis of Proportioning per Subsection 907-804.02.10.1. Likewise, if an area is being cured in accordance with Subsection 907-804.03.17.2, the curing by liquid membrane shall continue until the concrete in that area has attained a minimum of 75% of the 28-day compressive strength submitted as the Basis of Proportioning per Subsection 907-804.02.10.1.

The compressive strength of the concrete may be determined by the use of maturity meter in accordance with Subsection 907-804.03.15.

907-804.03.17.1--Water With Waterproof Cover. All burlap shall be completely saturated and wet prior to placing it on the concrete. The burlap shall have been fully soaked in water for a minimum of 12 hours prior to placement on the concrete.

For bridge decks, the Contractor shall apply one (1) layer of saturated burlap within 20 minutes of the initial strike-off for bridges without a skew and 25 minutes of the initial strike-off for bridges with a skew. For all other concrete, the Contractor shall apply one (1) layer of saturated burlap within 20 minutes of completing finishing.

Following the first layer of burlap, the Contractor shall apply a second layer of saturated burlap within five (5) minutes of applying the first layer. The concrete surface shall not be allowed to dry after strike-off or at any time during the curing period.

The Contractor shall maintain the burlap in a fully wet condition using powered fogging equipment capable of producing a fog spray of atomized droplets of water until the concrete has gained sufficient strength to allow foot traffic without the foot traffic marring the surface of the concrete. Burlap shall not be maintained in the fully wet condition using equipment which does not produce a fog spray of atomized droplets of water or by use of manually pressurized sprayers. For bridge decks, once the concrete has gained sufficient strength to allow foot traffic which does not mar the surface of the concrete, soaker hoses shall be placed on the burlap. The soaker hoses shall then be supplied with running water continuously to maintain continuous saturation of all burlap and the entire concrete surface.

If there is a delay in the placement of the first layer of saturated burlap outside the time limit, the struck-off and finished concrete shall be kept wet by use of the powered fogging equipment used to keep the burlap wet.

White polyethylene sheets shall be placed on top of the wet burlap and, as applicable, soaker hoses covering the entire concrete surface as soon as practical and not more than 12 hours after the placement of the concrete. White polyethylene sheets of the widest practical width shall be used, overlapping adjacent sheets a minimum of six inches (6") and tightly sealed with an adhesive like pressure sensitive tape, mastic, glue, or other approved methods to form a complete waterproof cover of the entire concrete surface. White polyethylene sheets which overlap a minimum of two feet (2') may be held in place using means other than an adhesive. The white polyethylene sheets shall be secured so that wind will not displace them. The Contractor shall immediately repair the broken or damaged portions or replace sections that have lost their waterproof qualities.

If burlap and/or white polyethylene sheets are temporarily removed for any reason during the curing period, the Contractor shall keep the entire exposed area continuously wet. The saturated burlap and white polyethylene sheets shall be replaced, resuming the specified curing conditions, as soon as possible.

The Contractor shall inspect the concrete surface once every 8 hours for the entirety of the curing period, so that all areas remain wet for the entire curing period and all curing requirements are satisfied and document the inspection in accordance with Subsection 907-804.03.17.1.1.

At the end of the curing period, one coating of liquid membrane shall be applied following the requirements of Subsection 907-804.03.17.1.2. The purpose of the coating of liquid membrane is to allow for slow drying of the concrete. The application of liquid membrane to any area shall be complete within 30 minutes of the beginning of removal of the white polyethylene sheets, soaker hoses, and burlap from this area.

907-804.03.17.1.1--Documentation. The Contractor shall provide the Engineer with a daily inspection report that includes:

- documentation that identifies any deficiencies found (including location of deficiency);
- documentation of corrective measures taken;
- a statement of certification that all areas are wet and all curing material is in place on the entire bridge deck;
- documentation showing the time and date of all inspections and the inspector's signature;
- documentation of any temporary removal of curing materials including location, date and time, length of time curing was removed, and means taken to ensure exposed area was kept continuously wet.

907-804.03.17.1.2--Liquid Membrane. At the end of the 14-day wet curing period the wet burlap and polyethylene sheets shall be removed and within 30 minutes, the Contractor shall apply white liquid membrane to the deck. The liquid membrane shall be thoroughly mixed within the time recommended by the liquid membrane producer but no more than an hour before use. If the use of liquid membrane results in a streaked or blotched appearance, the method shall be stopped and water curing applied until the cause of defective appearance is corrected.

The liquid membrane shall be applied when no free water remains on the surface but while the surface is still wet. The liquid membrane shall be applied according to the manufacturer's instructions with a minimum spreading rate per coat of one (1) gallon per 200 square feet of

concrete surface. If the concrete is dry or becomes dry, the Contractor shall thoroughly wet it with water applied as a fog spray by means of approved equipment.

The application of liquid membrane shall be accomplished by the use of power applied spray equipment using nozzles and other equipment recommended by the liquid membrane producer. Manually pressurized or manual pump-up type sprayers shall not be used to apply the first application of liquid membrane.

As a visual guide, the color of concrete covered with the required amount of liquid membrane should be indistinguishable from a sheet of commercially available standard "letter" size white copier paper placed on top of it when viewed from a distance of about five feet (5') away horizontally if standing on the same grade as the concrete. The appearance of the concrete does not supersede applying the minimum spreading rate.

The coating shall be protected against marring for at least seven (7) days after the application of the curing compound. The coating on bridge decks shall receive extra attention and may require additional protection as required by the Engineer. All membrane marred or otherwise disturbed shall be given an additional coating. Manually pressurized or manual pump-up type sprayers may be used for giving marred areas the required additional application of liquid membrane. Should the surface coating be subjected repeatedly to injury, the Engineer may require that the water curing method be applied at once.

The 7-day period during which the liquid membrane is applied and protected shall not be reduced even if the period of wet curing is extended past the required 14 days.

907-804.03.17.1.2.1--Liquid Membrane Documentation. The Contractor shall make available to the Engineer an application rate verification method and any information necessary during application of the liquid membrane to verify that the rate of application meets the prescribed rate for the various surfaces of the concrete, including, but not limited to, the top surface of the bridge deck and exposed sides of the bridge deck after any forms are removed. The Contractor shall submit this application verification method to the Engineer in accordance with Subsection 907-804.02.12.1.1.

One method of verifying the rate of application is as follows:

1. Determine the volume of liquid membrane in the container. For a container with a uniform cross-sectional area, for example a 55-gallon drum, determine the area of the cross-section. Determine the height of the surface of the liquid membrane from the bottom of the container. This may be accomplished by inserting a sufficiently long, clean dip-stick parallel with the axis of the container into the liquid membrane until the inserted end of the dip-stick contacts the bottom of the container. On removing the dip-stick, measure the length from the end which was inserted to the point on the dip-stick where the liquid membrane ceases to coat the dip-stick. Multiply the area of the cross-section by the height of the level of liquid membrane, maintaining consistent units, to determine the volume.
2. Perform step 1 prior to beginning applying the liquid membrane to establish the initial volume.
3. During the period of application, perform step 1 each 100 square feet of bridge deck.

4. In order to meet the required application rate of one (1) gallon per 200 square feet, the amount in the container shall be at least 0.5 gallon less than the previous volume in the previous 100 square feet. Other changes in volume may apply depending on the manufacturer's recommended application rate.
5. Additional applications to an area shall be applied until the required rate is satisfied. Areas which are not visually satisfactory to the Engineer shall have additional liquid membrane applied as directed by the Engineer.

The amount of liquid membrane applied shall be determined each day using the application verification method. This information shall be submitted to the Engineer within 24 hours of applying the liquid membrane.

907-804.03.17.2--Liquid Membrane Method. Surfaces on which curing is to be by liquid membrane shall be given the required surface finish prior to the application of liquid membrane. Concrete surfaces cured by liquid membrane shall receive two applications of white liquid membrane. Neither application shall be made from a position supported by or in contact with the freshly placed concrete. Both applications shall be applied perpendicularly to the surface of the concrete.

When using liquid membrane, the liquid membrane shall be thoroughly mixed within the time recommended by the liquid membrane producer but no more than an hour before use. If the use of liquid membrane results in a streaked or blotched appearance, the method shall be stopped and water curing applied until the cause of defective appearance is corrected.

The application of liquid membrane shall accomplished by the use of power applied spray equipment using nozzles and other equipment recommended by the liquid membrane producer. Manually pressurized or manual pump-up type sprayers shall not be used to apply the first two applications of liquid membrane.

The liquid membrane shall be applied when no free water remains on the surface but while the surface is still wet. The liquid membrane shall be applied according to the manufacturer's instructions with a minimum spreading rate per coat of one (1) gallon per 200 square feet of concrete surface. If the concrete is dry or becomes dry, the Contractor shall thoroughly wet it with water applied as a fog spray by means of approved equipment.

The first application of the liquid membrane shall be made as the work progresses. For bridge decks, the first application shall be completed in each area of the deck within 20 minutes of initial strike-off for bridges with no skew and within 25 minutes of initial strike-off for bridges with skew. For all other concrete, the first application of the liquid membrane shall be completed within 20 minutes of finishing.

The second application shall be applied within 30 minutes after the first application. The liquid membrane shall be uniformly applied to all exposed concrete surfaces.

As a visual guide, the color of concrete covered with the required amount of liquid membrane should be indistinguishable from a sheet of commercially available standard "letter" size white copier paper placed on top of it when viewed from a distance of about five feet (5') away

horizontally if standing on the same grade as the concrete. The appearance of the concrete does not supersede applying the minimum spreading rate.

The Contractor shall make available to the Engineer an application rate verification in accordance with Subsection 907-804.03.17.1.2.1.

The coating shall be protected against marring for at least 10 days after the application of the curing compound. The coating on bridge decks shall receive extra attention and may require additional protection as required by the Engineer. All membrane marred or otherwise disturbed shall be given an additional coating. Manually pressurized or manual pump-up type sprayers may be used for giving marred areas the required additional application of liquid membrane. Should the surface coating be subjected repeatedly to injury, the Engineer may require that the water curing method be applied at once.

Delete Subsection 907-804.19.7 on page 9, and substitute the following.

907-804.03.19.7--Finishing Bridge Decks.

907-804.03.19.7.1--General. Delete the third paragraph of Subsection 804.03.19.7.1 on page 884, and substitute the following.

Except when indicated otherwise on the plans, the finish of the bridge deck shall be either a belt finish, a broom finish, or one of the following drag methods: pan, double pan, burlap, or pan and burlap. Manual finishing of the bridge deck shall be performed only in areas inaccessible by the finishing equipment mounted to the strike-off screed, but shall not hinder the requirements for curing in accordance with Subsection 907-804.03.17.1. The surface texture specified and surface requirements shall be in accordance with the applicable requirements of Subsections 501.03.17 and 501.03.18 modified only as the Engineer deems necessary for bridge deck construction operations.

At no time shall water on the surface of the concrete from bleeding, fogging, curing, or other sources be worked into the concrete or used as an aid for finishing.

Regardless of the method of finishing selected, requirements for curing per Subsection 907-804.03.17 shall be completed within the specified time limits. If the requirements in Subsection 907-804.03.17 are not completed within the specific time limits, the Contractor shall cease operations, revise his operations up to and including acquiring new or additional equipment or additional personnel in order to satisfy the requirements in Subsection 907-804.03.17, and, on approval from the Engineer, resume operations

907-804.03.19.7.2--Longitudinal Method. Before the first paragraph of Subsection 804.03.19.7.2 on page 884, add the following.

The longitudinal method may be used for repairs to bridge decks or bridge widening projects. For bridge widening projects, the time for establishing curing in accordance with Subsections 907-804.03.17 shall be increased to within 30 minutes for bridges without skew and within 35 minutes for bridges with skew.

907-804.03.19.7.3--Transverse Method. Delete the first sentence of the second paragraph of Subsection 804.03.19.7.3 on page 885, and substitute the following.

The machine shall be so constructed and operated as to produce a bridge deck of uniform density with minimum manipulation of the fresh concrete and achieved in the shortest possible time.

Delete the fourth paragraph of Subsection 804.03.19.7.3 on page 885, and substitute the following.

At least one dry run shall be made the length of each pour with a "tell-tale" device attached to the screed carriage to assure the specified clearance to the reinforcing steel.

Delete the last sentence of the fifth paragraph of Subsection 804.03.19.7.3 on page 885, and substitute the following.

The screed shall be mechanically actuated to deliver the screeding action and for travel in a longitudinal direction at a uniform rate along the bridge deck.

Delete the last paragraph of Subsection 804.03.19.7.3 on page 886, and substitute the following.

Other finishing requirements shall be in accordance with the general requirements in Subsection 907-804.03.19.7.1 and as specified on the plans.

Regardless of the finish, the requirements for curing per Subsection 907-804.03.17 shall be completed within the specified time limits.

After Subsection 907-804.03.19.7.4 on page 9, add the following.

Delete the title of Subsection 804.03.19.7.4.1.3 on page 888, and substitute the following.

907-804.03.19.7.4.1.3--Final Surface Texture.

907-804.03.20--Opening Bridges.

907-804.03.20.2--Construction Traffic. Delete the paragraph in Subsection 804.03.20.2 on page 889, and substitute the following:

Unless otherwise specified, the concrete bridge decks shall be closed to construction traffic for the time required for curing in Subsection 907-804.03.17 and until the required compressive strength for the concrete is obtained.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-804-13 **CODE: (IS)**

DATE: 11/09/2010

SUBJECT: Concrete Bridges And Structures

Section 804, Concrete Bridges And Structures, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-804.02-- Materials.

907-804.02.1--General. Delete the third and fourth sentences of the first paragraph of Subsection 804.02.1 on page 846, and substitute the following:

For projects with 1000 cubic yards and more, quality control and acceptance shall be achieved through statistical evaluation of test results. For projects of more than 200 but less than 1000 cubic yards, quality control and acceptance shall be achieved by individual test results.

Add the following materials to the list of materials in Subsection 804.02.1 on page 847.

Blended Cement..... 907-701.01 and 907-701.04
Ground Granulated Blast Furnace Slag (GGBFS)..... 907-714.06
Silica Fume 907-714.07.2

907-804.02.8--Laboratory Accreditation. In Table 1 of Subsection 804.02.8 on page 849, substitute AASHTO: R 39 - Making and Curing Concrete Test Specimens in the Laboratory for AASHTO: T 126 - Making and Curing Concrete Test Specimens in the Laboratory.

907-804.02.9--Testing Personnel. Delete Table 2 in this subsection and replace it with the following.

Table 2

Concrete Technician's Tasks	Test Method Required	Certification Required**
Sampling or Testing of Plastic Concrete	AASHTO Designation:T 23, T 119, T 121, T 141, T 152, T 196, and ASTM Designation: C 1064	MDOT Class I certification
Compressive Strength Testing of Concrete Cylinders	AASHTO Designation: T 22 and T 231	MDOT Concrete Strength Testing Technician certification
Sampling of Aggregates	AASHTO Designation: T 2	Work under the supervision of an MDOT Class II certified technician

Testing of Aggregates	AASHTO Designation: T 19, T 27, T 84, T 85, T 248, and T 255	MDOT Class II certification
Proportioning of Concrete Mixtures*	AASHTO Designation: M 157 and R 39	MDOT Class III
Interpretation and Application of Maturity Meter Readings	AASHTO Designation: T 325 and ASTM Designation: C 1074	MDOT Class III or Two hours maturity method training

* Technicians making concrete test specimens for meeting the requirements of Subsection 804.02.10.1.2 shall be MDOT Class I certified and under the direct supervision of an MDOT Class III certified technician.

** MDOT Class I certification encompasses the same test procedures and specifications as ACI Concrete Field Testing Technician Grade I. MDOT Class II certification encompasses the same test procedures and specifications as ACI Aggregate Testing Technician - Level 1. MDOT Concrete Strength Testing Technician encompasses the same test procedures and specifications as ACI Concrete Strength Testing certification.

For specifics about the requirements for each level of certification, please refer to the latest edition of the Department's *Concrete Field Manual*. Technicians holding current MDOT Class I, MDOT Class II and/or MDOT Class III certifications shall be acceptable until those certifications expire. Upon a current certification expiration, recertification with the certifications listed in Table 2 shall be required. Technicians currently performing either specific gravity testing of aggregates or compressive strength tests shall be required to either:

- have the required MDOT certification listed in Table 2, or
- have a current MDOT Class III certification or work under the direct supervision of current MDOT Class III technician, and have demonstrated the specific gravity and/or compressive strength test during the inspection of laboratory equipment by the Materials Division, Concrete Section.

907-804.02.10--Portland Cement Concrete Mix Design. Delete the first sentence of the first paragraph of Subsection 804.02.10 on page 850 and substitute the following:

At least 30 days prior to production of concrete, the Contractor shall submit to the Engineer proposed concrete mixture designs complying with the Department's *Concrete Field Manual*.

Delete the Notes under Table 3 of Subsection 804.02.10 on pages 850 & 851, and substitute the following:

* Maximum size aggregate shall conform to the concrete mix design for the specified aggregate.

** The replacement limits of Portland cement by weight by other cementitious materials (such as fly ash, GGBFS, metakaolin, silica fume, or others) shall be in accordance with the values in Subsection 907-701.02. Other hydraulic cements may be used in accordance with the specifications listed in Section 701.

*** The slump may be increased up to eight (8) inches with :

- an approved water-reducing admixture,
- an approved water-reducing/set-retarding admixture, or
- a combination of an approved water-reducing admixture and an approved set-retarding admixture, in accordance with 907-713.02. Minus slump requirements shall meet those set forth in Table 3 of AASHTO Designation: M157.

**** Entrained air is not required except for concrete exposed to seawater. For concrete exposed to seawater, the total air content shall be 3.0 % to 6.0%. For concrete not exposed to seawater, the total air content shall not exceed 6.0%.

***** Class DS Concrete for drilled shafts shall have an 8±1-inch slump.

Delete the last paragraph of Subsection 804.02.10 on page 851 and substitute the following:

At least one water-reducing admixture shall be used in all classes of concrete in accordance with the manufacturer's recommended dosage range. Any combinations of admixtures shall be approved by the Engineer before their use.

907-804.02.10.1.1--Proportioning on the Basis of Previous Field Experience of Trial Mixtures. Delete the first sentence of the first paragraph of Subsection 804.02.10.1.1 on page 851, and substitute the following:

Where a concrete production facility has a record, based on at least 10 consecutive strength tests from at least 10 different batches within the past 12 months from a mixture not previously used on Department projects, the standard deviation shall be calculated.

907-804.02.10.3--Field Verification of Concrete Mix Design. Delete the first sentence of the third paragraph of Subsection 804.02.10.3 on page 853 and substitute the following:

For all Classes of concrete, the mixture shall be verified to yield within 2.0% of the correct volume when all the mix water is added to the batch.

For all Classes of concrete other than DS, F, and FX, the mixture shall produce a slump within a minus 1½-inch tolerance of the maximum permitted for mixtures with a maximum permitted slump of three inches (3") or less or within a minus 2½-inch tolerance of the maximum permitted for mixtures with a maximum permitted slump of greater than three inches (3"), and producing a total air content within a minus 1½ percent tolerance of the maximum allowable air content in Table 3.

For Class DS, the slump shall be within the requirements in Note ***** below Table 3. For Class DS exposed to seawater, the total air content shall be within a minus 1½ percent tolerance of the maximum allowable air content in Note **** below Table 3. For Class DS not exposed to seawater the total air content shall be within the requirements in Note **** below Table 3.

For Classes F and FX, the slump shall be within a minus 1½-inch tolerance of the maximum permitted for mixtures with a maximum permitted slump of three inches (3") or less or within a minus 2½-inch tolerance of the maximum permitted for mixtures with a maximum permitted

slump of greater than three inches (3"). For Classes F and FX exposed to seawater, the total air content shall be within a minus 1½ percent tolerance of the maximum allowable air content in Note **** below Table 3. For Classes F and FX not exposed to seawater the total air content shall be within the requirements in Note **** below Table 3.

Delete the third sentence of the third paragraph of Subsection 804.02.10.3 on page 853, and substitute the following:

If the requirements of yield, slump, or total air content are not met within three (3) production days after the first placement, subsequent field verification testing shall not be permitted on department projects, and the mix design shall not be used until the requirements listed above are met

907-804.02.10.4--Adjustments of Mixture Proportions. Delete the paragraph in Subsection 804.02.10.4 on page 854, and substitute the following:

The mixture may be adjusted by the Class III Certified Technician representing the Contractor in accordance with the allowable revisions listed in the Department's Concrete Field Manual, paragraph 5.7. Written notification shall be submitted to the Engineer a minimum of seven (7) days prior to any source or brand of material change, aggregate size change, allowable material type change, or decrease in any cementitious material content. Any adjustments of the concrete mixture design shall necessitate repeat of field verification procedure as described in Subsection 804.02.10.3 and approval by the Engineer.

907-804.02.11--Concrete Batch Plants. Delete the first three paragraphs of Subsection 804.02.11 on page 854, and substitute the following:

The concrete batch plant shall meet the requirements of the National Ready Mixed Concrete Association *Quality Control Manual, Section 3, Plant Certification Checklist* as outlined in the latest edition of the Department's *Concrete Field Manual*. The Contractor shall submit a copy of the approved checklist along with proof of calibration of batching equipment, i.e., scales, water meter, and admixture dispenser, to the Engineer 30 days prior to the production of concrete.

For projects with 1000 cubic yards and more, the concrete batch plant shall meet the requirements for an automatic system capable of recording batch weights. It shall also have automatic moisture compensation for the fine aggregate. For projects of more than 200 but less than 1000 cubic yards the plant can be equipped for manual batching with a fine aggregate moisture meter visible to the plant operator.

The concrete batch plant shall have available adequate facilities to cool concrete during hot weather.

Mixer trucks to be used on the project are to be listed in the checklist and shall meet the requirements of the checklist.

907-804.02.12--Contractor's Quality Control. Delete the fourth paragraph of Subsection 804.02.12 on page 854 & 855, and substitute the following:

The Contractor's Quality Control program shall encompass the requirements of AASHTO Designation: M 157 into concrete production and control, equipment requirements, testing, and batch ticket information. The requirement of AASHTO Designation: M 157, Section 11.7 shall be followed except, on arrival to the job site, a maximum of 1½ gallons per cubic yard is allowed to be added. Water shall not be added at a later time. If the maximum permitted slump is exceeded after the addition of water at the job site, the concrete shall be rejected.

907-804.02.12.3--Documentation. After the second sentence of the second paragraph of Subsection 804.02.12.3 on page 856, add the following:

Batch tickets and gradation data shall be documented in accordance with Department requirements. Batch tickets shall contain all the information in AASHTO Designation: M157, Section 16 including the additional information in Subsection 16.2 with the following exception: the information listed in paragraphs 16.2.7 and 16.2.8 is not required. Batch tickets shall also contain the concrete producer's permanent unique mix number assigned to the concrete mix design.

907-804.02.12.5--Non-Conforming Materials. In Table 4 of Subsection 804.02.12.5 on page 857, delete "/ FM" from the requirements on line B.3.a.

In Table 4 of Subsection 804.02.12.5 on page 857, replace "One set (two cylinders) for 0-100 yd^3 inclusive" with "A minimum of one set (two cylinders) for each 100 yd^3,"

907-804.02.13--Quality Assurance Sampling and Testing. Delete subparagraph c) in Subsection 804.02.13 on page 858 and substitute the following:

c) For concrete, the Contractor's QC and Department's QA testing of concrete compressive strengths compare when using the data comparison computer program with an alpha value of 0.01 for projects with 1000 cubic yards and more; or, strength comparisons are within 990 psi for projects of more than 200 but less than 1000 cubic yards.

In Table 5 of Subsection 804.02.13 on page 858, delete "and FM" from the requirements on line A.3.

Delete Subsection 907-804.02.13.1 beginning on page 859 and substitute the following:

907-804.02.13.1--Basis of Acceptance.

907-804.02.13.1.1--Sampling. Sampling of concrete mixture shall be performed in accordance with the latest edition of the Department's *Concrete Field Manual*.

907-804.02.13.1.2--Slump. Slump of plastic concrete shall meet the requirements of Table 3: MASTER PROPORTION TABLE FOR STRUCTURAL CONCRETE DESIGN. A check test shall be made on another portion of the sample before rejection of any load.

907-804.02.13.1.3--Air. Total air content of concrete shall be within the specified range for the class of concrete listed in Table 3: MASTER PROPORTION TABLE FOR STRUCTURAL CONCRETE DESIGN. A check test shall be made on another portion of the sample before rejection of any load.

907-804.02.13.1.4--Yield. If the yield of the concrete mix design is more than plus or minus 3% of the designed volume, the mix shall be adjusted by a Class III Certified Technician representing the Contractor to yield the correct volume plus or minus three percent (±3%). If batching of the proportions of the mix design varies outside the batching tolerance range of the originally approved proportions by more than the tolerances allowed in Subsection 804.02.12.1, the new proportions shall be field verified per Subsection 804.02.10.3.

907-804.02.13.1.5--Temperature. Cold weather concreting shall follow the requirements of Subsection 907-804.03.16.1. Hot weather concreting shall follow the requirements of Subsection 804.03.16.2 with a maximum temperature of 95°F for Class DS concrete or for concrete mixes containing cementitious materials meeting the requirements of Subsection 907-701.02.2 as a replacement of Portland cement. For other concrete mixes, the maximum concrete temperature shall be 90°F. Concrete with a temperature more than the maximum allowable temperature shall be rejected and not used in Department work.

907-804.02.13.1.6--Compressive Strength. Laboratory cured concrete compressive strength tests shall conform to the specified strength (f'_c) listed in the specifications. Concrete represented by compressive strength test below the specified strength (f'_c) may be removed and replaced by the Contractor. If the Contractor elects not to remove the material, it will be evaluated by the Department as to the adequacy for the use intended. All concrete evaluated as unsatisfactory for the intended use shall be removed and replaced by the Contractor at no additional cost to the Department. For concrete allowed to remain in place, reduction in payment will be as follows:

Projects with 1000 Cubic Yards and More. When the evaluation indicates that the work may remain in place, a statistical analysis will be made of the QC and QA concrete test results. If this statistical analysis indicates at least 93% of the material would be expected to have a compressive strength equal to or greater than the specified strength (f'_c) and 99.87% of the material would be expected to have a compressive strength at least one standard deviation above the allowable design stress (f_c), the work will be accepted. If the statistical analysis indicates that either of the two criteria are not met, the Engineer will provide for an adjustment in pay as follows for the material represented by the test result.

Total Pay on Material in Question = Unit Price - (Unit Price x % Reduction)

$$\% \text{ Reduction} = \frac{(f'_c - X)}{f'_c - (f_c + s)} \times 100$$

where:

f'_c = Specified 28-day compressive strength, psi

X = Individual compressive strength below f'_c, psi
s = standard deviation, psi*
f_c = allowable design stress, psi

* Standard deviation used in the above reduction of pay formula shall be calculated from the applicable preceding compressive strengths test results plus the individual compressive strength below f'_c. If below f'_c strengths occur during the project's first ten compressive strength tests, the standard deviation shall be calculated from the first ten compressive strength tests results.

Projects of More Than 200 but Less Than 1000 Cubic Yards. When the evaluation indicates that the work may remain in place, a percent reduction in pay will be assessed based on a comparison of the deficient 28-day test result to the specified strength. The Engineer will provide for an adjustment in pay as follows for the material represented by the test result.

Total Pay on Material in Question = Unit Price - (Unit Price x % Reduction)

$$\% \text{ Reduction} = \frac{(f'_c - X)}{f'_c} \times 100$$

where:

f'_c = Specified 28-day compressive strength, psi
X = Individual compressive strength below f'_c, psi

907-804.03--Construction Requirements.

907-804.03.6--Handling and Placing Concrete.

907-804.03.6.2--Consolidation. After the last sentence of Subsection 804.03.6.2 on page 864, add the following:

If the Department determines that there is an excessive number of projections, swells, ridges, depressions, waves, voids, holes, honeycombs or other defects in the completed structure, removal of the entire structure may be required as set out in Subsection 105.12.

907-804.03.15--Removal of Falsework, Forms, and Housing. Delete the first sentence of the second paragraph of Subsection 804.03.15 on page 871, and substitute the following:

Concrete in the last pour of a continuous superstructure shall have attained a compressive strength of 2,400 psi, as determined by cylinder tests or maturity meter probe, prior to striking any falsework.

Delete the first sentence of the third paragraph of Subsection 804.03.15 on page 871, and substitute the following:

At the Contractor's option and with the approval of the Engineer, the time for removal of forms may be determined by cylinder tests, in accordance with the requirements listed in Table 6, in which case the Contractor shall furnish facilities for testing the cylinders.

Delete the fourth and fifth paragraphs of Subsection 804.03.15 on pages 871 & 872, and substitute the following:

The cylinders shall be cured under conditions which are not more favorable than those existing for the portions of the structure which they represent.

Delete the table in Subsection 804.03.15 on page 872, and substitute the following:

Table 6
Minimum Compressive Strength Requirements for Form Removal

Forms:	
Columns	1000 psi
Side of Beams	1000 psi
Walls not under pressure	1000 psi
Floor Slabs, overhead	2000 psi
Floor Slabs, between beams	2000 psi
Slab Spans	2400 psi
Other Parts	1000 psi
Centering:	
Under Beams	2400 psi
Under Bent Caps	2000 psi
Limitation for Placing Beams on:	
Pile Bents, pile under beam	2000 psi
Frame Bents, two or more columns	2200 psi
Frame Bents, single column	2400 psi

In lieu of using concrete strength cylinders to determine when falsework, forms, and housings can be removed, an approved maturity meter may be used to determine concrete strengths by inserting probes into concrete placed in a structure. The minimum number of maturity meter probes required for each structural component shall be in accordance with Table 7. Falsework, forms, and housings may be removed when maturity meter readings indicate that the required concrete strength is achieved. Procedures for using the maturity meter and developing the strength/maturity relationship shall follow the requirements of AASHTO Designation: T 325 and ASTM Designation: C 1074 specifications. Technicians using the maturity meter or calculating strength/maturity graphs shall be required to have at least two hours of training prior to using the maturity equipment.

Table 7
Requirements for use of Maturity Meter Probes

Structure Component	Quantity of Concrete	No. of Probes
Slabs, beams, walls, & miscellaneous items	0 - 30 yd^3	2
	> 30 to 60 yd^3	3
	> 60 to 90 yd^3	4
	> 90 yd^3	5
Footings, Columns & Caps	0 - 13 yd^3	2
	> 13 yd^3	3
Pavement, Pavement Overlays	1200 yd^2	2
Pavement Repairs	Per repair or 900 yd^2 Whichever is smaller	2

907-804.03.16--Cold or Hot Weather Concreting.

907-804.03.16.1--Cold Weather Concreting. After the third paragraph of Subsection 804.03.16.1 on page 873, add the following:

In lieu of the protection and curing of concrete in cold weather, at the option of the Contractor with the approval of the Engineer, when concrete is placed during cold weather and there is a probability of ambient temperatures lower that 40°F, an approved maturity meter may be used to determine concrete strengths by inserting probes into concrete placed in a structure. The minimum number of maturity meter probes required for each structural component shall be in accordance with Table 7. An approved insulating blanketing material shall be used to protect the work when ambient temperatures are less than 40°F and shall remain in place until the required concrete strength in Table 6 is achieved. Procedures for using the maturity meter and developing the strength/maturity relationship shall follow the requirements of AASHTO Designation: T 325 and ASTM Designation: C 1074 specifications. Technicians using the maturity meter or calculating strength/maturity graphs shall be required to have at least two hours of training prior to using the maturity equipment.

Rename the Table in Subsection 804.03.16.1 on page 874 from "Table 6" to "Table 8".

907-804.03.19--Finishing Concrete Surfaces.

907-804.03.19.7--Finishing Bridge Floors.

907-804.03.19.7.4--Acceptance Procedure for Bridge Deck Smoothness. After the first sentence of the second paragraph of Subsection 804.03.19.7.4 on page 886, add the following:

Auxiliary lanes, tapers, shoulders and other areas that are not checked with the profilograph, shall meet a 1/8 inch in 10-foot straightedge check made transversely and longitudinally across the deck or slab.

907-804.05--Basis of Payment. Add the "907" prefix to the pay items listed on page 898.

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.

S E C T I O N 9 0 5 -- P R O P O S A L (CONTINUED)

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.

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.

Relocation and Construction of various metal buildings at the MDOT Shop Complex, known as State Project No. BWO-9030-25(002) / 502352301 & BWO-9041-25(001) / 502400301 & BWO-9721-25(001) / 502353301 & LWO-9002-25(006) / 501560303 in Hinds County.

Line No.	Item Code	Adj Code	Quantity	Units	Description [Fixed Unit Price]
					Roadway Items
0010	202-B005		5,830	Square Yard	Removal of Asphalt Pavement, All Depths
0020	202-B017		436	Linear Feet	Removal of Concrete Combination Curb & Gutter
0030	202-B018		75	Square Yard	Removal of Concrete Driveways, All Depths
0040	202-B025		307	Square Yard	Removal of Concrete Paved Ditch
0050	202-B041		677	Linear Feet	Removal of Fence, All Types
0060	202-B057		3	Each	Removal of Inlets, All Sizes
0070	202-B064		87	Linear Feet	Removal of Pipe, 8" And Above
0080	202-B070		2	Each	Removal of Sign Including Post & Footing
0090	202-B232		80	Linear Feet	Removal of Gravity Sewer Line, All Sizes, All Types
0100	202-B238		80	Linear Feet	Removal of Water Line, All Sizes, All Types
0110	203-EX035	(E)	3,800	Cubic Yard	Borrow Excavation, AH, FME, Class B9-6
0120	203-G003	(E)	2,800	Cubic Yard	Excess Excavation, FM, AH
0130	206-A001	(S)	1,000	Cubic Yard	Structure Excavation
0140	211-B001	(E)	100	Cubic Yard	Topsoil for Slope Treatment, Contractor Furnished
0150	212-B001		850	Square Yard	Standard Ground Preparation
0160	216-B004		850	Square Yard	Solid Sodding, Bermuda
0170	219-A001		20	Thousand Gallon	Watering [$20.00]
0180	221-A001	(S)	10	Cubic Yard	Portland Cement Concrete Paved Ditch
0190	234-A001		1,500	Linear Feet	Temporary Silt Fence
0200	406-A001		8,200	Square Yard	Cold Milling of Bituminous Pavement, All Depths
0210	602-A001	(S)	5,750	Pounds	Reinforcing Steel
0220	603-CA001	(S)	12	Linear Feet	15" Reinforced Concrete Pipe, Class III
0230	603-CA002	(S)	28	Linear Feet	18" Reinforced Concrete Pipe, Class III
0240	603-CA003	(S)	224	Linear Feet	24" Reinforced Concrete Pipe, Class III
0250	603-CA004	(S)	36	Linear Feet	30" Reinforced Concrete Pipe, Class III
0260	603-CA006	(S)	88	Linear Feet	42" Reinforced Concrete Pipe, Class III
0270	603-CB001	(S)	1	Each	18" Reinforced Concrete End Section
0280	603-CE001	(S)	32	Linear Feet	22" x 13" Concrete Arch Pipe, Class A III
0290	603-CE042	(S)	120	Linear Feet	44" x 27" Concrete Arch Pipe, Class A III, Flexible Plastic Gaskets
0300	603-CF001	(S)	1	Each	22" x 13" Concrete Arch Pipe End Section
0310	603-SB039	(S)	4	Each	24" Branch Connections, Stub into Inlet
0320	603-SB045	(S)	2	Each	18" Branch Connections, Stub into Existing Inlet

Line No.	Item Code	Adj Code	Quantity	Units	Description [Fixed Unit Price]
0330	603-SB050	(S)	1	Each	44" x 27" Branch Connection, Stub into Existing Inlet
0340	603-SB063	(S)	1	Each	42" Branch Connection, Stub Into Existing Inlet
0350	604-B001		25,458	Pounds	Gratings
0360	606-B004		175	Linear Feet	Guard Rail, Class A, Type 1, Metal Post
0370	607-B003		630	Linear Feet	60" Type III Chain Link Fence, Class I
0380	607-P1009		63	Each	Line Post, 9' x 2" Galvanized Steel
0390	607-P2010		30	Each	Brace Post, 9' x 2 1/2" Galvanized Steel
0400	609-B001	(S)	261	Linear Feet	Concrete Curb, Header
0410	609-D001	(S)	100	Linear Feet	Combination Concrete Curb and Gutter Type 1
0420	614-B001	(S)	290	Square Yard	Concrete Driveway, With Reinforcement
0430	618-A001		1	Lump Sum	Maintenance of Traffic
0440	619-D3001		30	Each	Remove and Reset Signs, All Sizes
0450	620-A001		1	Lump Sum	Mobilization
0460	809-A003	(S)	1,000	Square Feet	Retaining Wall System
0470	907-234-D001		15	Each	Inlet Siltation Guard
0480	907-237-A002		600	Linear Feet	Wattles, 12"
0490	907-242-A004		1	Lump Sum	Removal and Relocation of Metal Buildings with an addition of a scale maintenanceshop
0500	907-242-A006		1	Lump Sum	Construction of a warehouse
0510	907-242-A006		1	Lump Sum	Construction of an equipment shed
0520	907-246-B002		50	Each	Rockbags
0530	907-258-PP016		2	Each	Bollard
0540	907-262-A006	(S)	221	Linear Feet	8" Sanitary Sewer Pipe
0550	907-262-I001		3	Each	Monolithic Manhole Surfacing System
0560	907-262-J001		3	Each	Crystalline Concrete Waterproofing
0570	907-262-K001		3	Each	Manholes
0580	907-265-A006	(S)	254	Linear Feet	1 1/2" Copper Tubing "K" Service Tubing
0590	907-265-B006	(S)	173	Linear Feet	6" Ductile Iron Water Pipe
0600	907-265-D007		1	Each	6" Gate Valve
0610	907-265-D010		1	Each	1 1/2" Gate Valve
0620	907-265-N002		1	Each	Backflow Preventer with Box
0630	907-407-A001	(A2)	2,150	Gallon	Asphalt for Tack Coat
0640	907-601-B003	(S)	75	Cubic Yard	Class "B" Structural Concrete, Minor Structures
0650	907-603-PE202	(S)	18	Linear Feet	6" Corrugated Polyethylene Pipe
0660	907-607-G006		2	Each	Gate, Barrier Fence, Per Plans
0670	907-625-E001		2,400	Linear Feet	Detail Traffic Stripe, 4" Equivalent Length

Line No.	Item Code	Adj Code	Quantity	Units	Description [Fixed Unit Price]
0680	907-625-E002		200	Linear Feet	Detail Traffic Stripe, Blue-ADA
0690	907-625-F002		330	Linear Feet	Legend, 4" Equivalent Length
0700	907-625-F003		120	Square Feet	Legend, Blue-ADA
0710	907-631-A001		10	Cubic Yard	Flowable Fill, Excavatable
0720	907-699-A002		1	Lump Sum	Roadway Construction Stakes
					ALTERNATE GROUP AA NUMBER 1
0730	907-403-A012	(BA1)	1,600	Ton	Hot Mix Asphalt, ST, 19-mm mixture
					ALTERNATE GROUP AA NUMBER 2
0740	907-403-M004	(BA1)	1,600	Ton	Warm Mix Asphalt, ST, 19-mm mixture
					ALTERNATE GROUP BB NUMBER 1
0750	907-403-A015	(BA1)	1,375	Ton	Hot Mix Asphalt, ST, 9.5-mm mixture
					ALTERNATE GROUP BB NUMBER 2
0760	907-403-M001	(BA1)	1,375	Ton	Warm Mix Asphalt, ST, 9.5-mm mixture

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).

	Project No.	County		Project No.	County
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. _____	_____ _____	_____ _____	_____ _____	_____ _____	

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.

SIGNED _____

_____

_____

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 January 13, 1999.

I (we) agree that this notification of intent DOES NOT constitute APPROVAL of the subcontracts.

NOTE: Insert name and address of subcontractors. (Subcontracts equal to or in excess of fifty thousand dollars ($50,000.00) ONLY.)

(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 January 13, 1999.

Contractor _____

By _____

Title _____

CERTIFICATE MUST BE EXECUTED

REV. 2/99

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

CERTIFICATION
(Execute in duplicate)

I,_____,
(Name of person signing certification)

individually, and in my capacity as _____ of
(Title)

_____ do hereby certify under
(Name of Firm, Partnership, or Corporation)

penalty of perjury under the laws of the United States and the State of Mississippi that

_____, Bidder
(Name of Firm, Partnership, or Corporation)

on Project No. **BWO-9030-25(002) / 502352301 & BWO-9041-25(001) / 502400301 & BWO-9721-25(001) / 502353301 & LWO-9002-25(006) / 501560303** ,

in **Hinds** 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.

Initial here "_____" if exceptions are attached and made a part thereof. Any exceptions shall address to whom it applies, initiating agency and dates of such action.

Note: Exceptions will not necessarily result in denial of award but will be considered in determining bidder responsibility. Providing false information may result in criminal prosecution or administrative sanctions.

All of the foregoing and attachments (when indicated) is true and correct.

Executed on _____ _____
Signature

(5/29/2008S)

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

CERTIFICATION
(Execute in duplicate)

I,_____,
(Name of person signing certification)

individually, and in my capacity as _____ of
(Title)

_____ do hereby certify under
(Name of Firm, Partnership, or Corporation)

penalty of perjury under the laws of the United States and the State of Mississippi that

_____, Bidder
(Name of Firm, Partnership, or Corporation)

on Project No. **BWO-9030-25(002) / 502352301 & BWO-9041-25(001) / 502400301 & BWO-9721-25(001) / 502353301 & LWO-9002-25(006) / 501560303** ,

in **Hinds** 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.

Initial here "_____" if exceptions are attached and made a part thereof. Any exceptions shall address to whom it applies, initiating agency and dates of such action.

Note: Exceptions will not necessarily result in denial of award but will be considered in determining bidder responsibility. Providing false information may result in criminal prosecution or administrative sanctions.

All of the foregoing and attachments (when indicated) is true and correct.

Executed on _____ _____
Signature

(5/29/2008S)

S E C T I O N 9 0 2

CONTRACT FOR **BWO-9030-25(002) / 502352301 & BWO-9041-25(001) / 502400301 & BWO-9721-25(001) / 502353301 & LWO-9002-25(006) / 501560303**

LOCATED IN THE COUNTY(IES) OF **Hinds**

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: Executive Director
(names and addresses of witnesses)

_____ _____
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-9030-25(002) / 502352301 & BWO-9041-25(001) / 502400301 & BWO-9721-25(001) / 502353301 & LWO-9002-25(006) / 501560303**

LOCATED IN THE COUNTY(IES) OF: **Hinds**

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, 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.

Signed and sealed this the _____ day of _____ A.D. _____.

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.

Witness our signatures and seals this the _____ day of _____ A.D. _____.

_____	_____
(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 **Relocation and Construction of various metal buildings at the MDOT Shop Complex, known as State Project No. BWO-9030-25(002) / 502352301 & BWO-9041-25(001) / 502400301 & BWO-9721-25(001) / 502353301 & LWO-9002-25(006) / 501560303 in Hinds County.**

NOW THEREFORE, the condition of this obligation is such that if the aforesaid Principal shall be awarded the contract, the said Principal will, within the time required, enter into a formal contract and give a good and sufficient bond to secure the performance of the terms and conditions of the contract, then this obligation to be void; otherwise the Principal and Surety will pay unto the Obligee the difference in money between the amount of the bid of the said Principal and the amount for which the Obligee legally contracts with another party to perform the work if the latter amount be in excess of the former, but in no event shall liability hereunder exceed the penal sum hereof.

Signed and sealed this _____ day of _____ , 20___

_____
(Principal) (Seal)

_____ By: _____
(Witness) (Name) (Title)

_____
(Surety) (Seal)

_____ By: _____
(Witness) (Attorney-in-Fact)

_____
MS Agent

_____
Mississippi Insurance ID Number