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SM No. CBWO5195620011

PROPOSAL AND CONTRACT DOCUMENTS

FOR THE CONSTRUCTION OF
(EXEMPT)

8
New Maintenance Headquarters and Equipment Shed in Kalem, known as State Project No. BWO-5195-62(001) / 502308301 & BWO-5196-62(001) / 502308302, in the County of Scott, State of Mississippi.
Project Completion: October 31, 2011

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.
- _____ 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.

SECTION 00 01 10 TABLE OF CONTENTS

PROJECT: MAINTENANCE AREA HEADQUARTERS
 & EQUIPMENT SHED AT KALEM
 SCOTT COUNTY, MISSISSIPPI

PROJECT NUMBER: BWO-5195-62(001) 502308
 BWO-5196-62(001) 502308

DATE: 8-30-10

DESCRIPTION "A": The Department of Transportation shall clear and grub the site and have in place a building pad of compact select material within one foot of finish floor. This Work shall consist of minor site work and all construction work necessary in constructing a Maintenance Area Headquarters for District Five at Kalem on Highway 80 East in Scott County, Mississippi, Project No. BWO-5195-62(001) 502308, in accordance with these Specifications and conforming to the Drawings.

DESCRIPTION "B": The Department of Transportation shall clear and grub the site and have in place a building pad of compact select material within one foot of finish floor. This Work shall consist of minor site work and all construction work necessary in constructing an Equipment Shed for the Maintenance Area Headquarters for District Five at Kalem on Highway 80 East in Scott County, Mississippi, Project No. BWO-5196-62(001) 502308 in accordance with these Specifications and conforming to the Drawings

PAY ITEMS FOR FENCING AND GATES: Refer to Mississippi Standard Specifications for Road and Bridge Construction, 2004 Edition, and the Drawings for requirements to furnish and install 6' chain link fence with top guard, gates, line posts, brace posts, and gate posts.

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

DIVISION 00 PROCUREMENT AND CONTRACTING REQUIREMENTS

SECTION	00 01 10	TABLE OF CONTENTS
SECTION	00 01 15	LIST OF DRAWING SHEETS
SECTION	00 11 13	ADVERTISEMENT FOR BIDS
SECTION	00 21 13	INSTRUCTIONS TO BIDDERS
SECTION	00 22 13	SUPPLEMENTARY INSTRUCTIONS TO BIDDERS
SECTION	00 42 00	PROPOSAL FORMS
SECTION	00 43 13	BID SECURITY FORM
SECTION	00 45 19	STATE NON-COLLUSION CERTIFICATE
SECTION	00 45 47	STATE BOARD OF CONTRACTORS REQUIREMENTS
SECTION	00 52 00	AGREEMENT FORMS
SECTION	00 61 00	BOND FORMS
SECTION	00 72 00	GENERAL CONDITIONS
SECTION	00 73 00	SUPPLEMENTARY CONDITIONS
SECTION	00 91 13	ADDENDA

DIVISION 01 GENERAL REQUIREMENTS

SECTION	01 10 00	SUMMARY
SECTION	01 26 00	CONTRACT MODIFICATION PROCEDURES

SECTION	01 29 00	PAYMENT PROCEDURES
SECTION	01 29 73	SCHEDULE OF VALUES
SECTION	01 31 00	PROJECT MANAGEMENT AND COORDINATION
SECTION	01 31 19	PROJECT MEETINGS
SECTION	01 32 00	CONSTRUCTION PROGRESS DOCUMENTATION
SECTION	01 33 00	SUBMITTAL PROCEDURES
SECTION	01 42 19	REFERENCE STANDARDS
SECTION	01 43 00	QUALITY ASSURANCE
SECTION	01 45 29	TESTING LABORATORY SERVICES
SECTION	01 50 00	TEMPORARY FACILITIES AND CONTROLS
SECTION	01 61 15	BASIC PRODUCT REQUIREMENTS
SECTION	01 62 14	PRODUCT OPTIONS AND SUBSTITUTION PROCEDURES
SECTION	01 73 29	CUTTING AND PATCHING
SECTION	01 74 00	CLEANING AND WASTE MANAGEMENT
SECTION	01 77 00	CLOSEOUT PROCEDURES
SECTION	01 78 23	OPERATION AND MAINTENANCE DATA
SECTION	01 78 39	PROJECT RECORD DOCUMENTS

DIVISION 02 EXISTING CONDITIONS (Not Used)

DIVISION 03 CONCRETE

SECTION	03 10 00	CONCRETE FORMING AND ACCESSORIES
SECTION	03 20 00	CONCRETE REINFORCING
SECTION	03 30 00	CAST-IN-PLACE CONCRETE

DIVISION 04 MASONRY

SECTION	04 20 00	UNIT MASONRY
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DIVISION 05 METALS

SECTION	05 50 00	METAL FABRICATIONS
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DIVISION 06 WOOD, PLASTICS, AND COMPOSITES

SECTION	06 10 00	ROUGH CARPENTRY
SECTION	06 17 53	SHOP-FABRICATED WOOD TRUSSES
SECTION	06 40 00	ARCHITECTURAL WOODWORK

DIVISION 07 THERMAL AND MOISTURE PROTECTION

SECTION	07 21 28	CELLULOSE THERMAL INSULATION
SECTION	07 26 00	VAPOR RETARDERS
SECTION	07 27 26	FLUID-APPLIED MEMBRANE AIR BARRIERS
SECTION	07 56 13	HIGH-PERFORMANCE ROOF COATING
SECTION	07 61 00	SHEET METAL ROOFING
SECTION	07 62 00	SHEET METAL FLASHING AND TRIM
SECTION	07 84 00	FIRESTOPPING
SECTION	07 92 00	JOINT SEALANTS

DIVISION 08 OPENINGS

SECTION	08 11 13	HOLLOW METAL DOORS AND FRAMES
SECTION	08 14 29	PREFINISHED WOOD DOORS
SECTION	08 31 13	ACCESS DOORS AND FRAMES
SECTION	08 33 23	OVERHEAD COILING DOORS
SECTION	08 36 13	SECTIONAL DOORS
SECTION	08 41 13	ALUMINUM FRAMED ENTRANCES AND STOREFRONTS
SECTION	08 51 14	ALUMINUM WINDOWS-SINGLE HUNG
SECTION	08 51 15	ALUMINUM WINDOWS-AWNING
SECTION	08 71 00	DOOR HARDWARE

SECTION	08 80 00	GLAZING
DIVISION 09	FINISHES	
SECTION	09 05 15	COLOR DESIGN
SECTION	09 29 00	GYPSUM BOARD
SECTION	09 31 13	THIN-SET CERAMIC TILING
SECTION	09 51 00	ACOUSTICAL CEILINGS
SECTION	09 65 00	RESILIENT FLOORING
SECTION	09 68 00	CARPETING
SECTION	09 90 00	PAINTING AND COATING
SECTION	09 96 77	HIGH-PERFORMANCE COATING

DIVISION 10 SPECIALTIES

SECTION	10 11 00	VISUAL DISPLAY SURFACES
SECTION	10 14 00	SIGNAGE
SECTION	10 21 15	SOLID PLASTIC TOILET COMPARTMENTS
SECTION	10 26 13	CORNER GUARDS
SECTION	10 28 13	TOILET ACCESSORIES
SECTION	10 44 16	FIRE EXTINGUISHERS
SECTION	10 51 13	METAL LOCKERS
SECTION	10 56 13	METAL STORAGE SHELVING
SECTION	10 57 13	HAT AND COAT RACKS
SECTION	10 73 16	CANOPIES
SECTION	10 75 00	FLAGPOLES

DIVISION 11 EQUIPMENT

SECTION	11 31 15	RESIDENTIAL APPLIANCES & EQUIPMENT
---------	----------	------------------------------------

DIVISION 12 FURNISHINGS

SECTION	12 21 14	HORIZONTAL LOUVER BLINDS-METAL
SECTION	12 48 43	FLOOR MATS

DIVISION 13 SPECIAL CONSTRUCTION

SECTION	13 34 18	METAL BUILDING SHED
SECTION	13 34 19	METAL BUILDING SYSTEMS

DIVISIONS 14 – 21 (Not Used)

DIVISION 22 PLUMBING

SECTION	22 05 10	PLUMBING GENERAL REQUIREMENTS
SECTION	22 05 11	PLUMBING SUBMITTAL DATA
SECTION	22 05 29	HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT
SECTION	22 05 53	IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT
SECTION	22 07 00	PLUMBING INSULATION
SECTION	22 10 00	PLUMBING PIPING AND PUMPS
SECTION	22 13 00	FACILITY SANITARY SEWERAGE
SECTION	22 15 00	GENERAL SERVICE COMPRESSED-AIR SYSTEMS
SECTION	22 33 00	ELECTRIC DOMESTIC WATER HEATERS
SECTION	22 42 00	COMMERCIAL PLUMBING FIXTURES

DIVISION 23 HEATING, VENTILATING, AND AIR-CONDITIONING

SECTION	23 05 10	HVAC GENERAL REQUIREMENTS
SECTION	23 05 11	HVAC SUBMITTAL DATA
SECTION	23 05 13	COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT
SECTION	23 05 15	DESIGN CONDITIONS
SECTION	23 05 29	HANGERS AND SUPPORTS FOR HVAC PIPING AND

		EQUIPMENT
SECTION	23 05 53	IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT
SECTION	23 05 93	TESTING, ADJUSTING AND BALANCING FOR HVAC
SECTION	23 07 00	HVAC INSULATION
SECTION	23 09 00	INSTRUMENTATION AND CONTROL FOR HVAC
SECTION	23 11 26	FACILITY LIQUEFIED PETROLEUM GAS PIPING
SECTION	23 23 00	REFRIGERANT PIPING
SECTION	23 30 00	HVAC AIR DISTRIBUTION
SECTION	23 34 00	HVAC FANS
SECTION	23 34 50	CEILING MOUNTED CIRCULATION FANS
SECTION	23 37 00	AIR OUTLETS AND INLETS
SECTION	23 37 13	DIFFUSERS, REGISTERS, AND GRILLES
SECTION	23 41 00	PARTICULATE AIR FILTRATION
SECTION	23 51 23	GAS VENTS
SECTION	23 55 23	GAS-FIRED RADIANT HEATERS
SECTION	23 55 33	FUEL-FIRED UNIT HEATERS
SECTION	23 81 26	SPLIT-SYSTEM AIR-CONDITIONERS
SECTION	23 81 48	SPLIT-SYSTEM HEAT PUMPS

DIVISIONS 24 – 25 (Not Used)

DIVISION 26 ELECTRICAL

SECTION	26 05 10	ELECTRICAL GENERAL REQUIREMENTS
SECTION	26 05 11	ELECTRICAL SUBMITTAL DATA
SECTION	26 05 19	LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
SECTION	26 05 26	GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
SECTION	26 05 33	RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS
SECTION	26 24 16	PANELBOARDS
SECTION	26 27 00	LOW-VOLTAGE DISTRIBUTION EQUIPMENT
SECTION	26 27 26	WIRING DEVICES
SECTION	26 28 16	ENCLOSED SWITCHES AND CIRCUIT BREAKERS
SECTION	26 29 10	MOTOR CONTROLS AND WIRING
SECTION	26 32 13	DIESEL-ENGINE-DRIVEN GENERATOR SETS
SECTION	26 41 00	FACILITY LIGHTNING PROTECTION
SECTION	26 50 00	LIGHTING

DIVISION 27 (Not Used)

DIVISION 28 ELECTRONIC SAFETY AND SECURITY

SECTION	28 23 00	SECURITY CCTV VIDEO SURVEILLANCE
SECTION	28 31 00	FIRE DETECTION AND ALARM

DIVISIONS 29 – 30 (Not Used)

DIVISION 31 EARTHWORK

SECTION	31 10 00	SITE CLEARING
SECTION	31 23 12	EXCAVATION, FILL AND GRADING
SECTION	31 31 16	TERMITE CONTROL

DIVISION 32 EXTERIOR IMPROVEMENTS

SECTION	32 16 15	CONCRETE CURBS AND SIDEWALKS
SECTION	32 92 00	TURF AND GRASSES

DIVISIONS 33-49 (Not Used)

DIVISION 50	MDOT PROCURMENT AND CONTRACTING FORMS
SECTION 905	PROPOSAL, PROPOSAL SHEET NO. 2-1 AND 2-2
SECTION 905	COMBINATION BID PROPOSAL
CERTIFICATE	STATE BOARD OF CONTRACTORS REQUIREMENTS
CERTIFICATION	STATE NON-COLLUSION CERTIFICATE
SECTION 902	CONTRACT FORM
SECTION 903	CONTRACT BOND FORM
BOND FORM	BID BOND

(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

WORKING NUMBER	SHEET NUMBER	DESCRIPTION
----	1	TITLE SHEET
DI-1	2	DETAILED INDEX AND SUMMARY OF QUANTITIES
A1.1	3	SITE PLAN
A1.2	4	FLOOR PLAN - OFFICES AND SHOP
A1.3	5	ROOF PLAN - OFFICES AND SHOP
A1.4	6	OFFICE FLOOR PLAN AND FLOOR FINISH PLAN
A1.5	7	OFFICE ROOF FRAMING AND REFLECTED CEILING PLANS
A2.1	8	BUILDING ELEVATIONS
A2.2	9	INTERIOR VIEWS
A2.3	10	INTERIOR VIEWS
A3.1	11	BUILDING SECTIONS - SHOP
A3.2	12	WALL SECTIONS - OFFICES
A3.3	13	WALL SECTIONS - OFFICES
A4.1	14	CABINET SECTIONS
A5.1	15	DOOR AND WINDOW DETAILS
A5.2	16	DOOR AND WINDOW DETAILS
A5.3	17	SITE DETAILS
A6.1	18	SCHEDULES
S1.1	19	FOUNDATION PLAN
S5.1	20	FOUNDATION DETAILS
ES1.1	21	OPEN EQUIPMENT SHED PLAN AND ELEVATIONS
ES1.2	22	EQUIPMENT SHED DETAILS AND SCHEDULE
ES1.3	23	EQUIPMENT SHED DETAILS AND SCHEDULE
CL-1	24	FENCE: CHAIN LINK - CLASS 1
CLG-1	25	FENCE: CHAIN LINK - GATE
P0.1	26	PLUMBING LEGEND, ABBREVIATION, DETAILS AND GENERAL NOTES
P1.0	27	SITE PLAN - PLUMBING
P2.1	28	FLOOR PLAN - WASTE AND VENT (MAHQ)
P2.2	29	FLOOR PLAN - WATER, GAS AND COMPRESSED AIR (MAHQ)
P2.3	30	FLOOR PLAN - PLUMBING (EQUIPMENT SHED)
P3.1	31	ISOMETRIC RISER - WASTE AND VENT (MAHQ)
P3.2	32	ISOMETRIC RISER - WATER, GAS AND COMPRESSED AIR (MAHQ)
P4.1	33	PLUMBING SCHEDULES AND DETAILS
M0.1	34	MECHANICAL LEGEND, ABBREVIATION, DETAILS AND GENERAL NOTES
M2.1	35	FLOOR PLAN - MECHANICAL (MAHQ)
M2.2	36	FLOOR PLAN - MECHANICAL (EQUIPMENT SHED)
M3.1	37	MECHANICAL DETAILS
M3.2	38	MECHANICAL DETAILS
M4.1	39	MECHANICAL SCHEDULES

E0.1	40	ELECTRICAL LEGEND, ABBREV, AND GENERAL NOTES
E1.0	41	SITE PLAN - ELECTRICAL
E2.1	42	FLOOR PLAN - LIGHTING (MAHQ)
E2.2	43	FLOOR PLAN - POWER / COMMUNICATION (MAHQ)
E3.1	44	FLOOR PLAN - ELECTRICAL (EQUIPMENT SHED)
E4.1	45	ELECTRICAL SCHEDULES
E4.2	46	ELECTRICAL SCHEDULES
E4.3	47	ELECTRICAL SCHEDULES
E4.4	48	ELECTRICAL SCHEDULES
E4.5	49	ELECTRICAL SCHEDULES
E4.6	50	POWER RISER DIAGRAM
E4.7	51	ELECTRICAL DETAILS
E4.8	52	ELECTRICAL DETAILS

END OF SECTION

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

**ADVERTISEMENT FOR BIDS
SECTION 00 11 13**

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, October 26, 2010; and shortly thereafter publicly opened on the Sixth Floor for:

A single Contract to construct a Maintenance Area Headquarters at Kalem on Highway 80 East in Scott County, Mississippi, known as Project No. BWO-5195-62(001) 502308 and an Equipment Shed at Kalem on Highway 80 East in Scott County, Mississippi, known as Project No. BWO-5196-62(001) 502308.

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

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, religion or national origin in consideration for an award.

Drawings and Specifications are on file in the offices of the Mississippi Department of Transportation at Newton and Jackson.

Bid or specimen proposals must be acquired from the Contract Administration Engineer Division, First Floor of Mississippi Department of Transportation Office Building, Telephone (601) 359-7744. These proposals are available at a cost of Ten Dollars (\$10.00) per proposal.

Plans may be acquired on a cost per sheet basis from MDOT Shop Complex, 2567 North West Street, Building C, Room 114, Jackson, Mississippi 39216, Telephone (601) 359-7460, FAX (601) 359-7461, E-mail plans@mdot.state.ms.us.

Bid Bond, signed or countersigned by a Mississippi Agent or Qualified Non-Resident Agent, with Power of Attorney attached or on file with the Contract Administration Engineer of the Department, 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 Document 00200 - Instructions to Bidders pertaining to irregular proposals and rejection of bids.

(SPWP)

LARRY L."BUTCH" BROWN
EXECUTIVE DIRECTOR

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. 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 00 61 00 entitled *Bond Forms*.
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 | Richard Chisolm – Specifications Engineer | (601) 359-7301 |
| 5. Drawings | Richard Chisolm – Specifications Engineer | (601) 359-7301 |
| 6. Bidder's List & Specimen Proposals are available online at: | | |

<http://www.gomdot.com/Applications/BidSystem/Home.aspx>

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

END OF SECTION

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS
SECTION 00 22 13

Part 1 GENERAL

1.01 **WORK IN PROXIMITY OF HIGH VOLTAGE POWER LINES:** 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:** AT the request of the U. S. Department of Agriculture, Plant Pest Control Information Concerning Domestic Quarantines is cited as follows:

- A. 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 mills, 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 **FEDERAL BRIDGE FORMULA**

- A. 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/brdgcalt/calc_page.htm

- 1.05 **FUEL TAX APPLICABILITY TO BIDDERS AND CONTRACTORS:** Bidders are hereby advised that the Mississippi Code of 1972, section 27-55-301 et seq. requires the use of taxed diesel fuel used in performing contracts for construction, reconstruction, maintenance, or repair where such contracts are entered into with the State of Mississippi, any agency, department, institution, or political subdivision thereof. Section 27-55-313 reads as follows:

- A. A tax at the rate of Eighteen Cents (18¢) per gallon until the date specified in Section 65-39-35, and Fourteen and Three-fourths Cents (14.75¢) per gallon thereafter, is levied upon any delivering other motor fuel to a retail dealer, user or any other person for use in propelling motor vehicles on the highways of this state and/or for the privilege of engaging in the business of selling and delivering other motor fuel to any other person who purchases or uses other motor fuel in performing contracts for construction, reconstruction, maintenance or repairs, where such contracts are entered into with the State of Mississippi, any political subdivision of the State of Mississippi, or any department, agency or institution of the State of Mississippi or any political subdivision thereof.
- B. A tax at the rate described in this section is hereby levied upon any person who purchases, receives or acquires any other motor fuel upon which the tax has not been paid when such other motor fuel is used for any taxable purpose as set forth in this article. A tax at the rate described in this section is hereby levied upon any retailer who purchases, receives, or acquires any other motor fuel upon which the tax has not been

- paid when such other motor fuel is sold for use or used for any taxable purpose as set forth in this article.
- C. The commission may adopt rules and regulations providing for the issuance of permits to persons performing contracts as hereinabove provided, allowing or requiring said persons to purchase other motor fuel for use in performing said contracts without the payment to the distributor of the tax imposed hereunder, and providing for such persons to report and pay such tax directly to the commission in instances where the commission determines that such payment will facilitate and expedite the collection of the tax which may be due on such purchases by the permittee. The distributor is relieved of collecting and remitting the taxes specified hereunder, when furnished with a copy of said permit, and the person holding the permit shall become liable for such taxes instead of the seller, and the full enforcement provisions of this article shall apply in the collection of the tax from the permittee. The commission may require said person to execute and file with the commission a good and valid bond in a surety company authorized to do business in this state, or with sufficient sureties to be approved by the commission, conditioned that all taxes which may accrue to the State of Mississippi under the provisions of this chapter will be paid when due. Provided further, the commission may accept a bond filed under the provision of Section 27-65-21, when such bond is conditioned upon the payment of taxes hereunder.
- D. Any person who shall, while not licensed as a distributor of other motor fuel or retail dealer, sell or deliver to other persons any other motor fuel upon which the tax levied by this article has not been paid shall be liable for the tax and penalties imposed by this article if the person selling or delivering such fuel knows or has reason to know that it will be used or sold for a taxable purpose.
- E. A retail dealer may, with the approval of the commission, sell or dispense tax free other motor fuel. Said retailer shall comply with all rules and regulations pertaining to retailers selling or dispensing tax free other motor fuel. The commission may require said retailer to execute and file with the commission a good and valid bond, in a surety company authorized to do business in the state, conditioned that all taxes which may accrue to the State of Mississippi under the provisions of this chapter will be paid when due. Storage tanks or pumps located at all such retail dealers' place of business which are used or to be used in storing and dispensing kerosene for lamps, stoves, heaters and domestic purposes shall bear the label "not for highway use" of letters of not less than four (4) inches in height.
- F. When other motor fuel on which the full tax under this section has been paid has been Delivered to a retail dealer for sale or to a consumer for use as motor fuel for operating a motor vehicle upon the highways of this state, the distributor of other motor fuel who made said tax payments and deliveries may pick up and return to his bulk storage facility any portion of such other motor fuel which may be unused and claim credit for the amount of tax paid on the quantity so returned. In order to claim credit for the tax on the quantity of other motor fuel to be so returned, such distributor shall notify the commission of his desire to so return it. Such transaction shall only be made under the supervision of the commission.
- G. When dyed diesel fuel and clear diesel fuel are accidentally mixed and the mixture is converted to nonhighway use diesel fuel, the distributor or other person owning such mixture may claim credit for the highway portion of the tax paid on such mixture. Proof satisfactory to the distributor or other person owning such mixture shall notify the commission immediately after gaining knowledge that such accidental mixture has occurred.

Bidders/Contractors are required to comply with the provisions of said section, and any revisions or amendments thereto, for all work performed under this contract; and be able to substantiate compliance when requested by the Mississippi Department of Transportation or the Mississippi State Tax Commission.

1.06 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.

1.07 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.

1.08 CONTRACT TIME

- A. It is anticipated that the Notice to Award will be issued by not later than November 9, 2010, and the date for Notice to Proceed and Beginning of Contract Time will be December 14, 2010.
- B. The calendar date for completion of this Contract shall be October 31, 2011 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.

1.09 **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. Masonry Items
 - c. Metal Roofing
 - d. Plumbing Items
 - e. Heating, Ventilating and Air Conditioning Items
 - f. Electrical Items

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

END OF SECTION

SECTION 00 42 00 PROPOSAL

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Refer to DIVISION 50, SECTION 905 PROPOSAL for the Proposal Form. The form is bound in the back of the Project Manual.

- B. Comply with requirements in Section 00 21 13 .Instructions to Bidders.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 00 43 13

BID SECURITY FORM

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Refer to DIVISION 50, BOND FORM, for Bid Bond Form. The form is bound in the back of the Project Manual.
- B. Comply with requirements in Section 00 21 13 - Instructions to Bidders.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 00 45 19

STATE NON-COLLUSION CERTIFICATE

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Refer to DIVISION 50, CERTIFICATION, for State Non-Collusion Certificate Form. The form is bound in the back of the Project Manual.
- B. Comply with requirements in Section 00 21 13 .Instructions to Bidders.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 00 45 47

STATE BOARD OF CONTRACTORS REQUIREMENTS

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Refer to DIVISION 50, CERTIFICATE, for State Board of Contractors Requirements Certificate Form. The form is bound in the back of the Project Manual.
- B. Comply with requirements in Section 00 21 13 .Instructions to Bidders.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 00 52 00 AGREEMENT

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Refer to DIVISION 50, SECTION 902 CONTRACT FORM, for Contract (Agreement) Form. The form is bound in the back of the Project Manual.

- B. Comply with requirements in Section 00 21 13 - Instructions to Bidders.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 00 61 00 BOND FORMS

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Refer to DIVISION 50, SECTION 903 CONTRACT BOND FORM, for Contract Bond Form. The form is bound in the back of the Project Manual.
- B. Comply with requirements in Section 00 21 13 - Instructions to Bidders.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

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.

END OF SECTION



AIA[®] Document A201[™] – 2007

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

MAINTENANCE AREA HEADQUARTERS & EQUIPMENT SHED AT KALEM,
SCOTT COUNTY, MISSISSIPPI

BWO-5195-62(001) 502308

BWO-5196-62(001) 502308

THE OWNER:

(Name, legal status and address)

THE ARCHITECT:

(Name, legal status and address)

TABLE OF ARTICLES

- 1 GENERAL PROVISIONS
- 2 OWNER
- 3 CONTRACTOR
- 4 ARCHITECT
- 5 SUBCONTRACTORS
- 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
- 7 CHANGES IN THE WORK
- 8 TIME
- 9 PAYMENTS AND COMPLETION
- 10 PROTECTION OF PERSONS AND PROPERTY
- 11 INSURANCE AND BONDS
- 12 UNCOVERING AND CORRECTION OF WORK
- 13 MISCELLANEOUS PROVISIONS
- 14 TERMINATION OR SUSPENSION OF THE CONTRACT
- 15 CLAIMS AND DISPUTES

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.

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User Notes:

INDEX

(Topics and numbers in bold are section headings.)

Acceptance of Nonconforming Work

9.6.6, 9.9.3, **12.3**

Acceptance of Work

9.6.6, 9.8.2, 9.9.3, 9.10.1, 9.10.3, **12.3**

Access to Work

3.16, 6.2.1, **12.1**

Accident Prevention

10

Acts and Omissions

3.2, 3.3.2, 3.12.8, 3.18, 4.2.3, 8.3.1, 9.5.1, 10.2.5,
10.2.8, 13.4.2, 13.7, 14.1, 15.2

Addenda

1.1.1, 3.11.1

Additional Costs, Claims for

3.7.4, 3.7.5, 6.1.1, 7.3.7.5, 10.3, 15.1.4

Additional Inspections and Testing

9.4.2, 9.8.3, 12.2.1, **13.5**

Additional Insured

11.1.4

Additional Time, Claims for

3.2.4, 3.7.4, 3.7.5, 3.10.2, 8.3.2, **15.1.5**

Administration of the Contract

3.1.3, **4.2**, 9.4, 9.5

Advertisement or Invitation to Bid

1.1.1

Aesthetic Effect

4.2.13

Allowances

3.8, 7.3.8

All-risk Insurance

11.3.1, 11.3.1.1

Applications for Payment

4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5.1, 9.6.3, 9.7, 9.10, 11.1.3

Approvals

2.1.1, 2.2.2, 2.4, 3.1.3, 3.10.2, 3.12.8, 3.12.9, 3.12.10,
4.2.7, 9.3.2, 13.5.1

Arbitration

8.3.1, 11.3.10, 13.1.1, 15.3.2, **15.4**

ARCHITECT

4

Architect, Definition of

4.1.1

Architect, Extent of Authority

2.4.1, 3.12.7, 4.1, 4.2, 5.2, 6.3, 7.1.2, 7.3.7, 7.4, 9.2,
9.3.1, 9.4, 9.5, 9.6.3, 9.8, 9.10.1, 9.10.3, 12.1, 12.2.1,
13.5.1, 13.5.2, 14.2.2, 14.2.4, 15.1.3, 15.2.1

Architect, Limitations of Authority and Responsibility

2.1.1, 3.12.4, 3.12.8, 3.12.10, 4.1.2, 4.2.1, 4.2.2, 4.2.3,
4.2.6, 4.2.7, 4.2.10, 4.2.12, 4.2.13, 5.2.1, 7.4, 9.4.2,
9.5.3, 9.6.4, 15.1.3, 15.2

Architect's Additional Services and Expenses

2.4.1, 11.3.1.1, 12.2.1, 13.5.2, 13.5.3, 14.2.4

Architect's Administration of the Contract

3.1.3, 4.2, 3.7.4, 15.2, 9.4.1, 9.5

Architect's Approvals

2.4.1, 3.1.3, 3.5, 3.10.2, 4.2.7

Architect's Authority to Reject Work

3.5, 4.2.6, 12.1.2, 12.2.1

Architect's Copyright

1.1.7, 1.5

Architect's Decisions

3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 4.2.14, 6.3,
7.3.7, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4.1, 9.5, 9.8.4, 9.9.1,
13.5.2, 15.2, 15.3

Architect's Inspections

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 13.5

Architect's Instructions

3.2.4, 3.3.1, 4.2.6, 4.2.7, 13.5.2

Architect's Interpretations

4.2.11, 4.2.12

Architect's Project Representative

4.2.10

Architect's Relationship with Contractor

1.1.2, 1.5, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5,
3.7.4, 3.7.5, 3.9.2, 3.9.3, 3.10, 3.11, 3.12, 3.16, 3.18,
4.1.2, 4.1.3, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5,
9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3.7, 12, 13.4.2, 13.5, 15.2

Architect's Relationship with Subcontractors

1.1.2, 4.2.3, 4.2.4, 4.2.6, 9.6.3, 9.6.4, 11.3.7

Architect's Representations

9.4.2, 9.5.1, 9.10.1

Architect's Site Visits

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.5

Asbestos

10.3.1

Attorneys' Fees

3.18.1, 9.10.2, 10.3.3

Award of Separate Contracts

6.1.1, 6.1.2

Award of Subcontracts and Other Contracts for Portions of the Work

5.2

Basic Definitions

1.1

Bidding Requirements

1.1.1, 5.2.1, 11.4.1

Binding Dispute Resolution

9.7, 11.3.9, 11.3.10, 13.1.1, 15.2.5, 15.2.6.1, 15.3.1,
15.3.2, 15.4.1

Boiler and Machinery Insurance

11.3.2

Bonds, Lien

7.3.7.4, 9.10.2, 9.10.3

Bonds, Performance, and Payment

7.3.7.4, 9.6.7, 9.10.3, 11.3.9, **11.4**

Building Permit

3.7.1

Init.

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User Notes:

Capitalization

1.3

Certificate of Substantial Completion

9.8.3, 9.8.4, 9.8.5

Certificates for Payment

4.2.1, 4.2.5, 4.2.9, 9.3.3, 9.4, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4, 15.1.3

Certificates of Inspection, Testing or Approval
13.5.4

Certificates of Insurance

9.10.2, 11.1.3

Change Orders

1.1.1, 2.4.1, 3.4.2, 3.7.4, 3.8.2.3, 3.11.1, 3.12.8, 4.2.8, 5.2.3, 7.1.2, 7.1.3, 7.2, 7.3.2, 7.3.6, 7.3.9, 7.3.10, 8.3.1, 9.3.1.1, 9.10.3, 10.3.2, 11.3.1.2, 11.3.4, 11.3.9, 12.1.2, 15.1.3

Change Orders, Definition of

7.2.1

CHANGES IN THE WORK

2.2.1, 3.11, 4.2.8, 7, 7.2.1, 7.3.1, 7.4, 7.4.1, 8.3.1, 9.3.1.1, 11.3.9

Claims, Definition of

15.1.1

CLAIMS AND DISPUTES

3.2.4, 6.1.1, 6.3, 7.3.9, 9.3.3, 9.10.4, 10.3.3, 15, 15.4

Claims and Timely Assertion of Claims

15.4.1

Claims for Additional Cost

3.2.4, 3.7.4, 6.1.1, 7.3.9, 10.3.2, 15.1.4

Claims for Additional Time

3.2.4, 3.7.4.1.1, 8.3.2, 10.3.2, 15.1.5

Concealed or Unknown Conditions, Claims for 3.7.4

Claims for Damages

3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.1.1, 11.3.5, 11.3.7, 14.1.3, 14.2.4, 15.1.6

Claims Subject to Arbitration

15.3.1, 15.4.1

Cleaning Up

3.15, 6.3

Commencement of the Work, Conditions Relating to

2.2.1, 3.2.2, 3.4.1, 3.7.1, 3.10.1, 3.12.6, 5.2.1, 5.2.3, 6.2.2, 8.1.2, 8.2.2, 8.3.1, 11.1, 11.3.1, 11.3.6, 11.4.1, 15.1.4

Commencement of the Work, Definition of

8.1.2

Communications Facilitating Contract

Administration

3.9.1, 4.2.4

Completion, Conditions Relating to

3.4.1, 3.11, 3.15, 4.2.2, 4.2.9, 8.2, 9.4.2, 9.8, 9.9.1, 9.10, 12.2, 13.7, 14.1.2

COMPLETION, PAYMENTS AND

9

Completion, Substantial

4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2, 13.7

Compliance with Laws

1.6.1, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 4.1.1, 9.6.4, 10.2.2, 11.1, 11.3, 13.1, 13.4, 13.5.1, 13.5.2, 13.6, 14.1.1,

14.2.1.3, 15.2.8, 15.4.2, 15.4.3

Concealed or Unknown Conditions

3.7.4, 4.2.8, 8.3.1, 10.3

Conditions of the Contract

1.1.1, 6.1.1, 6.1.4

Consent, Written

3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 11.3.1, 13.2, 13.4.2, 15.4.4.2

Consolidation or Joinder

15.4.4

CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

1.1.4, 6

Construction Change Directive, Definition of
7.3.1

Construction Change Directives

1.1.1, 3.4.2, 3.12.8, 4.2.8, 7.1.1, 7.1.2, 7.1.3, 7.3, 9.3.1.1

Construction Schedules, Contractor's

3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2

Contingent Assignment of Subcontracts

5.4, 14.2.2.2

Continuing Contract Performance

15.1.3

Contract, Definition of

1.1.2

CONTRACT, TERMINATION OR SUSPENSION OF THE

5.4.1.1, 11.3.9, 14

Contract Administration

3.1.3, 4, 9.4, 9.5

Contract Award and Execution, Conditions Relating to

3.7.1, 3.10, 5.2, 6.1, 11.1.3, 11.3.6, 11.4.1

Contract Documents, Copies Furnished and Use of

1.5.2, 2.2.5, 5.3

Contract Documents, Definition of

1.1.1

Contract Sum

3.7.4, 3.8, 5.2.3, 7.2, 7.3, 7.4, 9.1, 9.4.2, 9.5.1.4, 9.6.7, 9.7, 10.3.2, 11.3.1, 14.2.4, 14.3.2, 15.1.4, 15.2.5

Contract Sum, Definition of

9.1

Contract Time

3.7.4, 3.7.5, 3.10.2, 5.2.3, 7.2.1.3, 7.3.1, 7.3.5, 7.4, 8.1.1, 8.2.1, 8.3.1, 9.5.1, 9.7, 10.3.2, 12.1.1, 14.3.2, 15.1.5.1, 15.2.5

Contract Time, Definition of

8.1.1

CONTRACTOR

3

Contractor, Definition of

3.1, 6.1.2

Init.

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User Notes:

Contractor's Construction Schedules

3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2

Contractor's Employees

3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3, 11.1.1, 11.3.7, 14.1, 14.2.1.1,

Contractor's Liability Insurance

11.1

Contractor's Relationship with Separate Contractors and Owner's Forces

3.12.5, 3.14.2, 4.2.4, 6, 11.3.7, 12.1.2, 12.2.4

Contractor's Relationship with Subcontractors

1.2.2, 3.3.2, 3.18.1, 3.18.2, 5, 9.6.2, 9.6.7, 9.10.2, 11.3.1.2, 11.3.7, 11.3.8

Contractor's Relationship with the Architect

1.1.2, 1.5, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5, 3.7.4, 3.10, 3.11, 3.12, 3.16, 3.18, 4.1.3, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3.7, 12, 13.5, 15.1.2, 15.2.1

Contractor's Representations

3.2.1, 3.2.2, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.8.2

Contractor's Responsibility for Those Performing the Work

3.3.2, 3.18, 5.3.1, 6.1.3, 6.2, 9.5.1, 10.2.8

Contractor's Review of Contract Documents

3.2

Contractor's Right to Stop the Work

9.7

Contractor's Right to Terminate the Contract

14.1, 15.1.6

Contractor's Submittals

3.10, 3.11, 3.12.4, 4.2.7, 5.2.1, 5.2.3, 9.2, 9.3, 9.8.2, 9.8.3, 9.9.1, 9.10.2, 9.10.3, 11.1.3, 11.4.2

Contractor's Superintendent

3.9, 10.2.6

Contractor's Supervision and Construction

Procedures

1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.5, 7.3.7, 8.2, 10, 12, 14, 15.1.3

Contractual Liability Insurance

11.1.1.8, 11.2

Coordination and Correlation

1.2, 3.2.1, 3.3.1, 3.10, 3.12.6, 6.1.3, 6.2.1

Copies Furnished of Drawings and Specifications

1.5, 2.2.5, 3.11

Copyrights

1.5, **3.17**

Correction of Work

2.3, 2.4, 3.7.3, 9.4.2, 9.8.2, 9.8.3, 9.9.1, 12.1.2, **12.2**

Correlation and Intent of the Contract Documents

1.2

Cost, Definition of

7.3.7

Costs

2.4.1, 3.2.4, 3.7.3, 3.8.2, 3.15.2, 5.4.2, 6.1.1, 6.2.3, 7.3.3.3, 7.3.7, 7.3.8, 7.3.9, 9.10.2, 10.3.2, 10.3.6, 11.3, 12.1.2, 12.2.1, 12.2.4, 13.5, 14

Cutting and Patching

3.14, 6.2.5

Damage to Construction of Owner or Separate Contractors

3.14.2, 6.2.4, 10.2.1.2, 10.2.5, 10.4, 11.1.1, 11.3, 12.2.4

Damage to the Work

3.14.2, 9.9.1, 10.2.1.2, 10.2.5, 10.4.1, 11.3.1, 12.2.4

Damages, Claims for

3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.1.1, 11.3.5, 11.3.7, 14.1.3, 14.2.4, 15.1.6

Damages for Delay

6.1.1, 8.3.3, 9.5.1.6, 9.7, 10.3.2

Date of Commencement of the Work, Definition of

8.1.2

Date of Substantial Completion, Definition of

8.1.3

Day, Definition of

8.1.4

Decisions of the Architect

3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 15.2, 6.3, 7.3.7, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4, 9.5.1, 9.8.4, 9.9.1, 13.5.2, 14.2.2, 14.2.4, 15.1, 15.2

Decisions to Withhold Certification

9.4.1, **9.5**, 9.7, 14.1.1.3

Defective or Nonconforming Work, Acceptance, Rejection and Correction of

2.3.1, 2.4.1, 3.5, 4.2.6, 6.2.5, 9.5.1, 9.5.2, 9.6.6, 9.8.2, 9.9.3, 9.10.4, 12.2.1

Definitions

1.1, 2.1.1, 3.1.1, 3.5, 3.12.1, 3.12.2, 3.12.3, 4.1.1, 15.1.1, 5.1, 6.1.2, 7.2.1, 7.3.1, 8.1, 9.1, 9.8.1

Delays and Extensions of Time

3.2, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, **8.3**, 9.5.1, 9.7, 10.3.2, 10.4.1, 14.3.2, 15.1.5, 15.2.5

Disputes

6.3, 7.3.9, 15.1, 15.2

Documents and Samples at the Site

3.11

Drawings, Definition of

1.1.5

Drawings and Specifications, Use and Ownership of

3.11

Effective Date of Insurance

8.2.2, 11.1.2

Emergencies

10.4, 14.1.1.2, 15.1.4

Employees, Contractor's

3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3.3, 11.1.1, 11.3.7, 14.1, 14.2.1.1

Equipment, Labor, Materials or

1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13.1, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2

Execution and Progress of the Work
 1.1.3, 1.2.1, 1.2.2, 2.2.3, 2.2.5, 3.1, 3.3.1, 3.4.1, 3.5,
 3.7.1, 3.10.1, 3.12, 3.14, 4.2, 6.2.2, 7.1.3, 7.3.5, 8.2,
 9.5.1, 9.9.1, 10.2, 10.3, 12.2, 14.2, 14.3.1, 15.1.3
 Extensions of Time
 3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3, 7.4, 9.5.1, 9.7, 10.3.2,
 10.4.1, 14.3, 15.1.5, 15.2.5
Failure of Payment
 9.5.1.3, 9.7, 9.10.2, 13.6, 14.1.1.3, 14.2.1.2
 Faulty Work
 (See Defective or Nonconforming Work)
Final Completion and Final Payment
 4.2.1, 4.2.9, 9.8.2, 9.10, 11.1.2, 11.1.3, 11.3.1, 11.3.5,
 12.3.1, 14.2.4, 14.4.3
 Financial Arrangements, Owner's
 2.2.1, 13.2.2, 14.1.1.4
 Fire and Extended Coverage Insurance
 11.3.1.1
GENERAL PROVISIONS
1
Governing Law
13.1
 Guarantees (See Warranty)
Hazardous Materials
 10.2.4, 10.3
 Identification of Subcontractors and Suppliers
 5.2.1
Indemnification
 3.17, 3.18, 9.10.2, 10.3.3, 10.3.5, 10.3.6, 11.3.1.2,
 11.3.7
Information and Services Required of the Owner
 2.1.2, 2.2, 3.2.2, 3.12.4, 3.12.10, 6.1.3, 6.1.4, 6.2.5,
 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 11.4, 13.5.1,
 13.5.2, 14.1.1.4, 14.1.4, 15.1.3
Initial Decision
15.2
Initial Decision Maker, Definition of
 1.1.8
 Initial Decision Maker, Decisions
 14.2.2, 14.2.4, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5
 Initial Decision Maker, Extent of Authority
 14.2.2, 14.2.4, 15.1.3, 15.2.1, 15.2.2, 15.2.3, 15.2.4,
 15.2.5
Injury or Damage to Person or Property
10.2.8, 10.4.1
 Inspections
 3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3,
 9.9.2, 9.10.1, 12.2.1, 13.5
 Instructions to Bidders
 1.1.1
 Instructions to the Contractor
 3.2.4, 3.3.1, 3.8.1, 5.2.1, 7, 8.2.2, 12, 13.5.2
Instruments of Service, Definition of
1.1.7
 Insurance
 3.18.1, 6.1.1, 7.3.7, 9.3.2, 9.8.4, 9.9.1, 9.10.2, 11

Insurance, Boiler and Machinery
11.3.2
Insurance, Contractor's Liability
11.1
 Insurance, Effective Date of
 8.2.2, 11.1.2
Insurance, Loss of Use
11.3.3
Insurance, Owner's Liability
11.2
Insurance, Property
 10.2.5, 11.3
 Insurance, Stored Materials
 9.3.2
INSURANCE AND BONDS
11
 Insurance Companies, Consent to Partial Occupancy
 9.9.1
 Intent of the Contract Documents
 1.2.1, 4.2.7, 4.2.12, 4.2.13, 7.4
Interest
13.6
Interpretation
 1.2.3, 1.4, 4.1.1, 5.1, 6.1.2, 15.1.1
 Interpretations, Written
 4.2.11, 4.2.12, 15.1.4
 Judgment on Final Award
 15.4.2
Labor and Materials, Equipment
 1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1,
 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3, 9.5.1.3,
 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2
 Labor Disputes
 8.3.1
 Laws and Regulations
 1.5, 3.2.3, 3.6, 3.7, 3.12.10, 3.13.1, 4.1.1, 9.6.4, 9.9.1,
 10.2.2, 11.1.1, 11.3, 13.1.1, 13.4, 13.5.1, 13.5.2,
 13.6.1, 14, 15.2.8, 15.4
 Liens
 2.1.2, 9.3.3, 9.10.2, 9.10.4, 15.2.8
 Limitations, Statutes of
 12.2.5, 13.7, 15.4.1.1
 Limitations of Liability
 2.3.1, 3.2.2, 3.5, 3.12.10, 3.17, 3.18.1, 4.2.6, 4.2.7,
 4.2.12, 6.2.2, 9.4.2, 9.6.4, 9.6.7, 10.2.5, 10.3.3, 11.1.2,
 11.2, 11.3.7, 12.2.5, 13.4.2
 Limitations of Time
 2.1.2, 2.2, 2.4, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2.7,
 5.2, 5.3.1, 5.4.1, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3,
 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 11.1.3, 11.3.1.5,
 11.3.6, 11.3.10, 12.2, 13.5, 13.7, 14, 15
Loss of Use Insurance
11.3.3
 Material Suppliers
 1.5, 3.12.1, 4.2.4, 4.2.6, 5.2.1, 9.3, 9.4.2, 9.6, 9.10.5
Materials, Hazardous
 10.2.4, 10.3

Materials, Labor, Equipment and
 1.1.3, 1.1.6, 1.5.1, 3.4.1, 3.5, 3.8.2, 3.8.3, 3.12, 3.13.1,
 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3,
 9.5.1.3, 9.10.2, 10.2.1.2, 10.2.4, 14.2.1.1, 14.2.1.2

Means, Methods, Techniques, Sequences and
 Procedures of Construction
 3.3.1, 3.12.10, 4.2.2, 4.2.7, 9.4.2

Mechanic's Lien
 2.1.2, 15.2.8

Mediation
 8.3.1, 10.3.5, 10.3.6, 15.2.1, 15.2.5, 15.2.6, **15.3**,
 15.4.1

Minor Changes in the Work
 1.1.1, 3.12.8, 4.2.8, 7.1, 7.4

MISCELLANEOUS PROVISIONS
13

Modifications, Definition of
1.1.1
 Modifications to the Contract
 1.1.1, 1.1.2, 3.11, 4.1.2, 4.2.1, 5.2.3, 7, 8.3.1, 9.7,
 10.3.2, 11.3.1

Mutual Responsibility
6.2

Nonconforming Work, Acceptance of
 9.6.6, 9.9.3, **12.3**
 Nonconforming Work, Rejection and Correction of
 2.3.1, 2.4.1, 3.5, 4.2.6, 6.2.4, 9.5.1, 9.8.2, 9.9.3, 9.10.4,
 12.2.1

Notice
 2.2.1, 2.3.1, 2.4.1, 3.2.4, 3.3.1, 3.7.2, 3.12.9, 5.2.1, 9.7,
 9.10, 10.2.2, 11.1.3, 12.2.2.1, 13.3, 13.5.1, 13.5.2,
 14.1, 14.2, 15.2.8, 15.4.1

Notice, Written
 2.3.1, 2.4.1, 3.3.1, 3.9.2, 3.12.9, 3.12.10, 5.2.1, 9.7,
 9.10, 10.2.2, 10.3, 11.1.3, 11.3.6, 12.2.2.1, **13.3**, 14,
 15.2.8, 15.4.1

Notice of Claims
 3.7.4, 10.2.8, **15.1.2**, 15.4

Notice of Testing and Inspections
 13.5.1, 13.5.2

Observations, Contractor's
 3.2, 3.7.4

Occupancy
 2.2.2, 9.6.6, 9.8, 11.3.1.5

Orders, Written
 1.1.1, 2.3, 3.9.2, 7, 8.2.2, 11.3.9, 12.1, 12.2.2.1, 13.5.2,
 14.3.1

OWNER
2

Owner, Definition of
2.1.1

Owner, Information and Services Required of the
 2.1.2, **2.2**, 3.2.2, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.3.2,
 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 11.3, 13.5.1,
 13.5.2, 14.1.1.4, 14.1.4, 15.1.3

Owner's Authority
 1.5, 2.1.1, 2.3.1, 2.4.1, 3.4.2, 3.8.1, 3.12.10, 3.14.2,
 4.1.2, 4.1.3, 4.2.4, 4.2.9, 5.2.1, 5.2.4, 5.4.1, 6.1, 6.3,
 7.2.1, 7.3.1, 8.2.2, 8.3.1, 9.3.1, 9.3.2, 9.5.1, 9.6.4,
 9.9.1, 9.10.2, 10.3.2, 11.1.3, 11.3.3, 11.3.10, 12.2.2,
 12.3.1, 13.2.2, 14.3, 14.4, 15.2.7

Owner's Financial Capability
 2.2.1, 13.2.2, 14.1.1.4

Owner's Liability Insurance
11.2

Owner's Relationship with Subcontractors
 1.1.2, 5.2, 5.3, 5.4, 9.6.4, 9.10.2, 14.2.2

Owner's Right to Carry Out the Work
 2.4, 14.2.2

Owner's Right to Clean Up
6.3

Owner's Right to Perform Construction and to Award Separate Contracts
6.1

Owner's Right to Stop the Work
2.3
 Owner's Right to Suspend the Work
 14.3
 Owner's Right to Terminate the Contract
 14.2

Ownership and Use of Drawings, Specifications and Other Instruments of Service
 1.1.1, 1.1.6, 1.1.7, **1.5**, 2.2.5, 3.2.2, 3.11.1, 3.17,
 4.2.12, 5.3.1

Partial Occupancy or Use
 9.6.6, **9.9**, 11.3.1.5

Patching, Cutting and
3.14, 6.2.5

Patents
 3.17

Payment, Applications for
 4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5, 9.6.3, 9.7, 9.8.5, 9.10.1,
 14.2.3, 14.2.4, 14.4.3

Payment, Certificates for
 4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1,
 9.10.3, 13.7, 14.1.1.3, 14.2.4

Payment, Failure of
 9.5.1.3, **9.7**, 9.10.2, 13.6, 14.1.1.3, 14.2.1.2

Payment, Final
 4.2.1, 4.2.9, 9.8.2, 9.10, 11.1.2, 11.1.3, 11.4.1, 12.3.1,
 13.7, 14.2.4, 14.4.3

Payment Bond, Performance Bond and
 7.3.7.4, 9.6.7, 9.10.3, **11.4**

Payments, Progress
 9.3, **9.6**, 9.8.5, 9.10.3, 13.6, 14.2.3, 15.1.3

PAYMENTS AND COMPLETION
9

Payments to Subcontractors
 5.4.2, 9.5.1.3, 9.6.2, 9.6.3, 9.6.4, 9.6.7, 14.2.1.2

PCB
 10.3.1

Performance Bond and Payment Bond

7.3.7.4, 9.6.7, 9.10.3, 11.4

Permits, Fees, Notices and Compliance with Laws

2.2.2, 3.7, 3.13, 7.3.7.4, 10.2.2

PERSONS AND PROPERTY, PROTECTION OF 10

Polychlorinated Biphenyl

10.3.1

Product Data, Definition of

3.12.2

Product Data and Samples, Shop Drawings

3.11, 3.12, 4.2.7

Progress and Completion

4.2.2, 8.2, 9.8, 9.9.1, 14.1.4, 15.1.3

Progress Payments

9.3, 9.6, 9.8.5, 9.10.3, 13.6, 14.2.3, 15.1.3

Project, Definition of

1.1.4

Project Representatives

4.2.10

Property Insurance

10.2.5, 11.3

PROTECTION OF PERSONS AND PROPERTY 10

Regulations and Laws

1.5, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 4.1.1, 9.6.4, 9.9.1, 10.2.2, 11.1, 11.4, 13.1, 13.4, 13.5.1, 13.5.2, 13.6, 14, 15.2.8, 15.4

Rejection of Work

3.5, 4.2.6, 12.2.1

Releases and Waivers of Liens

9.10.2

Representations

3.2.1, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.4.2, 9.5.1, 9.8.2, 9.10.1

Representatives

2.1.1, 3.1.1, 3.9, 4.1.1, 4.2.1, 4.2.2, 4.2.10, 5.1.1, 5.1.2, 13.2.1

Responsibility for Those Performing the Work

3.3.2, 3.18, 4.2.3, 5.3.1, 6.1.3, 6.2, 6.3, 9.5.1, 10

Retainage

9.3.1, 9.6.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3

Review of Contract Documents and Field

Conditions by Contractor

3.2, 3.12.7, 6.1.3

Review of Contractor's Submittals by Owner and Architect

3.10.1, 3.10.2, 3.11, 3.12, 4.2, 5.2, 6.1.3, 9.2, 9.8.2

Review of Shop Drawings, Product Data and Samples by Contractor

3.12

Rights and Remedies

1.1.2, 2.3, 2.4, 3.5, 3.7.4, 3.15.2, 4.2.6, 5.3, 5.4, 6.1, 6.3, 7.3.1, 8.3, 9.5.1, 9.7, 10.2.5, 10.3, 12.2.2, 12.2.4, 13.4, 14, 15.4

Royalties, Patents and Copyrights

3.17

Rules and Notices for Arbitration

15.4.1

Safety of Persons and Property

10.2, 10.4

Safety Precautions and Programs

3.3.1, 4.2.2, 4.2.7, 5.3.1, 10.1, 10.2, 10.4

Samples, Definition of

3.12.3

Samples, Shop Drawings, Product Data and

3.11, 3.12, 4.2.7

Samples at the Site, Documents and

3.11

Schedule of Values

9.2, 9.3.1

Schedules, Construction

3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2

Separate Contracts and Contractors

1.1.4, 3.12.5, 3.14.2, 4.2.4, 4.2.7, 6, 8.3.1, 12.1.2

Shop Drawings, Definition of

3.12.1

Shop Drawings, Product Data and Samples

3.11, 3.12, 4.2.7

Site, Use of

3.13, 6.1.1, 6.2.1

Site Inspections

3.2.2, 3.3.3, 3.7.1, 3.7.4, 4.2, 9.4.2, 9.10.1, 13.5

Site Visits, Architect's

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.5

Special Inspections and Testing

4.2.6, 12.2.1, 13.5

Specifications, Definition of

1.1.6

Specifications

1.1.1, 1.1.6, 1.2.2, 1.5, 3.11, 3.12.10, 3.17, 4.2.14

Statute of Limitations

13.7, 15.4.1.1

Stopping the Work

2.3, 9.7, 10.3, 14.1

Stored Materials

6.2.1, 9.3.2, 10.2.1.2, 10.2.4

Subcontractor, Definition of

5.1.1

SUBCONTRACTORS

5

Subcontractors, Work by

1.2.2, 3.3.2, 3.12.1, 4.2.3, 5.2.3, 5.3, 5.4, 9.3.1.2, 9.6.7

Subcontractual Relations

5.3, 5.4, 9.3.1.2, 9.6, 9.10, 10.2.1, 14.1, 14.2.1

Submittals

3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 7.3.7, 9.2, 9.3, 9.8,

9.9.1, 9.10.2, 9.10.3, 11.1.3

Submittal Schedule

3.10.2, 3.12.5, 4.2.7

Subrogation, Waivers of

6.1.1, 11.3.7

Init.

Substantial Completion

4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2, 13.7

Substantial Completion, Definition of
9.8.1

Substitution of Subcontractors

5.2.3, 5.2.4

Substitution of Architect

4.1.3

Substitutions of Materials

3.4.2, 3.5, 7.3.8

Sub-subcontractor, Definition of**5.1.2**

Subsurface Conditions

3.7.4

Successors and Assigns**13.2****Superintendent**

3.9, 10.2.6

Supervision and Construction Procedures

1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.7, 8.2, 8.3.1, 9.4.2, 10, 12, 14, 15.1.3

Surety

5.4.1.2, 9.8.5, 9.10.2, 9.10.3, 14.2.2, 15.2.7

Surety, Consent of

9.10.2, 9.10.3

Surveys

2.2.3

Suspension by the Owner for Convenience**14.3**

Suspension of the Work

5.4.2, 14.3

Suspension or Termination of the Contract

5.4.1.1, 14

Taxes

3.6, 3.8.2.1, 7.3.7.4

Termination by the Contractor

14.1, 15.1.6

Termination by the Owner for Cause

5.4.1.1, 14.2, 15.1.6

Termination by the Owner for Convenience**14.4**

Termination of the Architect

4.1.3

Termination of the Contractor

14.2.2

TERMINATION OR SUSPENSION OF THE CONTRACT
14**Tests and Inspections**

3.1.3, 3.3.3, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 10.3.2, 11.4.1.1, 12.2.1, 13.5

TIME**8****Time, Delays and Extensions of**

3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, 8.3, 9.5.1, 9.7, 10.3.2, 10.4.1, 14.3.2, 15.1.5, 15.2.5

Time Limits

2.1.2, 2.2, 2.4, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2, 5.2, 5.3, 5.4, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 11.1.3, 12.2, 13.5, 13.7, 14, 15.1.2, 15.4

Time Limits on Claims

3.7.4, 10.2.8, 13.7, 15.1.2

Title to Work

9.3.2, 9.3.3

Transmission of Data in Digital Form**1.6****UNCOVERING AND CORRECTION OF WORK**
12**Uncovering of Work****12.1**

Unforeseen Conditions, Concealed or Unknown

3.7.4, 8.3.1, 10.3

Unit Prices

7.3.3.2, 7.3.4

Use of Documents

1.1.1, 1.5, 2.2.5, 3.12.6, 5.3

Use of Site

3.13, 6.1.1, 6.2.1

Values, Schedule of

9.2, 9.3.1

Waiver of Claims by the Architect

13.4.2

Waiver of Claims by the Contractor

9.10.5, 13.4.2, 15.1.6

Waiver of Claims by the Owner

9.9.3, 9.10.3, 9.10.4, 12.2.2.1, 13.4.2, 14.2.4, 15.1.6

Waiver of Consequential Damages

14.2.4, 15.1.6

Waiver of Liens

9.10.2, 9.10.4

Waivers of Subrogation

6.1.1, 11.3.7

Warranty

3.5, 4.2.9, 9.3.3, 9.8.4, 9.9.1, 9.10.4, 12.2.2, 13.7.1

Weather Delays

15.1.5.2

Work, Definition of**1.1.3**

Written Consent

1.5.2, 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 11.4.1, 13.2, 13.4.2, 15.4.4.2

Written Interpretations

4.2.11, 4.2.12

Written Notice

2.3, 2.4, 3.3.1, 3.9, 3.12.9, 3.12.10, 5.2.1, 8.2.2, 9.7, 9.10, 10.2.2, 10.3, 11.1.3, 12.2.2, 12.2.4, 13.3, 14, 15.4.1

Written Orders

1.1.1, 2.3, 3.9, 7, 8.2.2, 12.1, 12.2, 13.5.2, 14.3.1, 15.1.2

Init.

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.

Init.

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User Notes:

§ 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 the

Init.

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.

Init.

§ 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 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.

Init.

§ 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 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.

Init.

§ 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.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and

Init.

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.

§ 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 which would otherwise exist as to a party or person described in this Section 3.18.

Init.

§ 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.

§ 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.

Init.

§ 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.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the

Init.

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 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
- .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

Init.

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.

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.

Init.

§ 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.

§ 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

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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;
- .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.

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§ 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, 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.

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§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

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§ 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.

§ 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.

§ 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.

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§ 10.4 EMERGENCIES

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

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

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

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

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

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§ 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 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

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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 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.

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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.

§ 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.

§ 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

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such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract 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.

§ 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.

§ 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.

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§ 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 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.

Additions and Deletions Report for AIA[®] Document A201[™] – 2007

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PAGE 1

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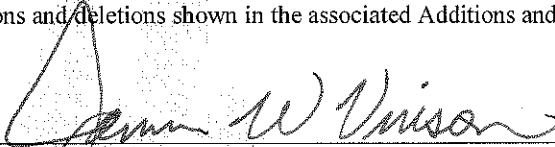
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I, JAMES W VINSON, AIA, CSI, CDT, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 09:12:19 on 08/24/2010 under Order No. 3861641932_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A201™ – 2007 - General Conditions of the Contract for Construction, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.



(Signed)

MDOT Architect

(Title)

August 30, 2010

(Dated)

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 performed 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

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.

**1.5 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

No supplementary conditions.

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

8.3.1 Change this Subparagraph to read as follows:

If the Contractor is delayed at any time in the commencement or progress of the Work by any act of neglect of the Owner or Project Engineer, or by any employee or either, or by changes ordered in the Work, or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or any causes beyond the Contractor's control, or by any other causes which the Project Engineer determines may justify the delay, then the Contract time may be extended by Change Order for such reasonable time as the Engineer may determine, subject to the Owner's approval. Any claim for loss or any delay occasioned by any separate Contractor, or Subcontractor, shall be settled between the Contractor and such other separate Contractor, or Subcontractors.

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.

.3 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

No supplementary conditions.

ARTICLE 15 CLAIMS AND DISPUTES

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.

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 at Kalem, Scott 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. Description "A": Maintenance Area Headquarters
 2. Description "B": Equipment Shed
- B. Time of Completion: The completion of this Work is to be on or before the time indicated on the Owner and Contractor Agreement.
- C. Contractor's Duties:
1. Except as specifically noted, provide and pay for:
 - a. Labor, materials, equipment.
 - b. Tools, construction equipment, and machinery.
 - c. Other facilities and services necessary for proper execution and completion of the Work.
 2. Pay legally required sales, consumer, use, payroll, privilege and other taxes.
 3. Secure and pay for, as necessary for proper execution and completion of Work, and as applicable at time of receipt of bids:
 - a. Permits
 - b. Government Fees
 - c. Licenses
 4. Give required notices.
 5. Comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities that bear on performance of Work.
 6. Promptly submit written notice to Project Engineer of observed variance of Contract Documents from legal requirements. Appropriate modifications to Contract Documents will adjust necessary changes. Assume responsibility for Work known to be contrary to such requirements, without notice.
 7. Enforce strict discipline and good order among employees. Do not employ on Work, unfit persons or persons not skilled in assigned task.
 8. Schedule of Values: Submit 8 copies to the MDOT Architectural Services Unit a Schedule of Values as described in Section 01 29 73 of these Specifications. This submittal will be recorded as submittal number one for this Project. When this submittal is approved, a copy will be transmitted to Construction Administration to be used to review and compare to amounts submitted on the CAD-720 form. Other copies will be kept by Architectural Services Unit and distributed to Project Engineer, MDOT Consultants, and Contractor.
 9. Sub-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
 3. 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 its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on Work by separate or other Contractors. Document 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 Maintenance Area Headquarters and Equipment Shed at Kalem on Highway 80 East in Scott County, Mississippi. The Contract Sum shall be full compensation for all site work, for furnishing all materials, and all other Work and effort of whatever nature in the construction of the buildings, installation of underground and other equipment, and final clean-up of the area. It shall also be complete compensation for all equipment, tools, labor, and incidentals necessary to complete the Work.

B. Payment will be made under:

- 1. DESCRIPTION "A":
MDOT Project No. BWO-5195-62(001) 502308
Maintenance Area Headquarters
at Kalem, Scott County lump sum
- 2. DESCRIPTION "B":
MDOT Project No. BWO-5196-62(001) 502308
Equipment Shed
at Kalem, Scott 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 7 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 7 copies of the Schedule of Values will be reviewed as Submittal #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 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, Contingency Allowance, 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" 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 (Not Used)

PART 3 - EXECUTION (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 diary to Project Engineer and MDOT Architect each Monday for previous week.
 - 4. Electrical: Take special care to coordinate and supervise the Work of electrical and other subcontractors.
 - 5. Communication: Establish lines of authority and communication at the job site.
 - 6. Location: The Project Coordinator (Superintendent) must be present on the job site at all times while work is in progress. Superintendent shall advise Project Engineer of an intended absence from the work and designate a person to be in charge of the Work during such absence.
 - 7. Permits: Assist in obtaining building and special permits required for construction.
- B. Interpretations of Contract Documents
 - 1. Consultation: Consult with Project Engineer to obtain interpretations.
 - 2. Assistance: Assist in resolution of 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 & 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. 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 7 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 & 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 Architect's action on Contractor's submittals, applications, and requests, is limited to 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 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 3.
- 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 29

TESTING LABORATORY SERVICES

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.
- B. Inspection, Sampling and Testing are required for:
 - 1. Section 31 23 12, Excavation, Fill and Grading.
 - 2. Section 03 20 00, Concrete Reinforcing.
 - 3. Section 03 30 00, Cast-In-Place Concrete.

1.02 LABORATORY'S DUTIES

- A. Materials will be inspected and sampled in accordance with current Mississippi Department of Transportation SOP pertaining to inspecting and sampling.
- B. Prepare reports of inspections and tests including:
 - 1. Date issued.
 - 2. Project title and number.
 - 3. Testing laboratory, name and address.
 - 4. Name and signature of inspector.
 - 5. Date of inspection or sampling.
 - 6. Record of temperature and weather.
 - 7. Date of test.
 - 8. Identification of product and Specification Section.
 - 9. Location of Project.
 - 10. Type 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. 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.
- B. Tabulate list by each Specification Section.
- C. 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.
- D. 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: _____

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.
- 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.
- 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 Owner'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 by 11 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 by 11 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, 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 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 SECTION INCLUDES

- A. All concrete formwork and other related items necessary to complete project indicated by Contract Documents unless specifically excluded.

1.02 RELATED ITEMS SPECIFIED ELSEWHERE

- A. Section 03 20 00 – Concrete Reinforcing.
- B. Section 03 30 00 – Cast-in-Place Concrete.

1.03 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Wood forms: 3/4 inch exterior grade plywood on studs and joists.
- B. Form Ties: Standard snap ties, 1-1/2 inch break-back.
- C. Form Oil: Approved non-staining type, "Noxcrete" or equal. Oil must not affect bonding of finishes on exposed concrete.

PART 3 - EXECUTION

3.01 FORM CONSTRUCTION

- A. Forms shall be properly aligned, adequately braced and mortar tight to produce concrete shapes required by Drawings. Align forms so that the actual surface does not vary from true surface more than 1/8 inch. The surface shall be clean, undamaged, and free of offsets and irregularities at joints. Adequately brace and frame to retain true shapes under vibration and placing strains without leaks, bowing, or deflection.
- B. Studs, girts, and walls shall not be less than 2 by 4's, S4S, construction of standard grade Douglas fir, or equal, selected for straightness. All walls shall consist of at least two 2 by 4's. Studs shall not be spaced more than 16 inches, girts not more than 24 inches and ties not more than 27 inches, on center.
- C. Lightly oil wood forms prior to placing reinforcing, and with oil not permitted on the reinforcing. Where oil form is used, remove excess before pouring concrete.
- D. Meet recommendations of "Recommended Practice for Concrete Form work" ACI 347 unless specified herein otherwise.

3.02 INSERTS AND FASTENING DEVICES FOR OTHER WORK

- A. Provide for installation of inserts, hangers, metal ties, anchors, bolts, dowels, nailing strips, grounds and other fastening devices required for attachment of other Work
- B. Locate partitions for other trades prior to pouring concrete in order that conduits, sleeves and inserts required by others will be installed in the proper locations
- C. Do not install sleeves in any concrete beams or piers except upon approval of the Project Engineer.
- D. Do not put aluminum conduits in concrete.

3.03 FORM REMOVAL

- A. Grade beam and column forms may be removed 24 hours after a pour is completed.
- B. Floor slab wood forms may be removed 10 days after pour, providing compressive strength has reached a minimum of 2500 psi based on job cast cylinders.

END OF SECTION

SECTION 03 20 00 CONCRETE REINFORCING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. All concrete reinforcing and the related items necessary to complete the Project indicated by the Contract Documents unless specifically excluded.

1.02 RELATED ITEMS SPECIFIED ELSEWHERE

- A. Section 03 10 00 – Concrete Forming and Accessories.
- B. Section 03 30 00 – Cast-in-Place Concrete.

1.03 SUBMITTALS

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

1.04 QUALITY ASSURANCE

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

1.05 DELIVERY, STORAGE, AND HANDLING

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

1.06 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.01 STEEL BAR REINFORCEMENT

- A. Bar reinforcement shall conform to ASTM A 615, grade 60, of domestic manufacture. Bars shall be new; free from rust, scale, oil, or other coatings that will prevent bond.

2.02 WELDED STEEL WIRE FABRIC

- A. Shall conform to ASTM A 185, new, free from rust and other coatings that will prevent bond.

2.03 ACCESSORIES

- A. Metal accessories as required shall support reinforcing bars and comply with ACI 315. Chairs and bolsters for use in exposed concrete shall have plastic coated or stainless steel legs or shall be plastic.

PART 3 - EXECUTION

3.01 INSTALLATION

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

END OF SECTION

SECTION 03 30 00 CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 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 provide testing as specified in Section 01 45 29 – Testing Laboratory Services. Cylinders, 3 specimens from each sample, are to be cast on the job in accordance with ASTM C 31. Specimens will be tested in accordance with ASTM C 39. One cylinder from each location will be tested at 7 days for information and the other two at 28 days for acceptance. Owner is to make at least one strength (average of two cylinders) for each class of concrete placed on any one day and an additional one strength test for each 100 cubic yards, or fractions thereof, of concrete placed in any one day. 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. Slump may be increased to 6 inches with an approved mid-range water reducer and up to 8 inches with an approved high-range water reducer.

2.02 CONCRETE MATERIALS

- A. Portland Cement: ASTM C-150, Type I.
- B. Water: From an approved source.
- C. Structural Concrete Aggregate: Nominal maximum aggregate size 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. Refer to Section 09 90 00 for Concrete Floor Stain and Sealer in main shop area and as scheduled on Drawings
 - C. Curing Compound: Clear bond, manufactured by Guardian Chemical Co., Kure-N-Seal, manufactured by 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, Master Builders; Sonnogrout, Sonneborn; Five Star Grout, U.S. Grout Company.
- 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 least 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 04 20 00 UNIT MASONRY

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Brick veneer masonry work as shown on the Drawings and schedules.

1.02 RELATED SECTIONS

- A. Section 09 05 15 – Color Design.

1.03 SUBMITTALS

- A. Submit product data, specifications and other data for each type of masonry unit and accessory required, including certification that each type complies with the specified requirement. Include instructions for handling, storage, installation, cleaning and protection of each. Indicate by transmittal that the Installer has received a copy of each instruction.

1.04 QUALITY ASSURANCE

- A. Fire-rated Masonry: Wherever a fire-resistance classification is shown or scheduled for unit masonry construction (4 hour, 3 hour, and similar designations), comply with the requirements for materials and installation established by the American Insurance Association and other governing authorities for the construction shown.
- B. Job Mock-up: Prior to installation of masonry work, erect sample wall panel mock-up materials, bond and joint tooling shown or specified for final Work. Provide special features as directed for caulking and contiguous work. Build mock-up at the site, where directed, of full thickness and approximately 4 feet by 3 feet unless otherwise shown, indicating the proposed range of color, texture and workmanship to be expected in the completed Work. Obtain MDOT Architect's acceptance of visual qualities of the mock-up before start of masonry work. Retain mock-up during construction as a standard for judging completed masonry work. Do not alter, move or destroy mock-up until Work is completed. Provide mock-up panel for each type of exposed unit masonry work.

1.05 PROJECT CONDITIONS

- A. Protect partially completed masonry against weather, when Work is not in progress, by covering top of walls with strong, waterproof, non-staining membrane. Extend membrane a minimum of 2 inches down both sides of walls and anchor securely in place.
- B. Protect masonry against freezing when the temperature of the surrounding air is 40 degrees F. and falling. Heat materials and provide temporary protection of completed portions of masonry work. Comply with the requirements of the governing code and with the "Construction and Protection Recommendations for Cold Weather Masonry Construction" of the Technical Notes on Brick and Tile Construction by the Brick Institute of America (BIA).

PART 2 - PRODUCTS

2.01 ACCEPTABLE BRICK MANUFACTURERS

- A. Equivalent products by the following manufacturers are acceptable:
 - 1. Boral Brick, Hattiesburg, Mississippi
 - 2. Columbus Brick, Columbus, Mississippi
 - 3. Old South Brick & Supply Company, Jackson, Mississippi
 - 4. Tri-State Brick & Tile Company, Inc., Jackson, Mississippi
- B. Substitutions shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures.

2.02 MASONRY UNITS

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

2.03 BRICK, GENERAL

- A. Unless otherwise shown or specified, provide modular size brick (7-5/8 inches long x 2-1/4 inches high x 3-3/4 inches wide) for exposed vertical brickwork. At Contractor's option, provide solid or cored brick for vertical brickwork. Do not use cored brick with net cross-sectional area less than 75 percent of gross area in the same plane or with core holes closer than 3/4 inch from any edge. Use solid brick in locations where the cores in cored bricks are exposed to view.
- B. Face Brick: Brick exposed to view, ASTM C 216, Grade SW for exterior exposures.
- C. Building (Common) Brick: Brick not exposed to view, ASTM C 62, Grade SW for exterior exposures and Grade MW for interior masonry which will be concealed by other work. Select from manufacturer's standard colors and textures.

2.04 MORTAR MATERIALS

- A. Mortar mixes shall comply with the requirements of ASTM C 270 Standard Specification for Mortar for Unit Masonry. Type S mortar shall be used for exterior Work. Type N mortar shall be used for interior Work. Mortar color for face brick shall be as selected by the Project Architect from manufacturer's standard colors. Mortar color for building (common) brick shall be natural color or white cement as required to produce the required standard mortar color.
- B. Portland Cement: ASTM C 150 Type I, except Type III may be used for cold weather protection.
- C. Hydrated Lime: ASTM C 207, Type S.
- D. Sand: ASTM C 144, except for joints less than 1/4 inches, use aggregate graded with 70 to 100 percent passing the No. 16 sieve.

2.05 MASONRY ACCESSORIES

- A. Provide adjustable wire ties conforming to ASTM A 82 Specification for Steel Wire, Plain, for Concrete Reinforcement. The wire shall be a minimum of W1.7, 9 gage. Plate portions of adjustable ties shall be a minimum of 14 gage in thickness. Plate portion shall conform to ASTM A 366 Standard Specification for Steel, Carbon, Cold-Rolled Sheet, Commercial Quality. All tie components shall be hot-dip galvanized after fabrication and shall conform to ASTM A 153 Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware, Class B-2.
- B. Anchoring Devices for Masonry: Provide straps, bars, bolts and rods fabricated from not less than 16 gage sheet metal or 3/8 inch diameter rod stock, unless otherwise indicated.
- C. Concrete Inserts for Masonry:
 - 1. Furnish dovetail shots with filler strips, where masonry abuts concrete. Fabricate from 24 gage galvanized steel unless otherwise indicated.
 - 2. For installation of concrete inserts, see concrete sections of these Specifications. Advise concrete installer of specific requirements regarding his placement of inserts, which are to be used, by the masonry installer for anchoring of masonry Work.
- D. Flashing for Brick Veneer Walls: Provide concealed flashing, shown to be built into masonry, as specified in Section 07650 - Flexible Flashing, unless otherwise indicated.

2.06 MASONRY MAT & WEEP VENTS

- A. Manufacturer and Type: Products equal to CavClear Masonry Mat and CavClear Weep Vents as manufactured by Archovations, Inc., PO Box 241, Hudson, WI 54016. Telephone (888) 436-2620.
 - 1. Description: Airspace maintenance and drainage system for masonry cavities to prevent mortar from making contact with the backup to ensure water management. The system shall be fluid conducting, non-absorbent, mold and mildew resistant polymer mesh consisting of 100 percent recycled polymer with PVC binder. Weep Vents shall have "M" notched bottom. Color to be selected by the MDOT Architect from full range of standard colors
 - 2. Mat Size: 1-1/4 inch thick by 16 inches high by 8 feet long.
 - 3. Weep Vent Size: 1/2 inch thick by 2-1/2 inches high by 3-1/2 inches wide.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Advanced Building Products, Inc., Springvale, ME. Tel: (800) 252-2306.
 - 2. Colbond Geosynthetics, Enka, NC. Tel. (800) 664-6638.
- C. Substitutions shall fully comply with specified requirements and Section 01630-Product Options and Substitution Procedures.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Masonry installer must examine the areas and conditions under which masonry is to be installed and notify the Project Engineer and 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 masonry installer.

3.02 INSTALLATION

- A. Build single-wythe walls to the actual thickness of the masonry units, using units of nominal thickness shown or specified.
- B. Build chases and recesses as shown and as required for the work of other trades. Provide not less than 8 inches of masonry between chase or recess and jamb of openings and between adjacent chases and recesses.
- C. Cut brick with motor-driving saw designed to cut masonry with clean, sharp, un-chipped edges. Cut units as required to provide pattern shown and to fit adjoining Work neatly. Use full units without cutting wherever possible.
- D. Wet brick having ASTM C67 absorption rates greater than 0.025 oz. per sq. inch per minute. Determine absorption by drawing a circle the size of a quarter on typical units and place 20 drops of water inside the circle. Wet brick units only if water is absorbed within 1-1/2 minutes. The units shall be wetted thoroughly 3 to 24 hours prior to their use so as to allow moisture to become distributed throughout the unit. The units shall be surface dry when laid.
- E. Frozen Materials and Work: Do not use frozen materials or materials mixed or coated with ice or frost. For masonry, which is specified to be wetted, comply with the BIA recommendations. Do not use calcium chloride in mortar or grout.
- F. Pattern Bond: Lay masonry work in a running bond unless indicated otherwise.
- G. Layout walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to properly locate openings, movement type joints, returns and offsets. Avoid the use of less-than half-size units at corner, jambs and wherever possible at other locations. Lay-up walls plumb and true and with courses level, accurately spaced and coordinated with other work.
- H. Stopping and Resuming Work: Rack back 1/2 masonry unit length in each course; do not tooth. Clean exposed surfaces of set masonry, wet units lightly (if specified to be wetted), and remove loose masonry units and mortar prior to laying fresh masonry.

3.03 MORTAR BEDDING AND JOINTING

- A. Mix mortar ingredients for a minimum of 5 minutes in a mechanical batch mixer. Use water clear and free of deleterious materials, which would impair the work. Do not use mortar, which has begun to set, or if more than 2-1/2 hours has elapsed since initial mixing. Re-temper mortar during 2-1/2 hour period as required restoring workability.

- B. Lay brick and other solid masonry units with COMPLETELY FILLED BED AND HEAD JOINT; butter ends with sufficient mortar to fill head joints and shove into place. DO NOT slush head joints.
- C. Joints: Maintain joints widths shown, except for minor variations required to maintain bond alignment. If not shown, lay walls with 3/8" joints. Cut joints flush for masonry walls that are to be concealed or to be covered by other materials. Tool exposed joints slightly concave. Rake out mortar in preparation for application of caulking or sealant where shown.
- D. Remove masonry units disturbed after laying; clean and relay in fresh mortar. Do not pound corners at jambs to fit stretcher units that have been set in position. If adjustments are required, remove units, clean off mortar, and reset in fresh mortar.

3.04 EXTERIOR BRICK VENEER WALLS

- A. Keep cavity clean of mortar droppings during construction. Strike joints facing cavity, flush.
- B. Tie exterior wythe to back-up with adjustable ties embedded in mortar joints at proper spacing, not more than 16 inches on center vertically and 24 inches on center horizontally. Fasten ties to wood frame with corrosion-resistant nails that penetrate the sheathing and are driven a minimum of 1-1/2 inches into the studs.
- C. Place Masonry Mat continuously full height in exterior masonry cavity prior to construction of exterior wythe; follow manufacturer's installation instructions. Install horizontally between wall ties or joint reinforcement. Stagger end joints in adjacent rows. Butt adjacent pieces to moderate contact. Fit to perimeter construction and penetrations without voids. Use multiple layers at bottom of wall and above through-wall flashings when air space depth exceeds masonry mat thickness by more than 3/8 inch. Extend extra mat at least to top of base flashing.
- D. Place Weep Vents in head joints at exterior wythe of cavity wall located immediately above ledges and flashing, spaced 24 inches on center, unless otherwise shown. Install with notched side down. Leave the side of the masonry units forming the vent space un-buttered and clear from mortar. Slide vent material into joint once the two masonry units forming the weep vent are in place. Install the Weep Vents as the wall is being erected so joints do not become filled with mortar or debris.

3.05 ANCHORING MASONRY WORK

- A. Provide anchoring devices of the type shown and as specified. If not shown or specified, provide standard type for facing and back-up involved. Anchor masonry to structural members where masonry abuts or faces such members to comply with the following:
 - 1. Provide an open space not less than 1/2 inch in width between masonry and structural member, unless otherwise shown. Keep open space free of mortar or other rigid materials.
 - 2. Anchor masonry to structural members with metal ties embedded in masonry joints and attached to structure. Provide anchors with flexible tie sections unless otherwise shown. Space anchors as shown, but not more than 24 inches on center horizontally.

3.06 LINTELS

- A. Install loose lintels of steel and other materials where shown.

3.07 CONTROL AND EXPANSION JOINTS

- A. Provide vertical expansion, control and isolation joints in masonry. Build-in related masonry accessory items as the masonry work progresses. Rake out mortar in preparation for application of caulking and sealants.
- B. Control Joint Spacing: If location of control joints is not shown, place vertical joints spaced not to exceed 25'-0" on center. Locate control joints at points of natural weakness in the masonry work.

3.08 FLASHING OF MASONRY WORK

- A. Provide concealed flashing in masonry work as shown. Prepare masonry surfaces smooth and free from projections, which might puncture flashing. Place through-wall flashing on bed of mortar and cover with mortar. Seal flashing penetrations with mastic before covering with mortar. Terminate flashing 1/2 inch from face of wall, unless otherwise shown. Extend flashing beyond edge of lintels and sills at least 4 inches and turn up edge on sides to form pan to direct moisture to exterior. Provide weep holes in the head joints of the first course of masonry immediately above concealed flashing, spaced 24 inches on center, unless otherwise shown.
- B. Install reglets and nailers for flashing and other related Work where shown to be built into masonry Work.

3.09 REPAIR, POINTING AND CLEANING

- A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged or if units do not match adjoining units as intended. Provide new units to match units and install with fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point up all joints at corners, openings and adjacent work to provide a neat uniform appearance, properly prepared for application of caulking or sealant compounds.
- C. Good workmanship and job housekeeping practices shall be used to minimize the need for cleaning the masonry. Clean exposed brick masonry surfaces as recommended by BIA Technical Notes 20 "Cleaning Clay Products Masonry" and masonry manufacturer. Clean exposed masonry by dry brushing at the end of each day's work and after final pointing to remove mortar spots and droppings. Protect the base of the wall from mud splashes and mortar droppings. Should additional cleaning be required apply chemical (MURIATIC ACID IS NOT ACCEPTABLE) or detergent cleaning solutions in accordance with the masonry and chemical manufacturers' recommendations.

END OF SECTION

SECTION 05 50 00 METAL FABRICATIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. The Work includes, but is not limited to, pipe railings, pipe bollards, steel lintels and miscellaneous framing & supports.

1.02 RELATED SECTIONS

- A. Section 09 05 15 – Color Design.
- B. Section 09 90 00 - Painting and Coating: Painting for all ferrous metal exposed to view.

1.03 SUBMITTALS

- A. Submit shop drawings for shop fabricated items. Indicate profiles, sizes, materials connection details, attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, with plans, elevations, and details where applicable.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Structural shapes shall be standard sections conforming to the American Society for Testing Materials Specification A-36. Punch and drill as necessary for work of others. Provide all bearing plates and all anchors, bolts, and etc. The Work shall be true and free of twists, bends and open joints between component parts. Materials shall be thoroughly straightened in the shop before laid off or worked in any way, care being used to avoid injury to the material.
- B. Gray cast iron shall conform to ASTM A48-83, class 30. All castings shall be of uniform quality, free from blowholes, shrinkage defects, swells, cracks or other defects. Castings shall be free of fins, burrs and slag.
- C. Expansion bolts shall be equal to Phillips Red Head or "cinch" bolts as manufactured by the National Lead Company. Hilti Fasteners, Rawlplug Company and Wej-it Corporation are acceptable manufacturers. Use toggle type bolts or similar for all anchorage into hollow construction.
- D. Bolt or weld connections: Provide necessary lugs and brackets for anchorage. Welding shall be in accordance with current "Code of Fusion, Welding and Gas Cutting in Building Construction, Part A - Structural Steel" issued by the American Welding Society, both for fabrication and erection. All welders shall have certification, as a result of tests prescribed by the American Welding Society.
- E. Detail metal Work for ample size, strength and stiffness and as indicated. Countersink and provide reinforcement where necessary; drill or punch holes for bolts and screws. At the proper time furnish the necessary templates, patterns and items of miscellaneous metal, such as sleeves, inserts and similar items to be built into adjoining Work.

- F. Fabricate metal Work with sharp lines and angles, with smooth true surfaces and clean edges. Form exposed joints to exclude water. Furnish certificates from manufacturers stating that materials comply with the specification requirements.
- G. Provide as necessary holes of proper number and spacing for the attachment of Work of other trades. Do not use cutting torch in field without permission of the Project Engineer.
- H. Anchor bolts, washers, nuts and clamps shall be furnished where indicated on the Drawings and where necessary for properly securing Work in place. All bolts and anchors used on the exterior of the building or built into exterior walls shall be cadmium plated. Miscellaneous angles and plates not indicated or specified otherwise shall not be less than 1/4 inch thick.
- I. Shop paint and field touch up shall be ICI Devflex 4020, Rustoleum 769, Tnemec 99, Southern Coatings 476, or approved equal. Shop coat shall be compatible with finish coats specified in Section 09 90 00 – Paints and Coatings.
- J. Fastenings shall be invisible where possible. Where exposed, screws, bolts, and the like shall be vandal-proof. All welded exposed joints on steel manufactured items; etc. shall be ground smooth and filled to receive paint.

2.02 METAL PRIMER

- A. Where materials come in contact with dissimilar materials which may cause harmful reaction, where exposed to moisture, or such as aluminum to cement mortar or concrete, the surface shall be protected by zinc chromate primer or approved paint.

2.03 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.

2.04 PIPE BOLLARDS

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

2.05 LOOSE LINTELS

- A. Provide loose galvanized steel lintels for openings and recesses in masonry walls and partitions. Weld adjoining members together to form a single unit where indicated. Provide a minimum of 8 inches bearing at each side of openings.

2.06 MISCELLANEOUS FRAMING AND SUPPORTS

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

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Perform cutting, drilling and fitting required for installation; set Work accurately in location, alignment and elevation measured from established lines and levels. Provide anchorage devices and fasteners where necessary for installation to other Work.
- B. Set loose items on cleaned bearing surfaces, using wedges or other adjustments as required. Solidly pack open spaces with bedding mortar, consisting of 2 part Portland Cement to 3 parts sand and only enough water for packing and hydration, or use commercial non-shrink grout material.
- C. Touch-up shop paint after installation. After cleaning field welds, bolted connections and abraded areas, apply same type paint as used in shop. Color to be selected from standard colors available. Use galvanizing repair paint on damaged galvanized surfaces.

END OF SECTION

SECTION 06 10 00 ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED SECTIONS

- A. Section 03 10 00 - Concrete Forming and Accessories.
- B. Section 06 40 00 - Architectural Woodwork.
- C. Section 08 71 00 - Door Hardware.

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 FRAMING LUMBER

- A. Where wood framing is shown or scheduled, provide lumber complying with grading rules which conform to the requirements of the "National Grading Rule for Dimension Lumber" of the American Lumber Standards Committee established under PS 20.
- B. For Light Framing: Standard Grade.
- C. For Structural Framing: (4 inches and wider and from 2 inches to 4 inches thick), provide the following: No. 1 Grade; Douglas Fir (WCLB or WWPA), Southern Pine (SPIB). Fb (minimum extreme fiber stress in bending); 1,250 psi. E (minimum modulus of elasticity); 1,700,000 psi.

2.03 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.

2.04 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.
- D. Plywood Subfloor: T&G panels shall be 3/4 inch thick and comply with APA-The Engineered Wood Association rated Sturd-I-Floor, Exposure 1.
- E. Particleboard: Particleboard shall be 1/2-inch thick and comply with Type PBU, ANSI standard A208.1
- F. Exterior Plywood: Exterior type, medium density, C Grade for concealed faces.
 - 1. Roof sheathing: 3/4 - inch thick.
 - 2. Wall sheathing: 1/2 - inch thick.

2.05 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.

2.06 FURRING CHANNELS

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

2.07 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.

2.08 FELT

- A. Refer to Section 07 26 00 – Vapor Retarders for weather-resistive barrier on exterior face of wall sheathing.

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. Fasten 6 inches on center along supported panel edges and 10 inches on center at intermediate supports.
- C. Plywood Sheathing: Panel ends and edges shall have spacing of 1/8 inch, unless otherwise indicated by the panel manufacturer. Nail 6 inches on center along supported panel edges and 10 inches on center at intermediate supports with 6d common nails for panels' 1/2 -inch thick and 8d nails for panels 3 /4 inch thick.
- D. Plywood Subfloor: Fasten to supporting members using combination of glue and wood screws. Mastic construction adhesives shall comply with the APA Glued Floor System and ASTM standard D3498, Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems (based on APA Specification AFG-01). Fasten screws at 6 inches on center along all edges and 10 inches on center at intermediate supports.
- E. Particleboard: Fasten to plywood subfloor using combination of glue and type A or AB, sheet metal, twin fast types and fully threaded designed for use in particleboard. Install in accordance with installation instructions of The Composite Panel Association.
- F. Furring Channels: Fasten to purlins using self-drilling, self-tapping screws, Spaced at 6 inches on center.

3.03 WOOD GROUND NAILERS, BLOCKING, AND SLEEPERS

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

3.04 WOOD FURRING

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

3.05 WOOD FRAMING

- A. Set wood framing accurately to required lines and levels. Provide framing members of sizes and on spacing shown, and frame openings as shown, or if not shown, comply with the recommendation of the "Manual for Housing Framing" of the National Forest Products Association. Cut, join, and tightly fit framing around other Work. Do not splice structural members between supports unless otherwise detailed.
- B. Anchor and nail as shown, or if not shown, to comply with the "Recommended Nailing Schedule - Table 1 of the "Manual of House Framing" and other recommendations of the N.F.P.A.

END OF SECTION

SECTION 06 17 53

SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Single plane, metal connected wood trusses fabricated from conventional dimensional lumber.
- B. Design and fabricate wood trusses where shown on the Drawing and as needed for a complete and proper installation.

1.02 REFERENCES

- A. The applicable portions of the current editions of the following standards are a part of these Specifications:
 - 1. National Design Specifications for Wood Construction published by the National Forest Products Association.
 - 2. Design Specifications for Metal Plate Connected Wood Trusses published by The Truss Plate Institute.
 - 3. American Society for Testing and Materials (ASTM).
 - a. ASTM A446 Grade A.
 - b. ASTM A525 Coating Destination G60.
 - 4. Timber Construction Manual published by American Institute of Timber Construction.

1.03 SUBMITTALS

- A. Shop Drawings: Submit shop drawings indicating all truss types, connections, framing members and accessories. SHOP DRAWINGS SHALL BEAR THE SEAL OF A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF MISSISSIPPI.

1.04 QUALITY ASSURANCE

- A. Provide the services of a structural engineer registered to practice in the State of Mississippi to design the wood trusses and applicable temporary and permanent bracing to sustain the indicated loads for the spans, profiles and arrangements needed to complete the Work.
- B. Comply with provisions of all applicable standards and codes and the 2009 International Building Code.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Trusses, if stored prior to erection, shall be stored in a vertical position and protected from the weather. Handle with care to avoid damage.
- B. Erect and install trusses in accordance with Truss Manufacturer's approved shop drawings and installation instructions.
- C. Temporary construction loads that cause member stresses beyond design limits are not permitted.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All truss members - No. 2 kiln dried Southern Yellow Pine having a maximum moisture content of 19 percent. Top and bottom chords members shall be 2 inches by 6 inches minimum.
- B. Dimensional joist and truss lumber shall have the following minimum properties, unless noted otherwise on the Drawings:
 - 1. Bending stress ----- 1,000 psi
 - 2. Horizontal shear stress ----- 80 psi
- C. Connector plates shall be a minimum thickness of 0.036 inches and shall be manufactured from steel meeting the requirements of ASTM A446 Grade A, and shall be hot dipped galvanized according to ASTM A525 Coating Designation G90.
- D. Hurricane clips shall be equal to 18 gage galvanized steel framing anchor Type TA-4as manufactured by Cleveland Steel Specialty Company or approved equal by Simpson Strong – Tie or USP Structural Connectors

2.02 DESIGN LOADS

- A. The dimensional wood roof framing shall be designed for the following loads, unless noted otherwise on the Drawings:
 - 1. Live load ----- 20 psf
 - 2. Top chord dead load ----- 10 psf
 - 3. Bottom chord bottom load ----- 10 psf

2.03 FABRICATION

- A. Trusses shall be manufactured by a company established to perform this Work. Manufacturing Company must have the Project Engineer's prior approval.
- B. Size, stress and arrangement shall be determined by dimensions indicated on the Drawings. Each truss shall be custom designed to fit the dimensions indicated on the Drawings. Complete design calculations showing internal layout, member forces, and stress control points are to be furnished for each truss design. DESIGN CALCULATIONS SHALL BEAR THE SEAL OF A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF MISSISSIPPI.

2.04 OTHER MATERIALS

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

PART 3 - EXECUTION

3.01 ACCEPTABLE INSTALLERS

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

3.02 EXAMINATION

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

3.03 PREPARATION

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

3.04 INSTALLATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the Work of those trades for interface with the Work of this Section.
- B. Install the Work of this Section in strict accordance with the original design, pertinent requirements of agencies having jurisdiction, the Truss Plate Institute, and manufacturer's recommended installation procedures. Anchor all components firmly into position.
- C. Hoist the trusses into position with proper bracing secured at designated lifting points. Exercise care to keep out-of-place bending of trusses to a minimum. Install temporary horizontal and cross bracing to hold trusses plumb and in safe condition until permanent bracing is installed. Install permanent bracing and related components prior to application of loads to trusses. Do not cut or remove any truss members
- D. Roof truss anchorage shall be by hurricane clips. Clips shall allow horizontal nailing into the top plates. Hurricane slip type truss anchors shall be provided at each corner and at every truss bearing point. Where an anchored truss bears on an intermediate point, a truss anchor shall be installed at that bearing point.
- E. Trusses to be set 24 inches on center maximum spacing.
- F. Brace temporary and permanently to sustain a vertical position under construction and design loads. Block eaves and ridges to provide straight alignment of trusses

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" = 1'-0". Large scale details shall be provided and drawn at a minimum scale of 3" = 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) K&V No. 255-256.
 6. Adjustable shelf hardware (back support) K&V No. 87-24 and No.187-16 for 16 inches deep shelves.
 7. Keyboard: Multi-Platform Articulating Keyboard Platform equal to Kensington Model KMW60067. Equivalent products by Fellows and Safco are acceptable.
 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 interior walls, exterior walls, and floors as shown on the Drawings and specified herein.
 - 1. Pneumatically blown dry into floor assemblies.
 - 2. 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/ft³.
 2. Thermal Resistance: The average thermal resistance per inch: 3.8 (R-Value/in).
 3. Flammability Characteristics: Critical Radiant Flux - greater than or equal to 0.12 watts/cm²; Smoldering Combustion - less than or equal to 15 percent.
 4. Moisture Vapor Sorption: This requirement assures that normal variations in relative humidity will not adversely affect thermal resistance. Cellulose insulation shall meet the requirements of less than 15 percent for maximum weight gain under the specified test conditions.
 5. Surface Burning Characteristics: Flame Spread – 15; Smoke Developed – 5.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions where building insulation is to be installed and notify the 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 Insulation: Cellulose insulation shall be pneumatically blown dry into floor assemblies after all mechanical, plumbing and electrical and other utility installations have been completed and in compliance with manufactures instructions.
- D. Nu-Wool WALLSEAL: Cellulose insulation shall be pneumatically sprayed with a controlled water fog for adhesion into open wall cavities after all mechanical, plumbing and 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 27 26

FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Materials and installation methods for fluid applied (fully adhered), vapor permeable air barrier membrane system located in the non-accessible part of the wall.
 - 2. Materials and installation methods to bridge and seal air leakage pathways in roof and foundation junctions, window and door openings, control and expansion joints, masonry ties, piping and other penetrations through the wall assembly.
- B. Related Sections include the following:
 - 1. Division 04 Section "Unit Masonry Assemblies" for embedded flashings.
 - 2. Division 06 Section "Rough Carpentry" for wall sheathings.
 - 3. Division 07 Section "Sheet Metal Flashing and Trim" for sheet metal flashings.
 - 4. Division 07 Section "Joint Sealants" for joint-sealant materials and installation.

1.02 DEFINITIONS

- A. ABAA: Air Barrier Association of America.
- B. Air Barrier Assembly: The collection of air barrier materials and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.03 PERFORMANCE REQUIREMENTS

- A. General: Air barrier shall be capable of performing as a continuous vapor-permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- B. The air barrier shall have the following characteristics:
 - 1. It must be continuous, with all joints made airtight.
 - 2. It shall have an air permeability not to exceed 0.004 cfm/sq. ft. under a pressure differential of 0.3 in. water. (1.57 psf.) (equal to 0.02L/sq. m @ 75 Pa.).
 - 3. It shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, and shall transfer the load to the structure. It shall not displace adjacent materials under full load.
 - 4. It shall be durable or maintainable.

5. The air barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between:
 - a. Foundation and walls.
 - b. Walls and windows or doors
 - c. Different wall systems.
 - d. Wall and roof.
 - e. Wall and roof over unconditioned space.
 - f. Walls, floor and roof across construction, control and expansion joints.
 - g. Walls, floors and roof to utility, pipe and duct penetrations.
6. All penetrations of the air barrier and paths of air infiltration/exfiltration shall be made airtight.

1.04 REFERENCES

- A. The following standards and publications are applicable to the extent referenced in the text. The most recent version of these standards is implied unless otherwise stated
- B. American Society for Testing and Materials (ASTM)
 1. C920 Specifications for Elastomeric Joint Sealants
 2. C1193 Guide for Use of Joint Sealants
 3. D412 Standard Test Methods for Rubber Properties in Tension
 4. D570 Test Method for Water Absorption of Plastics
 5. D1004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting
 6. D1876 Test Method for Peel Resistance of Adhesives
 7. D1938 Test Method for Tear Propagation Resistance of Plastic Film and Sheeting
 8. D1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
 9. D4258 Practice for Surface Cleaning Concrete for Coating
 10. D4263 Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
 11. E96 Test Methods for Water Vapor Transmission of Materials
 12. E154 Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
 13. E162 Test Method for Surface Flammability of Materials Using a Radiant Heat Source
 14. E1186 Practice for Air Leakage Site Detection in Building Envelopes and Air Retarder Systems
 15. E2178-01 Standard Test Method for Air Permeance of Building Materials
 16. E2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

1.05 SUBMITTAL

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of air barrier.
- B. Shop Drawings: Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
 1. Include details of interfaces with other materials that form part of air barrier.

- C. Product Certificates: For air barriers, certifying compatibility of air barrier and accessory materials with Project materials that connect to or that come in contact with the barrier; signed by product manufacturer.
 - D. Qualification Data: For Applicator.
 - E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for air barriers, submit certified test report showing compliance with requirements specified for ASTM E2178.
 - F. Warranty: Submit a sample warranty identifying the terms and conditions stated in Article 1.09.
- 1.06 QUALITY ASSURANCE
- A. Applicator Qualifications: A firm experienced in applying air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
 - B. Preinstallation Conference: Conduct conference at Project site.
 - 1. Include installers of other construction connecting to air barrier, including masonry, sealants, windows, and door frames.
 - 2. Review air barrier requirements including surface preparation, substrate condition and pretreatment, minimum substrate curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, sequence of installation, and protection and repairs.
- 1.07 DELIVERY, STORAGE, AND HANDLING
- A. Deliver materials and products in labeled packages. Store and handle in strict compliance with manufacturer's instructions, recommendations and material safety data sheets. Protect from damage from sunlight, weather, excessive temperatures and construction operations. Remove damaged material from the site and dispose of in accordance with applicable regulations.
 - B. Do not double-stack pallets of fluid applied membrane components on the job site. Provide cover on top and all sides, allowing for adequate ventilation.
 - C. Protect fluid-applied membrane components from freezing and extreme heat.
 - D. Sequence deliveries to avoid delays, but minimize on-site storage.
- 1.08 PROJECT CONDITIONS
- A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air barrier manufacturer. Protect substrates from environmental conditions that affect performance of air barrier. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

1.09 WARRANTY

- A. Material Warranty: Manufacturer's standard form in which manufacturer agrees to replace fluid-applied air barrier membrane materials that fail within specified warranty period when installed and used in strict conformance with written manufacturer's instructions.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to maintain air permeance rating not to exceed 0.02 L/s/sq. m. when tested per ASTM E2178, within specified warranty period.
 - b. Failure to maintain a vapor permeance rating greater than 10 perms when tested in accordance with ATM E96, Me
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 FLUID-APPLIED, VAPOR PERMEABLE MEMBRANE AIR BARRIER

- A. Fluid-Applied, Vapor-Permeable Membrane Air Barrier: Single Component Acrylic membrane.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Single Component Acrylic Membrane:
 - 1) Henry Company; Air-Bloc 31.
 - 2) Grace Construction Products; Perm-A-Barrier VP (Basis-of-Design)
 - 2. Physical and Performance Properties:
 - a. Membrane Air Permeance: Not to exceed 0.0004 cfm/sq. ft. of surface area (at specified thickness) at 1.57-lbf/sq. ft. pressure difference (0.002 L/s x sq. m of surface area at 75-Pa) when applied to CMU wall; when tested per ASTM E2178.
 - b. Membrane Vapor Permeance: Not less than 11.2 perms (649.6 ng/Pa x s x sq. m); when tested per ASTM E96.
 - c. UV Exposure Limit: Not more than 180 calendar days; per ASTM D412 and ASTM E96-Method B.

2.02 AUXILIARY MATERIALS

- A. General: Auxiliary materials recommended by air barrier manufacturer for intended use and compatible with air barrier membrane. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- B. Liquid Membrane for Details and Terminations: Provide Bituthene Liquid Membrane as manufactured by Grace Construction Products.
- C. Wall Primer (for Use with Throughwall Flashing and Tapes Applied to Substrate): Liquid waterborne primer recommended for substrate by manufacturer of air barrier material.
 - 1. Flash Point: No flash to boiling point.
 - 2. Solvent Type: Water.
 - 3. VOC Content: Not to exceed 10 g/l.
 - 4. Application Temperature: 25 degrees F and above.
 - 5. Freezing point (as packaged): 21 degrees F.

6. Product: Perm-A-Barrier WB Primer manufactured by Grace Construction Products.
- D. Flexible Membrane Wall Flashing: 0.8 mm (32 mils) of self-adhesive rubberized asphalt integrally bonded to 0.2 mm (8 mil) of cross-laminated, high-density polyethylene film to provide a min. 1.0 mm (40 mil) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed, conforming with the following:
1. Water Vapor Transmission: ASTM E96, Method B: 2.9 ng/m²sPa (0.05 perms) max.
 2. Water Absorption: ASTM D570: max. 0.1 percent by weight
 3. Puncture Resistance: ASTM E154: 356 N (80 lbs.) min.
 4. Tear Resistance
 - a. Initiation ASTM D1004: min. 58 N (13.0 lbs.) M.D.
 - b. Propagation ASTM D1938: min. 40 N (9.0 lbs.) M.D.
 5. Lap Adhesion at -4°C (25°F): ASTM D1876: 880 N/m (5.0 lbs./in.) of width.
 6. Low Temperature Flexibility ASTM D1970: Unaffected to -43°C (-45°F)
 7. Tensile Strength: ASTM D412, Die C Modified: min. 5.5 MPa (800 psi)
 8. Elongation, Ultimate Failure of Rubberized Asphalt: ASTM D412, Die C: min. 200 percent.
 9. Product: Perm-A-Barrier Wall Flashing manufactured by Grace Construction Products.
- E. Joint Reinforcing Strip: Air barrier manufacturer's approved tape.
- F. Transition Tape: 0.9 mm (36 mils) of self-adhesive rubberized asphalt integrally bonded to 0.1 mm (4 mil) of cross-laminated, high-density polyethylene film to provide a min. 1.0 mm (40 mil) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed, conforming with the following:
1. Water Vapor Transmission: ASTM E96, Method B: 2.9 ng/m²sPa (0.05 perms) max.
 2. Water Absorption: ASTM D570: max. 0.1% by weight
 3. Puncture Resistance: ASTM E154: 356 N (80 lbs.) min.
 4. Tear Resistance
 - a. Initiation ASTM D1004: min. 58 N (13.0 lbs.) M.D.
 - b. Propagation ASTM D1938: min. 40 N (9.0 lbs.) M.D.
 5. Lap Adhesion at -4°C (25°F): ASTM D1876: 880 N/m (5.0 lbs./in.) of width
 6. Low Temperature Flexibility ASTM D1970: Unaffected to -43°C (-45°F)
 7. Tensile Strength: ASTM D412, Die C Modified: min. 5.5 MPa (800 psi)
 8. Elongation, Ultimate Failure of Rubberized Asphalt: ASTM D412, Die C: min. 200%.
 9. Product: Perm-A-Barrier Detail Membrane or Perm-A-Barrier Aluminum Flashing manufactured by Grace Construction Products.
- G. Substrate Patching Membrane: Manufacturer's standard trowel-grade substrate filler.
- H. Sprayed Polyurethane Foam Sealant: 1- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft density; flame spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.
- I. Joint Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low-modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O. Comply with Division 7 Section "Joint Sealants."

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
 - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 SURFACE PREPARATION

- A. Refer to manufacturer's literature for requirements for preparation of substrates. Surfaces shall be sound and free of voids, and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, and debris. Use repair materials and methods that are acceptable to manufacturer of the fluid-applied air barrier system.
- B. Exterior sheathing panels: Ensure that the boards are sufficiently stabilized with corners and edges fastened with appropriate screws. Pre-treat all board joints with 50 - 75mm (2-3 in.) wide, manufacturer's recommended self-adhesive tape. Gaps greater than 6mm (1/4 in.) should be filled with mastic or caulk, allowing sufficient time to fully cure before application of the tape and fluid applied air barrier system. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- C. Related Materials: Treat construction joints and install flashing as recommended by manufacturer.
- D. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application
- E. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- F. At changes in substrate plane, apply sealant or Bituthene Liquid Membrane at sharp corners and edges to form a smooth transition from one plane to another.
- G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.03 JOINT TREATMENT

- A. Plywood Sheathing: Fill joints greater than 1/4 inch with sealant according to ASTM C 1193 and with air barrier manufacturer's written instructions. Apply first layer of fluid air barrier membrane at joints. Tape joints with joint reinforcing strip after first layer is dry. Apply a second layer of fluid air barrier membrane over joint reinforcing strip.

3.04 AIR BARRIER MEMBRANE INSTALLATION

- A. Apply air barrier membrane to achieve a continuous air barrier according to air barrier manufacturer's written instructions.
- B. Apply air barrier membrane within manufacturer's recommended application temperature ranges.
- C. Apply a continuous unbroken air barrier to substrates according to the following minimum thickness. Apply membrane in full contact around protrusions such as masonry ties.
 - 1. Vapor-Permeable Membrane Air Barrier: 90-mil wet film thickness, 45-mil dry film thickness.
- D. Do not cover air barrier until it has been inspected by Project Engineer/ MDOT Architect.
- E. Fill correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.

3.05 TRANSITION STRIP INSTALLATION

- A. Install strips, transition strips, and auxiliary materials according to air barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.
- B. Apply primer to substrates to receive transition tapes at required rate and allow to dry. Limit priming to areas that will be covered by transition tape in same day. Reprime areas exposed for more than 24 hours.
- C. Connect and seal exterior wall air barrier membrane continuously to exterior glazing and window systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.
- D. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- E. Apply joint sealants forming part of air barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. Wall Openings: Prime concealed perimeter frame surfaces of windows, storefronts, and doors. Apply transition strip so that a minimum of 3 inches of coverage is achieved over both substrates. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.
 - 1. Transition Strip: Roll firmly to enhance adhesion.

3.06 CLEANING AND PROTECTION

- A. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
 - 1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. Remove and replace air barrier exposed for more than 180 days.
- B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.
- C. Remove masking materials after installation.

END OF SECTION

SECTION 07 56 13

HIGH-PERFORMANCE ROOF AND WALL COATING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
1. Materials and installation methods for a polyurethane metallic pigmented coating used to seal existing rusted areas / surfaces.
 2. Materials and installation methods for a water-borne coating used to cover existing metal roofing that must have a flexible base coat to fill and seal before a topcoat is applied.
 3. Materials and installation methods for a water-based, high-performance top coating.

1.02 DESCRIPTION

- A. Rust Grip® is a one-part polyurethane metallic pigmented coating containing 51.3 percent solids by volume. It is designed to seal rusted surfaces.
- A. Super Base H/S (high-solids) is a one-part, water-based acrylic coating that is easily applied without environmental concerns. It is designed to have the ability to fill and seal surface and act as a basecoat to Super Therm®.
- B. Super Threm® is a water-based, high-performance coating which exhibits strength and toughness while providing a unique protection from heat radiation. Using a combination of low-density ceramics in an industrial grade resin system, Super Therm® also guards against corrosion while providing mold and mildew, and vapor and moisture resistance.

1.03 PERFORMANCE REQUIREMENTS (SUPER THREM®)

- A. American Society of Testing and Materials (ASTM):
1. ASTM B-117 / D-1654; Salt Spray (Fog); Results; Passed 450 Hours.
 2. ASTM C-411; High-Temperature Surface Performance; Results; no warping, cracking, delamination, or color change.
 3. ASTM C-1371; Emissivity; Results; 0.91 percent.
 4. ASTM C-1371; Reflectivity; Results; 0.85 percent.
 5. ASTM D-412; Tensile Strength; Results; 444 psi.
 6. ASTM D-522; Mandrel Bend; Results; 1 inch (25mm) bend, 1/4 inch (6mm) bend.
 7. ASTM D-1653; Water Vapor Permeability; Results; Passed.
 8. ASTM D 3273-82T / D 3274; Fungal Resistance; Results; Passed.
 9. ASTM D-4060; Abrasion Resistance (Taber test); Results; 0.06g.
 10. ASTM D-6904; Resistance to Wind Driven Rain for Exterior Coatings (Fed Spec TT-C-555B)
 11. ASTM D-7088; Resistance to Hydrostatic Pressure for Coatings (Fed Spec TT-C-555B)
 12. ASTM E-84 (NFPA 255); Flame Spread / Smoke Developed; Results; Class "A" Rating.
 13. ASTM E 84-89; Flame Spread / Smoke Developed; Results; Flame Index "0", Smoke Index "0".
 14. ASTM E-96; Water Vapor Transmission; Results; Less than .01

Note: All tests run in triplicate. Above values are the average results.

1.04 SUBMITTALS

A. Manufacturer's current product data sheet which includes the following information:

1. Generic type of coating.
2. Performance data with certified test reports.
3. Recommended dry film thickness.
4. Application instructions.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. All work shall be performed by skilled craftsmen qualified to perform the required work in a manner comparable with the best standards of practice and shall be an approved / certified applicator of the manufacturer of the coating.
2. Continuity of personnel shall be maintained and transfers of key personnel shall be coordinated with the Architect.
3. The Contractor shall provide a supervisor/superintendent at the work site during the cleaning and application operation.
4. The supervisor/superintendent shall have the authority to sign change orders, coordinate work and make decisions pertaining to the fulfillment of the contract.
5. The manufacturer of the coatings may have a factory representative on site if desired by the factory.

1.06 HANDLING, STORAGE AND SAFETY

- A. Materials delivered to job-site shall be in original sealed and labeled containers of the coating manufacturer.
- B. Coatings shall be stored in facilities designed for the purpose of coating storage and mixing. Storage areas shall be located away from open flames, be well ventilated, and be capable of maintaining ambient storage temperature as recommended by the coating manufacturer.
- C. Coatings, reducing agents, and other solvents must be stored in original containers until opened. If not re-sealable, then they must be transferred to UL approved safety containers.
- D. Provide proper ventilation, personal protection and fire protection for storage before, during and after application.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Coatings shall be applied during good weather.
- B. Surface temperature shall be at least 5 degrees F above dew point.
- C. Air and surface temperatures shall be within limits prescribed by the manufacturer for the coating being applied and work areas shall be reasonable free of airborne dust at the time of application and while coating is drying.

1.08 WARRANTY

- A. Submit a specimen of the Manufacturer's ten-year roofing warranty.
 - 1. Applicator must be certified by the Manufacturer.
 - 2. Applicator shall comply with the Manufacturer's warranty procedures and requirements.
 - 3. Applicator shall provide a copy of the project drawings, plus photographs which include descriptions of the project and all unusual details, with the form. Before, during, and after photos shall be submitted with project profile to the Manufacturer at the end of the project prior to issuance of warranty.
 - 4. Completed warranty registration forms must be returned to the Manufacturer's Warranty Department with appropriate signatures of the contractor and building owner no later than 15 days after completion of the project.
 - 5. A Representative of the Manufacturer will inspect the project upon completion and within 6 months after completion. All defective work shall be repaired in accordance with this specification and to the satisfaction of the Manufacturer/Architect/Owner.
 - 6. Applicator shall provide warranty inspections throughout the duration of the warranty period.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on coatings manufactured by Superior Products International II, Inc., Shawnee, Kansas. Tel. (913) 962-4848.
- B. 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 MATERIALS (RUST GRIP®)

- A. Rust Repair Coating: The coating utilized shall be Rust Grip®, which is a one-part polyurethane metallic pigmented coating containing 51.3 percent solids by volume. Comply with manufacturer's recommended technical data for other requirements.

2.03 MATERIALS (SUPER BASE H/S)

- A. Colors, where not specified, shall be "light blue" for the elastomeric coating of SUPER BASE H / S. Coatings may be color tinted by the Manufacturer. Architect will select colors from manufacture's complete range of available colors.
- B. Roof: The coating utilized shall be Super Base H / S, which is a water based, elastomeric coating containing 61.58 percent solids by volume. Film thickness must be a minimum of 10.0 mils dry film thickness applied at 100 sq. ft. per gallon. Check and comply with manufacturer's recommended technical data sheets for adjustments or other requirements to compensate for porosity and other surface adjustments.
- C. All materials are to be lead and chromate free.

2.04 MATERIALS (SUPER THERM®)

- A. Colors, where not specified, shall be "White." Coatings may be color tinted by the Manufacturer. MDOT Architect will select colors from manufacture's complete range of available colors
- B. Roof: The coating utilized shall be Super Therm®, which is a water based, ceramic coating containing 68 percent solids by volume. Film thickness must be 10.0 mils dry film thickness. Comply with manufacturer's recommended technical data for other requirements.
- C. Fuel Tanks and Pump Pedestals at Fuel Station: Same coating as described above.
- D. All materials are to be lead and chromate free.

2.05 EQUIPMENT

- A. The applicator's coating equipment shall be designed for application of materials specified and shall be maintained in first class working condition. Equipment shall be subject to approval of the Project Engineer/MDOT Architect.
 - 1. Recommended spray equipment is airless sprayer (3,000 psi or less) with carbon steel or titanium tip sized between .029 and .032
- B. In accordance with requirements set forth by regulatory agencies applicable to the construction industry, the manufacturer's printed instructions and appropriate technical bulletins, the contractor shall provide and require use of protective life-saving equipment for persons working in or around the project site.
- C. Equipment shall include protective helmets which shall be worn by all persons while in the vicinity of the work.
- D. Where ventilation is used to control hazardous exposure, all equipment shall be explosion-proof. Ventilation shall reduce the concentration of air contaminants to the degree that a hazard does not exist.
- E. Wherever the occupational noise, exposure exceeds State and Federal maximum allowable sound levels, the contractor shall provide and require the use of approved ear protective devices.
- F. Temporary ladders and scaffolding shall conform to applicable safety requirements. They shall be erected where requested by the Project Engineer / MDOT Architect to facilitate inspection and be moved by the contractor to locations requested by the Project Engineer / MDOT Architect.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine surfaces scheduled to be coated prior to commencing work.
- B. Report in writing to the Owner's representative any condition that may affect proper application and overall performance of the coating system.
- C. Do not proceed with work until such conditions have been corrected.
- D. Commencing with work indicates acceptance of existing conditions and responsibility for performance of applied coating.

3.02 SURFACE PREPARATION

A. General:

1. Comply with manufacturer's written instructions and recommendations applicable to substrates and paint systems indicated.
2. Material applied prior to approval of the surface by the Architect shall be removed and reapplied to the satisfaction of the Architect at the expense of the Contractor.
3. Dust, dirt, oil, grease or any foreign matter that will affect the adhesion or durability of the coating shall be removed by washing with citrus cleaner. Surface must be complete dry and clean.
4. Surface preparation and repairs shall be approved by the Architect/Owner before primer is applied.

B. Present Surface Conditions:

1. Remove all dirt, oil, tar, grease, or contaminants using citrus cleaner.
2. Unsound surface materials shall be repaired or replaced prior to coating application.
3. Repair holes and open seams prior to coating application.

C. Dirt, Oil, Tar, Grease, and Contaminants Removal:

1. Power wash surface (3,500 psi) with citrus cleaner to remove all dirt, oil, tar, grease, or contaminants and previous coatings not tightly bonded.
2. When surface is clean, rinse well with water. Surface must be completely dry and clean.

3.03 MIXING INSTRUCTIONS

- A. Prior to application Super Base H/S and Super Therm[®] shall be mixed mechanically or by hand for three minutes.
- B. Super Base H / S and Super Therm[®] should not be diluted or thinned. Water should not normally be mixed with Super Base H / S and Super Therm[®]. However, if coating becomes dry in pail, then add small amount of water, remix, and continue application.
- C. Colors (if required) shall be mixed by the manufacturer.

3.04 APPLICATION INSTRUCTIONS

- A. Super Base H / S and Super Therm[®] can be applied by brush, roller, or airless sprayer.
 1. If application is by brush, use a soft or medium bristle brush. Two coats will be required to achieve the desired thickness when using a brush.
 2. If application is by roller, use a 3/4 inch nap roller. Two coats will be required to achieve the desired thicknesses when using a roller.
 3. If application is by spray, use a standard airless sprayer (3,000 psi or less) with a carbon steel or titanium tip sized between .029 and .032.
 4. Remove filters from the gun handle and spray machine prior to application as they will trap the ceramics.
- B. Super Base H / S and Super Therm[®] shall be applied at no less than at total of 16 mils wet / 10 mils dry (100 sq / ft per gallon).
- C. Super Base H / S must be totally dry before it has exposure to rain. Top-coat as soon as possible with Super Therm[®].

- D. If Super Therm® is applied during a period of high humidity or if there is rain after application, bubbles may appear on the surface. Do not puncture the bubbles. This is normal and the coating will continue to cure with no effect on the performance or appearance of the coating. Bubbles will disappear without a trace or imprint.

3.05 INSPECTION

- A. After application of each coating in the specified system and its surface has cured, measure its thickness with a properly calibrated Nordson Microtest Dry Film Thickness Gauge, or equivalent. (Use an instrument such as a Tooke gauge if a destructive tester is deemed necessary). Follow standard method for measurement of dry paint thickness. The Project Engineer / MDOT Architect shall, at his discretion, use the contractor's or his own equipment to perform similar inspections.
- B. Make as many determinations as needed to ensure the specified thickness are achieved. The contractor shall apply additional coat(s), at no extra cost to the Owner, to all surfaces having less dry film thickness than specified until the specified thickness is achieved.
- C. The coating applicator shall permit the Owner's representative and/or coatings manufacturer (as requested by Owner) to inspect his work for conformance to this specification. Owner reserves the right to reject all work which does not comply with this specification.

3.06 CLEAN UP

- A. Upon completion, clean up and remove from site all surplus materials, tools, appliance, empty cans, cartons and rubbish which result from painting work. Site shall be left in a neat and orderly condition.
- B. Remove all protective drop clothes and masking from surfaces not being coated. Provide touch-up around same areas as directed by Owner's representative.
- C. Remove all splatters and drippings.
- D. Upon completion of the work, all staging, scaffolding and containers shall be removed from the site or destroyed in a manner approved by the Project Engineer/MDOT Architect.
- E. Keep the area of work in a clean condition and do not permit cleaning materials to accumulate as to constitute a nuisance or hazard to the execution of the work or the operation of the existing facilities.

3.07 PROTECTION

- A. Diligence shall be taken to ensure that vehicles, equipment, fixtures, miscellaneous hardware, etc. are protected against coating spillage, over-spray, etc.
- B. Surfaces not to be coated will be marked, removed, or otherwise covered to protect against cleaning and coating application procedures and weather. Such damages shall be corrected at no expense to the Owner. Finished surfaces shall be free from defects or blemishes.
- C. Protective coverings or drop clothes shall be used to protect floors, fixtures, and equipment.
- D. Surfaces, from which materials cannot be removed satisfactorily, shall be repainted as required to produce a finish satisfactory to the Project Engineer/MDOT Architect.

END OF SECTION

SECTION 07 61 00

SHEET METAL ROOFING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section includes factory formed, prefinished standing seam metal roof panels with concealed fasteners and related accessories, valleys, hips, ridges, eaves, corners, rakes, miscellaneous flashing, gutters, downspouts, underlayment and attaching devices as shown and / or required for a complete weathertight metal roofing system.

1.02 RELATED SECTIONS

- A. Section 09 05 15 – Color Design.

1.03 REFERENCES

- A. ASTM A-525 General Requirements for Steel Sheet, Zinc-Coated (Galvanized).
- B. ASTM A-653 Steel Sheet, Zinc-Coated (Galvanized) by Hot Dip Process, Structural Physical Quality.
- C. ASTM E-1646: Static Water Infiltration.
- D. ASTM E-1680: Static Air Infiltration.
- E. Spec Data Sheet - Galvalume Sheet Metal by Bethlehem Corp.
- F. SMACNA - Architectural Sheet Metal Manual.
- G. UL 90 Rating (minimum) : Wind Uplift Approval Conforming to Underwriters Lab. (UL) Section 580 Specifications and Complying with 2009 International Building Code requirements and local codes, whichever are more stringent.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data and installation instructions for each type of roofing material and accessory required.
- B. SHOP Drawings: Submit detailed drawings showing layout of panels and fasteners, anchoring details, joint details, trim, flashing, and accessories. Show details of weatherproofing terminations, and penetrations of metal work. Indicate material type, Thickness, finish and color.
- C. Samples: Submit a two-foot by two-foot representative sample of each type of panel and accessory indicating panels, standing seams, closure, edge trim and flashing complete with factory finish and color if product is not one of those specified.
- D. Submit certification prepared, signed, and sealed by a Professional Engineer registered in the State of Mississippi, verifying that roof system meets or exceeds wind uplift requirements as specified herein.
- E. Submit certification indicating compliance with minimum requirements of the Water Infiltration - ASTM E-1646 performance tests.
- F. 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.
- G. Submit written proof from manufacturer that installer is approved to install their materials.

- H. Submit executed Warranty per Section 01 77 00 - Closeout Procedures for Owners signature.
- 1.05 QUALITY ASSURANCE
 - A. Manufacturer: Company specializing in Architectural Sheet Metal Products with 10 years minimum experience.
 - B. Installer: Company specializing in Architectural Sheet Metal 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. 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. Installer shall be approved by the roofing manufacturer in writing to install their materials.
- 1.06 DELIVERY, STORAGE AND HANDLING
 - A. Upon receipt of panels and other materials, installer shall examine the shipment for damage and completeness. Panels should be stored on edge in a clean, dry place. One end shall be elevated to allow moisture to run off. Panels with strippable film must not be stored in the open exposed to the sun. Stack all materials to prevent damage and to allow for adequate ventilation.
- 1.07 WARRANTY
 - A. Paint Finish: Paint finish shall have a 20-year, non-prorated, guarantee against cracking, peeling and fade (Not to exceed 5 N.B.S. units).
 - B. Special Weather Tightness Warranty: The entire installation (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 metal roofing manufacturer and his authorized installer, agreeing to replace / repair defective materials and workmanship during the warranty period with NO COST to the Owner.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by Firestone Metal Products/ Una-Clad, Jackson, MS. Tel: (800) 426-7737.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Architectural Metal Systems, Eufaula, AL. Tel. (334) 687-2032.
 - 2. Englert, Inc., Perth Amboy, NJ, Tel: (732) 826-8614.
 - 3. MBCI, Hernando, MS, Tel: (800) 206-6224.
 - 4. Petersen Aluminum, Elk Grove Village, IL. Tel. (800) 323-1960.
- 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 SHEET MATERIALS

- A. Materials: Sheet Steel shall be Una-Clad 24 gage-minimum, G-90 Galvanized ASTM A 653, or (24 gage-minimum, prefinished Galvalume ASTM 792 Grade 50B with an AZ-50 coating).

- B. Finish: Finish shall be PPG Duranar ULTRA-Cool IR or equal coating applied by the manufacturer on a continuous coil coating line. Top side dry film thickness of 0.5 mil clear coat over 0.75 mil fluoropolymer topcoat, over 0.20 mil prime coat, to provide a total dry film thickness of 1.45 mil. Bottom side shall be coated with primer with a dry film thickness of 0.25 mil. Finish shall conform to all tests for adhesion, flexibility, and longevity as specified by the finish supplier.
 - a. Minimum energy performance of the roof material and finish shall be: Outside shortwave (solar) absorptivity, 0.75 maximum, Reflectance of 0.25 minimum, Outside longwave (thermal) emissivity, 0.85, Inside shortwave absorptivity, 0.45, and Inside longwave (thermal) emissivity, 0.85
- C. Color: Shall be as indicated in Section 09 05 15 for color selection. Color design selected from standard and premium colors of Firestone Una-Clad. Substituted systems, if submitted, shall match selected color.
- D. Film: Strippable film shall be applied to the top side of the painted coil to protect the finish during fabrication, shipping and field handling. This strippable film shall be removed before installation.

2.03 ACCESSORY MATERIALS

- A. Concealed fastening clips: G-90 galvanized steel, spaced 18-inches on center, unless closer spacing is required by design wind loads.
- B. Fasteners: 1-inch # 10 pancake head wood screw with a # 2 Phillips head size. Minimum 2 fasteners per clip.
- C. Sealant: Extruded vinyl weatherseal
- D. Underlayment: Peel and Stick Membrane shall be installed over entire roof substrate. Membrane shall be equal to Certainteed Wintergard™ HT, Grace Ice & water Shield HT, Henry Blueskin® PE 200 HT, Imetco Dry Dek™, or Tamko® TW Metal and Tile Underlayment. Provided underlayment must be approved and warranted as part of the complete roofing system.

2.04 FABRICATION

- A. Panels: All panels shall be seamless. Panels beyond 60 feet must be manufactured at the project location by factory personnel using manufacturer's roll forming equipment.
- B. Panels fabricated by a portable roll former will require Project Engineer / MDOT Architect's prior approval.
- C. All exposed adjacent flashing and accessories shall be of the same material and finish as the roof panels. All flashing, hem exposed edges on underside 1/2 inch. Fabricate in accordance with standard SMACNA procedures and details. All roof sections requiring flashing less than 25 feet should be continuous lengths. Roof sections requiring closures greater than 25 feet shall be flashed using the fewest pieces possible.

2.05 PREFORMED METAL ROOFING SYSTEM

- A. Systems shall be equal to Firestone/Una-Clad Integral Snap Lock systems and shall include, but is not limited to, the following components:
 - 1. Standing Seam Metal Roof Panels with Striations.
 - 2. Preformed Metal Valley Flashing.
 - 3. Preformed Metal Hip Flashing.
 - 4. Preformed Metal Vented Ridge Cap.
 - 5. Concealed fastening clips and fasteners.
 - 6. Preformed Metal Gutters.
 - 7. Preformed Metal Downspouts.
 - 8. Solid and Vented Metal Soffit Panels.

9. Metal Fascia and Cladding.
 10. Miscellaneous Metal Trim Necessary for a Complete System Installation.
- B. Integral Snap Lock Model UC-14 roof panels with striations shall have 16 inches on center seam spacing, roll-formed in continuous lengths from eave to ridge, with a minimum standing seam height of 1-3/4 inches.
 - C. Model UC-501 soffit panels (Solid and fully vented as shown on Drawings) shall be 17-inches on center with 1 inch reveal panels in .028 inch thick steel painted with Kynar 500 finish. Color to be selected by Architect from manufacturers full range of standard and premium colors.
 - D. Certification shall be submitted, based on independent testing laboratory, indicating no measurable water penetration or air leakage through the system when tested in accordance with ASTM E-1646 and ASTM E-1680.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine wood trusses to ensure proper attachment to framing.
- B. Inspect roof structure to verify deck is clean and smooth, free of depressions, waves or projections, properly sloped to valleys or eaves.
- C. Verify roof openings, curbs, pipes, sleeves, ducts or vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.
- D. Installer shall examine substrate and conditions under which Work is to be performed and must notify Contractor in writing of unsatisfactory conditions. Do not proceed with installation until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 INSTALLATION OF UNDERLAYMENTS

- A. Install using methods recommended by manufacturer in accordance with local building code.
- B. Peel and Stick Membrane: Install one layer of membrane lapped, staggered, and applied horizontally from eave to ridge over approved roof substrate. Run membrane underlayment horizontally lapped so water sheds; secure in place. Lap ends 4 inches minimum; stagger end laps of each layer 36 inches minimum. Repair or replace any torn membrane to maintain a continuous membrane ahead of installation of metal roofing.
- C. Vent Pipes: At vent pipes, install a 24 inch minimum square piece of Peel and Stick Membrane lapping over roof deck underlayment; seal tightly to pipe.
- D. Vertical Walls: At vertical walls, install leak barrier membrane extending 6 inches minimum up the wall and 12 inches minimum on to the roof surface lapping over roof deck underlayment.
- E. Metal Drip Edge: At rake edges, install metal drip edge flashing over Peel and Stick Membrane and roof deck underlayment; set tight to rake boards; lap joints 2 inches minimum and seal with plastic cement; secure with nails.

3.03 INSTALLATION OF PANELS

- A. Comply with Drawings, manufacturers instructions, and conform to standards set forth in the Architectural Sheet Metal Manual published by SMACNA, in order to achieve a watertight installation.

- B. Install panels in such a manner that horizontal lines are true and level and vertical lines are plumb.
 - C. Install starter and edge trim before installing roof panels.
 - D. Remove protective strippable film prior to installation of roof panels.
 - E. Attach panels using manufacturer's standard clips and fasteners, spaced in accordance with approved shop drawings.
 - F. Install sealants for preformed roofing panels as specified on shop drawings.
 - G. Do not allow panels or trim to come into contact with dissimilar materials.
 - H. Do not allow traffic on completed roof. If required, provide cushioned walk boards.
 - I. Protect installed roof panels and trim from damage caused by adjacent construction until completion of installation.
 - J. Thoroughly clean and touch-up areas scarred during installation with a touch-up paint approved by panel manufacturer. Only minor scratches and fastener heads shall be touched-up; all other damaged material shall be replaced.
 - K. Gutter Supports: Space supports at maximum 48 inches on center, constructed of same material as gutters.
 - L. Downspout Straps: Space straps 72 inches on center maximum (minimum of 3 per downspout), constructed of same material as downspout.
- 3.04 CLEANING
- A. Clean grease, finger marks, and stains from panels in accordance with manufacturer's recommendations.
 - B. Remove all scrap and construction debris from the site.

END OF SECTION

SECTION 07 62 00 SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED SECTIONS

- A. Section 07 61 00 – Sheet Metal Roofing
- B. Section 09 05 15 – Color Design.

1.03 SUBMITTALS

- A. Submit manufacturer's product data, technical specifications, installation instructions and general recommendations for each specified sheet material and fabricated product for Project Engineer / MDOT Architect's approval.
- B. Samples: Submit 2 samples, eight inch square, of specified sheet materials to be exposed as finished surfaces. Submit 2 twelve inches long, completely finished units of specified factory-fabricated products exposed as finished work. Submit 2 color charts of manufacturer's complete line of standard colors available.
- C. Shop Drawings: Submit shop drawings showing layout, joining, profiles, and anchorage of fabricated work, including major counter flashing and expansion joint systems, and roof accessories; layouts at 1/4 inch scale, details at 3 inch scale.
- D. Qualification Data: Submit 2 copies for firms and persons that demonstrate capabilities and experience. Include a list with ten completed Project names and addresses, and name and addresses of Architects and Owners.

1.04 PROJECT CONDITIONS

- A. Coordinate with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of the work and protection of materials and finishes.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer, with 5 years minimum experience, who has completed sheet metal work similar to that indicated for this project and with a record of successful in- service performance.
- B. Mock-Up: Prior to installing, construct mock-up to demonstrate aesthetic effects as well as qualities of materials and execution.

PART 2 - PRODUCTS

2.01 FLASHING AND SHEET METAL MATERIALS

- A. Shall be 0.040-inch thick aluminum, mill finish. ASTM B209 (ASTM B 209M), 3003-H14. Use where concealed from view only.

2.02 FLASHING - EXPOSED TO VIEW

- A. Shall be fabricated in accordance with SMACNA standards to sizes and profiles shown on the drawings. Pre-finished aluminum, minimum 0.040-inch thick, colors as selected, Kynar 500 (70% PVDF), 20 year coating. Equal to Petersen Aluminum Corp. Tel. (800) 722-2523.

2.03 FASTENERS

- A. Same metal as flashing / sheet metal or, other non-corrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.
- B. Elastomeric Sealant: Generic type recommended by manufacturer of metal and fabricator of components being sealed; comply with FS TT-S-007, TT-S-00230, or TT-S-001543.
- C. Metal Accessories: Provide sheet metal clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed, non-corrosive, size and gage required for performance.

PART 3 - EXECUTION

3.01 INSTALLATION REQUIREMENTS

- A. Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations, and with SMACNA "Architectural Sheet Metal Manual". Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible and set units true to line and level as indicated. Install work with laps, joints and seams which will be permanently watertight and weatherproof.

3.02 ACCESSORIES INSTALLATION

- A. Comply with manufacturer's instructions and recommendations. Coordinate with installation of roof deck and other substrates to receive accessory units, and with vapor barriers, roof insulation, roofing and flashing; as required to ensure that each element of the work performs properly, and that combined elements are waterproof and weathertight. Anchor units securely to supporting structural substrates, adequate to withstand lateral and thermal stresses as well as inward and outward loading pressures.
- B. Separate metal from incompatible metal or corrosive substrates by coating concealed surfaces with asphalt mastic as recommended by manufacturer.

3.03 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces, removing substances, which might cause corrosion of metal or deterioration of finishes.
- B. Protection: Installer shall advise Contractor of required procedures for surveillance and protection of flashings, sheet metal work, and accessories during construction, to ensure that work will be without damage or deterioration, other than natural weathering, at time of substantial completion.
- C. Flashings and sheet metal with any cuts, abrasions, or imperfections will not be acceptable and is to be replaced.

END OF SECTION

SECTION 07 84 00 FIRESTOPPING

PART 1 - GENERAL

1.01 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, and glazing.
- C. Samples (not required for named products):
 - 1. Submit hollow metal frame, corner section of typical frame, of sufficient size to show corner joint, hinge reinforcement, dust cover boxes, anchors, and floor anchors.
 - 2. Submit hollow metal door section of typical door, of sufficient size to show edge, top and bottom construction, insulation, hinge reinforcement, face stiffening, corner of vision opening construction, and glazing beads.

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. 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.
- B. Design and Construction: Frames shall be custom made welded units with integral trim, of the sizes and shapes shown on approved shop drawings. Knocked-down frames will not be accepted. Finished work shall be strong, rigid, and neat in appearance, square, true and free of defects, warp or buckle. Molded members shall be clean cut, straight and of uniform profile throughout their lengths. Jamb depths, trim, profile and backbends shall be as shown on Drawings. Corner joints shall have contact edges closed tight, with trim faces mitered and continuously welded, and stops mitered. The use of gussets will not be permitted.
 - 1. Stops shall be 5/8 inch deep. Cut-off (sanitary or hospital type) stops, where scheduled, shall be capped at 45 degrees at heights shown on drawings, and all jamb joints below cut-off stops shall be ground and filed smooth, making them imperceptible. Do not cut off stops on frames for soundproof, lightproof on lead-lined doors.
 - 2. When shipping limitations so dictate, frames for large openings shall be designed and fabricated for field splicing by others.
 - 3. Frames for multiple or special openings shall have mullion and / or rail members which are closed tubular shapes having no visible seams or joints. All joints between faces of abutting members shall be securely welded and finished smooth.
 - 4. Hardware reinforcements: Frames shall be mortised, reinforced, drilled and tapped at the factory for fully templated mortised hardware only, in accordance with approved hardware schedule and templates provided by the hardware supplier. Where surface-mounted hardware is to be applied, frames shall have reinforcing plates. Frames shall be reinforced for closers. Minimum thickness of hardware reinforcing plates shall be as follows:
 - a. Hinge and pivot reinforcements - 7 gage, 1 1/4 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 be 18 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 13/4 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.
- C. 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.
- D. 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.
- E. 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.
- F. 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 Dutch doors:
 - a. 5 inches from head of frame to top of hinge.
 - b. 10 inches from finished floor to bottom of bottom hinge.
 - c. 5 inches from split line to top and bottom respectively of lower and upper intermediate 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.
 - G. Push-pull bars – 3'-1" to centerline of bar.
 - H. Arm pulls – 3'-11" to centerline.
 - I. Push plates – 4'- 0" to centerline of plate.
 - J. Roller latches – 3'-9" to centerline.
 - K. All of the above dimensions from paragraph 2.07(B) through 2.07(J) 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. Wood Doors: AWI “Architectural Flush Doors” of the Architectural Woodwork Institute.

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. Particleboard-Core Doors:
 - 1. Particleboard: ANSI A208.1, Grade LD-1 or Grade LD-2, made with binder containing no urea-formaldehyde resin.
 - 2. Blocking: Provide wood blocking in particleboard-core doors as follows:
 - a. 5-inch top-rail blocking, in doors indicated to have closers.
 - b. 5-inch bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
 - 3. Provide doors with either glued-wood-stave or better than stave cores instead of particleboard cores for doors indicated to receive exit devices.
- C. Structural-Composite-Lumber-Core Doors:
 - 1. Structural Composite Lumber: WDMA I.S.10.
 - a. Screw Withdrawal, Face: 700 lbf.
 - b. Screw Withdrawal, Edge: 400 lbf.
- D. Mineral-Core Doors:
 - 1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
 - 2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as follows:
 - a. 5-inch top-rail blocking.
 - b. 5-inch bottom-rail blocking, in doors indicated to have protection plates.
 - c. 5-inch midrail blocking, in doors indicated to have armor plates.
 - d. 4-1/2 by 10 inch lock blocks in doors indicated to have exit devices.
 - 3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

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.

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."

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.

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 doors 1/8 inch in 2 inches at lock and hinge edges.
- B. Door Clearances: Fit to frames and machine for hardware for proper fit and uniform clearance at each edge.
 - 1. 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.

3.04 ADJUSTING AND CLEANING

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

3.05 PROTECTION OF COMPLETED WORK

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

END OF SECTION

SECTION 08 31 13

ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

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

1.02 SUBMITTALS

- A. Product Data: For each type of access door and frame indicated. Include construction details, fire ratings, materials, individual components and profiles, and finishes.
- B. Shop Drawings: Show fabrication and installation details of access doors and frames for each type of substrate. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each door face material, at least 3 by 5 inches in size, in specified finish.
- D. Access Door and Frame Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.
- E. Ceiling Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim are shown and coordinated with each other.

1.03 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of access door(s) and frame(s) through one source from a single manufacturer.

- B. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics per the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. NFPA 252 for vertical access doors and frames.
 - 2. UL 263 for horizontal access doors and frames.
- C. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

1.04 COORDINATION

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

PART 2 - PRODUCTS

2.01 STEEL MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
 - 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Steel Sheet: Electrolytic zinc-coated, ASTM A 591/A 591M with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- C. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Surface Preparation for Steel Sheet: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
 - 2. Surface Preparation for Metallic-Coated Steel Sheet: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.
 - a. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
 - 3. Factory-Primed Finish: Apply shop primer immediately after cleaning and pretreating.
- D. Drywall Beads: Edge trim formed from 0.0299-inch zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.
- E. Plaster Beads: Casing bead formed from 0.0299-inch zinc-coated steel sheet with flange formed out of expanded metal lath and in size to suit thickness of plaster.

2.02 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Babcock-Davis; A Cierra Products Co., Minneapolis, MN. Tel. (888) 412-3726.
 2. J. L. Industries, Inc., Bloomington, MN. Tel. (800) 554-6077.
 3. Larsen's Manufacturing Company, Minneapolis, MN. Tel. (800) 527-7367.
 4. Milcor Inc., Lima, OH. Tel. (800) 528-1411.
- B. Flush Access Doors and Frames with Exposed Trim: Fabricated from metallic-coated steel sheet.
1. Locations: Wall surfaces.
 2. Door: Minimum 0.060-inch thick sheet metal, set flush with exposed face flange of frame.
 3. Frame: Minimum 0.060-inch thick sheet metal with 1-inch wide, surface-mounted trim.
 4. Hinges: Continuous piano.
 5. Latch: Self-latching bolt operated by screwdriver with interior release.
 6. Lock: Mortise cylinder.
 - a. Lock Preparation: Prepare door panel to accept cylinder specified in Division 8 Section "Door Hardware (Scheduled by Describing Products)."
- C. Flush Access Doors and Trimless Frames: Fabricated from steel sheet.
1. Locations: Wall and ceiling surfaces.
 2. Door: Minimum 0.060-inch-thick sheet metal, set flush with surrounding finish surfaces.
 3. Frame: Minimum 0.060-inch-thick sheet metal with drywall bead flange.
 4. Hinges: Continuous piano.
 5. Latch: Self-latching bolt operated by screwdriver with interior release.
 6. Lock: Mortise cylinder.
 - a. Lock Preparation: Prepare door panel to accept cylinder specified in Division 8 Section "Door Hardware (Scheduled by Describing Products)."
- D. Exterior Flush Access Doors and Frames with Exposed Trim: Weatherproof with extruded door gasket.
1. Locations: Wall surfaces.
 2. Door: Minimum 0.040-inch-thick, metallic-coated steel sheet; flush panel construction with manufacturer's standard 2-inch-thick fiberglass insulation.
 3. Frame: Minimum 0.060-inch-thick extruded aluminum.
 4. Hinges: Continuous piano, zinc plated.
 5. Lock: Dual-action handles with key lock.
- E. Fire-Rated, Insulated, Flush Access Doors and Frames with Exposed Trim: Fabricated from steel sheet.
1. Locations: Wall surfaces.
 2. Fire-Resistance Rating: Not less than that of adjacent construction.
 3. Temperature Rise Rating: 250 deg F at the end of 30 minutes.
 4. Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 0.036 inch.

5. Frame: Minimum 0.060-inch-thick sheet metal with 1-inch-wide, surface-mounted trim.
6. Hinges: Continuous piano.
7. Automatic Closer: Spring type.
8. Latch: Self-latching device operated by flush key with interior release.
9. Lock: Self-latching device with mortise cylinder lock.
 - a. Lock Preparation: Prepare door panel to accept cylinder specified in Division 8 Section "Door Hardware (Scheduled by Describing Products)."

2.03 FABRICATION

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

PART 3 - EXECUTION

3.01 INSTALLATION

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

3.02 ADJUSTING AND CLEANING

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

END OF SECTION

SECTION 08 33 23 OVERHEAD COILING DOORS

PART 1 - GENERAL

1.01 SUMMARY

- A. 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. Manufacturer Product Designation: Raynor PowerHoist Standard (Model Series PHS).
 - 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.

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 selected by MDOT Architect from manufacturer's full selection of standard colors.
- 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 36 13

SECTIONAL DOORS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Electrically operated sectional doors, operators, controls and accessories.
- B. Related Sections:
 - 1. Division 05 Sections: Miscellaneous Metals for steel supports.
 - 2. 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): 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 sectional overhead doors to withstand a 20 PSF (88 MPH) wind loading pressure in the fully closed position unless otherwise indicated or as required by AHJ (Authorities Having Jurisdiction).
- B. Spring Cycle Requirements: 25,000 cycles.

1.04 SUBMITTALS

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.
- B. Product Data: Submit manufacturer's product data, roughing-in diagrams, and installation instructions for each type and size of sectional overhead doors. Include operating instructions and maintenance information with data for shaft and gearing, lubrication frequency, control adjustment, spare part sources. Include both published data and any specific data prepared for this project.
- C. Shop Drawings: Provide drawings indicating track details, head and jamb conditions, spring shafts, anchorage, accessories, finish colors, patterns and textures, operator mounts and other related information. Include relationship with adjacent materials.
- D. Samples: Submit selection and verification samples of metal finishes.

- E. Quality Assurance Submittals: Submit the following:
 - 1. Certificates: Submit manufacturer's certificate that products meet or exceed specified requirements.
 - 2. Certificates: Submit installer qualifications.
- F. Closeout Submittals: Submit Warranty documents specified herein.

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.

1.06 DELIVERY, STORAGE & HANDLING

- A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays. Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

1.07 WARRANTY

- A. 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.
- B. Warranty of door and all components to be free from defects in labor and materials for a period of one year from the date of Final Acceptance.

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 SECTIONAL 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 SteelForm™ STANDARD by Raynor Garage Doors.

2.03 DOOR OPERATORS

- A. Provide doors designed for electric motor operation.
- B. Manufacturer Product Designation: Raynor PowerHoist Standard (Model Series PHS).
 - 1. Type: Trolley.
 - 2. Motor Horsepower Rating: Continuous 1/2 HP.
 - 3. Electrical Requirements: 115 volt single phase.
 - 4. Duty Cycle: 30 cycles/hour.
 - 5. Control Wiring: Three button momentary contact "open-close-stop"
 - 6. Model Number: O.D.P-Standard.

2.04 DOOR SECTIONS

- A. Material: Steel pan construction, 2 inches thick, roll formed from 24 gauge minimum thickness commercial quality hot-dipped galvanized G60 steel in compliance with ASTM A 653. Each door section to have two deep ribs, four pencil grooves, and roll-formed tongue-and-groove joints. End stiles and center stiles to be riveted to outside face with stainless steel rivets and resistance welded to interior rail. End stiles and center stiles to be minimum 16 gauge thickness.
- B. Mounting: Sections mounted in door opening using Lap Jamb Angle Mounting: section overlap door jambs by 1 inch (25mm) on each side of door opening
- D. Seals: Sections to be sealed at end stiles with 1/4 inch (6.4mm) thick polyethylene foam. Bottom of door to have flexible U-shaped vinyl seal in aluminum retainer.
- E. Trussing: Doors designed to withstand specified windload. Deflection of door in horizontal position to be maximum of 1/120th of door width.
- F. Paint Type and Color: Kynar 500 in Standard color as selected by Project Engineer / MDOT Architect. Refer to Section 09 05 15 "Color Design". Exterior skin to have two coats of paint, one primer coat and one finish coat.

2.05 TRACK

- A. Material: Hot-dipped galvanized steel (ASTM A-653), fully adjustable for adequate sealing of door to jamb or weatherseal.
- B. Configuration Type: Provide normal headroom track as recommended by manufacturer to suit loading required and clearances available. Horizontal track shall be adequately reinforced with continuous angle
- C. Size: 2 inches

2.06 COUNTERBALANCE SYSTEM

- A. Type: Provided with aircraft-type, galvanized steel lifting cables with minimum safety factor of 5 to 1. Torsion Springs consisting of heavy-duty oil-tempered wire torsion springs on a continuous ball-bearing cross-header shaft.

2.07 HARDWARE

- A. Hinges and Brackets: Fabricated from galvanized steel.
- B. Track Rollers: 2 inches diameter consistent with track size, with hardened steel ball bearings.
- C. Perimeter Seal: Provide perimeter seal for jambs and header.
- D. Air Infiltration Seal: Provide air infiltration seal between door sections.
- E. Locks: Furnish door system with interior lock with dead bolt provided with hole to receive padlock provided by owner.

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: Installer shall take field dimensions and examine conditions of substrates, supports, and other conditions under which this Work is to be performed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

3.03 INSTALLATION

- A. Install door and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports in accordance with final shop drawings, manufacturer's instructions, and as specified herein.
- B. Anchor components securely to wall construction and building framing without distortion or stress. Secure tracks to structural members only.
- C. Instruct Owners personnel in proper operating procedures and maintenance.

3.04 ADJUSTING

- A. General: Lubricate bearings and sliding parts, assure weathertight fit around door perimeter 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 41 13

ALUMINUM-FRAMED ENTRANCES & STOREFRONTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed entrance and storefront system includes tubular aluminum sections with supplementary internal support framing as required, aluminum and glass entrances, shop fabricated, factory finished, glass and glazing, related flashing, anchorage and attachment devices.

1.02 RELATED SECTIONS

- A. Section 08 71 00 - Door Hardware: Mortised hardware reinforcement requirements affecting framing members; hardware items other than specified in this section.
- B. Section 08 80 00 - Glazing.
- C. Section 09 05 15 - Color Design.
- D. Section 12 21 31 - Horizontal Louver Blinds: Attachments to framing member.

1.03 SUBMITTALS

- A. Product Data: Submit component dimensions; describe components within assembly, anchorage, fasteners, and glass.
- B. Shop Drawings: Submit Shop Drawings for fabrication and installation, including elevations, detail sections, anchorage, reinforcement, and glazing.
- C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.04 QUALITY ASSURANCE: Perform Work in accordance with AAMA - Metal Curtain Wall, Window, storefront and Entrance Guide Specifications Manual.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing aluminum glazing systems with minimum five years experience.
- B. Design structural support framing components under direct supervision of a professional engineer experienced in design of this Work and licensed at the place where the Project is located.

1.06 DELIVERY, STORAGE, AND PROTECTION

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

1.07 ENVIRONMENTAL REQUIREMENTS

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

1.08 COORDINATION

- A. Section 01 31 00 – Project Management & Coordination: Administrative requirements for coordination and project conditions.
- B. Coordinate Work with Section 08 71 00 Door Hardware.
- C. Division 26 and 27 Electrical Section(s) for coordination with electronic door hardware specified in this Section.

1.09 WARRANTY

- A. Section 01 77 00 - Closeout Procedures: Execution Requirements for Product warranties and bonds.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and specifications are based on products manufactured by Kawneer Co., Inc., 555 Guthridge Court, Norcross, GA 30092. Tel. (770) 449-5555.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Traco, Cranberry Township, PA. Tel. (724) 776-7000.
 - 2. Vistawall Architectural Products, Terrell, TX. Tel. (972) 551-6100.
- C. Substitutions shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures.

2.02 MATERIALS

- A. Storefront Framing: Kawneer Trifab VG 451 - 2 inches by 4-1/2 inches and 4-1/2 inches by 4 -1/2 inches nominal dimensions; Screw Spline Fabrication.
- B. Exterior Aluminum Entrances: Kawneer Series 350 Medium Style Swing Doors.
- C. Accessories for Exterior Doors:
 - 1. Weatherstripping: Sealair weathering comprised of a thermoplastic elastomer weathering on a tubular shape with a semi-rigid polymeric backing.
 - 2. Sill Sweep Strips: EPDM blade gasket sweep strip in an aluminum extrusion applied to the interior exposed surface of the bottom rail with concealed fasteners. Finish shall be painted to match door color.
 - 3. Threshold: Extruded aluminum with clear anodized finish, one piece per door opening, with ribbed surface.
 - 4. Offset Pivots: Top and bottom. Finish shall be No.17 Clear.

5. Push / Pull: Architects Classic Hardware Style "CO-9" pull and "CP-11" push bar. Mount pull top attachment 44-3/16 inches above bottom of door and push bar 37 inches above bottom of door. Finish shall be No.14 Clear.
 6. Closers: LCN Quest.
 7. Locks: Adams-Rite MS 1850A (Refer to Section 08 71 00 for cylinder) mount 41-9/16 inches above bottom of door.
- D. Interior Aluminum Entrance: Kawneer Series 350 Medium Style Swing Doors. Coordinate door hardware with Division 26 and 27 Sections for electrical requirements.
- E. Accessories for Interior Door:
1. Weatherstripping: Sealair weathering comprised of a thermoplastic elastomer weathering on a tubular shape with a semi-rigid polymeric backing.
 2. Threshold: Extruded aluminum with clear anodized finish one piece per door opening, with ribbed surface.
 3. Offset Pivots: Top and bottom. Finish shall be No.17 Clear.
 4. Closers: LCN Quest.
 5. Refer to Section 08 71 00 for cylinder.
 6. Electronic Hardware as follows:
 - a. EL Paneline exit device with CPN offset pull.
 - b. EPT power transfer unit.
 - c. SP1000 power supply unit (mount in ceiling or closet).
 - d. Provide remote push button Kawneer No. 050401.

2.03 COMPONENTS

- A. Extruded Aluminum: ASTM B221; 6063 alloy for extruded structural members.
- B. Glass and Glazing Materials: As specified in Section 08 80 00.
- C. Flashing: Minimum 0.032-inch_thick aluminum.
- D. Sealant and Backing Materials:
 1. Sealant used within system (Not Used for Glazing): Manufacturer's standard materials to achieve weather, moisture, and air infiltration requirements.
 2. Perimeter Sealant: Specified in Section 07 92 00.

2.04 FABRICATION

- A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
- C. Prepare components to receive anchor devices. Fabricate anchors.
- D. Arrange fasteners and attachments to conceal from view.
- E. Reinforce interior horizontal head rail to receive blind track brackets and attachments.
- F. Prepare components with internal reinforcement for door hardware.

- G. Reinforce framing members for imposed loads.

2.05 SHOP FINISHING

- A. Fluropon (70% PVDF), AAMA 2605-02, Fluoropolymer Coating, color selected by Project Engineer / MDOT Architect from manufacturer's standard colors.
- B. Extent of Finish:
 - 1. Apply factory coating to all surfaces exposed at completed assemblies.
 - 2. Apply finish to surface cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
 - 3. Apply touch-up materials recommended by coating manufacturer for field application to cut ends and minor damage to factory applied finish.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Section 01 31 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify dimensions, tolerances, and method of attachment with other Work.
- C. Verify wall openings and adjoining air and vapor seal materials are ready to receive Work of this Section.

3.02 INSTALLATION

- A. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- B. Provide alignment attachments and shims to permanently fasten system to building structure.
- C. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent Work
- D. Provide thermal isolation where components penetrate or disrupt building insulation.
- E. Install sill flashing. Turn up ends and edges; seal to adjacent Work to form water tight dam.
- F. Coordinate attachment and seal of perimeter air and vapor barrier materials.
- G. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- H. Install integral flashing and integral joint sealers.
- I. Set thresholds in bed of mastic and secure.
- J. Install hardware using templates provided. Refer to Section 08 71 00 for installation requirements.

- K. Coordinate installation of glass with Section 08 80 00; separate glass from metal surfaces.
- L. Coordinate installation of perimeter sealants with Section 07 92 00.

3.03 CLEANING

- A. Section 01 74 00 –Cleaning and Waste Management: Final cleaning.
- B. Remove protective material from pre-finished aluminum surfaces.
- C. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- D. Remove excess sealant by method acceptable to sealant manufacturer.

3.04 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 61 15 - Basic Product Requirements: Protecting installed construction.
- B. Protect finished Work from damage.

END OF SECTION

SECTION 08 51 14 ALUMINUM WINDOWS-SINGLE HUNG

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Extent of aluminum windows is shown on Drawings and in Schedules. Types of aluminum windows required include fixed and single hung exterior window units.

1.02 RELATED SECTIONS

- A. Section 08 80 00 – Glazing for glazing requirements of aluminum windows, including windows specified herein shall be factory pre-glazed.
- B. Section 09 05 15 – Color Design.
- C. Section 12 21 14 – Window Blinds.

1.03 SUBMITTALS

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

1.04 QUALITY ASSURANCE

- A. Except as otherwise indicated, requirements for aluminum windows, terminology, tolerances, standards of performance, and fabrication workmanship are those specified and recommended in AAMA/NWWDA 101/I.S. 2-97 and applicable general recommendations published by AAMA and AA.
- B. Manufacturer: Provide aluminum window units and framing system produced by a single firm with minimum 5 years successful experience in fabricating types required for this Project.
- C. Performance and Testing: Except as otherwise indicated, comply with air infiltration tests, water resistance tests and applicable load tests in AAMA/NWWDA 101/I.S. 2-97 for type and classification of window units required in each case. Where manufacturer's standard window units comply with requirements and have been tested in accordance with specified tests, provide certification by manufacturer showing compliance with such tests.

- D. Uniform Load Structural Test: A minimum exterior and interior uniform load of 75 pounds per square foot shall be applied to the entire outside surface of the test unit. This test load shall be maintained for a period of 10 seconds. At the conclusion of the test, there shall be no glass breakage, permanent damage of fasteners, hardware parts, support arms, actuating mechanisms, or any other damage causing the window to be inoperable. There shall be no permanent deformation of any frame or sash member in excess of 0.4 percent of span.
- E. Air Infiltration Test: With the sash in a closed and locked position, the window shall be subjected to an air infiltration test in accordance with ASTM E 283. Air infiltration shall not exceed 0.07 cubic feet per minute, per square foot of window area.
- F. Water Resistance Test: No water shall pass the interior face of the window frame and there shall be no leakage as defined in tests methods ASTM E 331 and ASTM E547.
- G. Condensation Resistance Factor: The window shall be tested in accordance with AAMA 1502 standards and tests of thermal performance and shall have a condensation resistance factor of no less than 48.
- H. Operating Force: The sash shall have been adjusted to operate in either direction with a force not exceeding 45 pounds after the sash is in motion.
- I. Field Measurement: Wherever possible, take field measurements prior to preparation of Shop Drawings and fabrication, to ensure proper fitting of work. However, proceed with fabrication and coordinate installation tolerances as necessary when field measurements might delay the Work.

1.05 DELIVERY, STORAGE, AND HANDLING

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

1.06 SPECIAL PROJECT WARRANTY

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

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on Series 4000-4 Model 4140 Single Hung windows as manufactured by Peerless Products, Inc., Lenexa, KS 66219. Telephone (800) 279-9999.

- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Graham Architectural Products, York, PA. Tel. (800) 755-6274.
 - 2. Winco Window Company, Saint Louis, MO. Tel. (800) 525-8089.
- C. Substitutions shall fully comply with specified requirements and Section 01 62 14 - Product Options and Substitution Procedures

2.02 MATERIALS AND ACCESSORIES

- A. Aluminum Members: All extruded sections shall be of 6063-T5 aluminum. Alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish; ASTM B 221 for extrusions, ASTM B 209 for sheet/plate. Main frame extruded members shall have a minimum depth of 4 inches.
- B. Fasteners: Aluminum, non-magnetic stainless steel, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum components. Do not use exposed fasteners except where unavoidable for application of hardware. Match finish of adjoining metal. Provide Phillips flat-head machine screws for exposed fasteners. Locate all fasteners so as not to bridge the thermal break construction of windows.
- C. Concealed Flashing: Dead-soft stainless steel, 26 gage minimum, type selected by manufacturer for compatibility.
- D. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible; otherwise, nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A 386.
- E. Clear Protective Coatings: AAMA 602.2, compounded specifically for protection of aluminum finish during construction.
- F. Sliding Weather-stripping: Provide double weather-stripping using silicone-coated woven pile with polypropylene fin center complying with AAMA 701.
- G. Glass and Glazing Materials: Provide glass and glazing materials that comply with requirements of Section 08800 of these Specifications.

2.03 WINDOW CLASSIFICATION (GRADE)

- A. Except as otherwise indicated, provide window units complying with requirements of AAMA classification of H-HC55.

2.04 WINDOW TYPE (OPERATION)

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

2.05 FABRICATION

- A. Required sizes for frame units, including profile requirements, are shown on drawings. Any variable dimensions are indicated, together with maximum and minimum dimensions required to achieve design requirements and coordination with other Work. Details shown are based upon standard details by manufacturer indicated. Similar details by other manufacturers listed will be acceptable, provided they comply with other requirements, including profile limitations.
- B. Prefabrication: To greatest extent possible, complete fabrication assembly, finishing, hardware application, and other work before shipment to project site. Disassemble components only as necessary for shipment and installation.
- C. Sequence: Complete cutting, fitting, forming, drilling, and grinding of metal work prior to cleaning, finishing, surface treatment, and application of finishes. Remove arises from cut edges and ease edges and corners to radius of approximately 1/64 inch.
- D. Welding: Comply with AWS recommendations to avoid discoloration; grind exposed welds smooth and restore mechanical finish.
- E. Reinforcing: Install reinforcing as necessary for performance requirements; separate dissimilar metals with bituminous paint or other separator that will prevent corrosion.
- F. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.
- G. Fasteners: Conceal fasteners wherever possible.

2.06 SILLS

- A. Provide extruded sills equal to those manufactured by Peerless. Sizes shown on Drawings.

2.07 SCREENS

- A. Provide manufacturer's standard aluminum screen at operable units.

2.08 FINISHES

- A. Kynar 500 (70% PVDF), AAMA 2605-02, finish to be selected by Project Engineer / MDOT Architect from manufacturer's full range of standard colors available. Protect finishes promptly after drying by applying clear protective coating not less than 0.5 mils dry film thickness.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations for installation of aluminum windows. Set units plumb, level, and true to line, without warp or rack of framing members. Anchor securely in place, separating aluminum and other corrodible metal surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

- B. Set sill members and other members in bed of compound as shown, or with joint fillers or gaskets as shown to provide weather-tight construction. Comply with requirements of Section 07 92 00 for caulking and sealant.
- C. Refer Section 08 80 00 - Glazing for installation of glass to be glazed into windows.

3.02 ADJUSTING AND CLEANING

- A. Adjust operating hardware to function properly, without binding, and to provide tight fit at contact points and weather-stripping, for smooth operation and weather-tight closure. Lubricate any hardware or moving parts as required.
- B. Clean completed system, inside and out, promptly after installation of glass and sealants. Remove excess glazing and sealant compounds, dirt, and other substances from aluminum surfaces. Remove protective coating when completion of construction activities no longer requires its retention.
- C. Institute protective measures and other precautions required to ensure that aluminum window units will be without damage or deterioration, other than normal weathering, at time of acceptance.

END OF SECTION

SECTION 08 51 15 ALUMINUM WINDOWS-AWNING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Extent of aluminum windows is shown on Drawings and in Schedules. Types of aluminum windows required include fixed and operable exterior window units.

1.02 RELATED SECTIONS

- A. Section 08 80 00 – Glazing for glazing requirements of aluminum windows, including windows specified herein to be factory pre-glazed.
- B. Section 09 05 15 – Color Design.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's sample warranty, specifications, standard details, and installation recommendations for components of aluminum window units required for project, including data that products that have been tested comply with performances requirements.
- B. Shop Drawings: Submit Shop Drawings for fabrication and installation of aluminum windows, including elevations, detail sections of typical composite members, anchorage, reinforcement, expansion provisions, and glazing.
- C. Samples: Submit samples of each type and color of aluminum finish, on 12-inch long sections of extrusions or formed shapes and on 6-inch square sheets.

1.04 QUALITY ASSURANCE

- A. Comply with applicable provisions of "Metal Curtain Wall, Window, Storefront, and Entrance Guide Specifications Manual" by AAMA.
- B. Manufacturer: Provide aluminum window units and framing system produced by a single firm with minimum 5 years successful experience in fabricating types required for this Project.
- C. Performance and Testing: Fabricate exterior components from manufacturer's stock systems which have been designed to provide for expansion and contraction resulting from ambient temperature range of 120 degrees F (49 degrees C).
- D. Wind Loading: Fabricate exterior components from manufacturer's stock systems which have been tested in accordance with ASTM E 330 to withstand Uniform pressure of 24 psf inward and 24 psf outward.
- E. Weather Resistance: Fabricate exterior framing components from manufacturer's stock systems which have been tested to demonstrate permanent resistance to leakages as follows with test pressure differential of 10% of design loading (excluding operable edges).
- F. Air infiltration: Maximum 0.06 cfm per square foot, tested in accordance with ASTM E 283.

- G. Water infiltration: No uncontrolled water penetration, tested in accordance with ASTM E 331.
 - H. Field Measurement: Wherever possible, take field measurements prior to preparation of Shop Drawings and fabrication, to ensure proper fitting of work. However, proceed with fabrication and coordinate installation tolerances as necessary when field measurements might delay the Work.
- 1.05 SPECIAL PROJECT WARRANTY
- A. Provide written warranty signed by Manufacturer, Installer, and Contractor, agreeing to replace aluminum windows which fail in materials or workmanship within 3 years of acceptance. Failure of materials or workmanship includes excessive leakage or air infiltration, excessive deflections, faulty operation of entrances, deterioration of finish or construction in excess of normal weathering, and defects in hardware, weather-stripping, and other components of the Work.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on Winco 1450 Series as manufactured by Winco Window Company, 6200 Maple Ave., Saint Louis, MO 63130. Tel. (800) 525-8089.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Graham Architectural Products, York, PA. Tel. (800) 755-6274
 - 2. Peerless Products, Inc., Lenexa, KS. Tel. (800) 279-9999
- C. Substitutions shall fully comply with specified requirements and Section 01 62 14 - Product Options and Substitution Procedures

2.02 MATERIALS AND ACCESSORIES

- A. Aluminum Members: Alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish; ASTM B 221 for extrusions, ASTM B 209 for sheet/plate. Main frame extruded members shall have a minimum depth of 4 inches.
- B. Fasteners: Aluminum, non-magnetic stainless steel, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum components. Do not use exposed fasteners except where unavoidable for application of hardware. Match finish of adjoining metal. Provide Phillips flat-head machine screws for exposed fasteners.
- C. Concealed Flashing: Dead-soft stainless steel, 26 gage minimum, type selected by manufacturer for compatibility.
- D. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible; otherwise, nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A 386.
- E. Clear Protective Coatings: AAMA 602.2, compounded specifically for protection of aluminum finish during construction.

- F. Compression Weather-stripping: Manufacturer's standard replaceable stripping of either molded neoprene gaskets, molded PVC gaskets or thermoplastic rubber.
- G. Glass and Glazing Materials: Provide glass and glazing materials that comply with requirements of Section 08800 of these Specifications.
- H. Hinges: Extruded three knuckle butt hinges with nylon bushings and 4 bar stainless steel arms.
- I. Locks: Cam type.
- J. Operator: Roto Operator HC-2 (RH).
- K. Sills: Provide extruded sills equal to those manufactured by Winco. Sizes shown on Drawings.
- L. Screens: Provide manufacturer's standard aluminum screen at operable units

2.03 FABRICATION

- A. Required sizes for frame units, including profile requirements, are shown on drawings. Any variable dimensions are indicated, together with maximum and minimum dimensions required to achieve design requirements and coordination with other Work. Details shown are based upon standard details by manufacturer indicated. Similar details by other manufacturers listed will be acceptable, provided they comply with other requirements, including profile limitations.
- B. Prefabrication: To greatest extent possible, complete fabrication assembly, finishing, hardware application, and other work before shipment to project site. Disassemble components only as necessary for shipment and installation. Preglaze window units to greatest extent possible, in coordination with installation and hardware requirements. Do not drill and tap for surface-mounted hardware items until time of installation at Project Site.
- C. Sequence: Complete cutting, fitting, forming, drilling, and grinding of metal work prior to cleaning, finishing, surface treatment, and application of finishes. Remove arises from cut edges and ease edges and corners to radius of approximately 1/64".
- D. Welding: Comply with AWS recommendations to avoid discoloration; grind exposed welds smooth and restore mechanical finish.
- E. Reinforcing: Install reinforcing as necessary for performance requirements; separate dissimilar metals with bituminous paint or other separator that will prevent corrosion.
- F. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.
- G. Fasteners: Conceal fasteners wherever possible.

2.04 FINISHES

- A. Kynar 500 (70% PVDF), AAMA 2605-02, finish to be selected by Project Engineer / MDOT Architect from manufacturer's full range of standard colors available. Protect finishes promptly after drying by applying clear protective coating not less than 0.5 mils dry film thickness.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations for installation of aluminum windows. Set units plumb, level, and true to line, without warp or rack of framing members. Anchor securely in place, separating aluminum and other corrodible metal surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
- B. Set sill members and other members in bed of compound as shown, or with joint fillers or gaskets as shown to provide weather-tight construction. Comply with requirements of Section 07 92 00 for caulking and sealant.
- C. Refer Section 08 80 00 - Glazing for installation of glass to be glazed into windows.

3.02 ADJUSTING AND CLEANING

- A. Adjust operating hardware to function properly, without binding, and to provide tight fit at contact points and weather-stripping.
- B. Clean completed system, inside and out, promptly after erection and installation of glass and sealants. Remove excess glazing and sealant compounds, dirt, and other substances from aluminum surfaces. Remove protective coating when completion of construction activities no longer requires its retention.
- C. Institute protective measures and other precautions required to assure that aluminum entrances and storefronts will be without damage or deterioration, other than normal weathering, at time of acceptance.

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.

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. Best Access Sys. Indianapolis, IN. Tel: (800) 311-1705.
 - 2. Corbin Russwin Arch't. Hardware. Berlin, CT. Tel: (800) 543-3658.
 - 3. Dorma Door Controls, Inc. Reamstown, PA. Tel: (800) 523-8483.
 - 4. Falcon Lock, Security, CO. Tel. (800) 266. 4456.
 - 5. Hager Companies. Saint Louis, MO. Tel: (800) 325-9995.
 - 6. Hes, Inc., Phoenix, AZ. Tel. (623) 582-4626.
 - 7. LCN. Princeton, IL. Tel: (800) 526-2400.
 - 8. McKinney Hinge. Scranton, PA. Tel: (800) 346-7707.
 - 9. Pemko. Ventura, CA. Tel: (800) 283-9988.
 - 10. Rockwood Manufacturing Co. Rockwood, PA. Tel: (800) 458-2424.
 - 11. Schlage Lock Co. Colorado Springs, CO. Tel: (800) 847-1864.
 - 12. Stanley Hardware. New Britain, CT. Tel: (800) 337-4393.
 - 13. Trimco/BBW/Quality. Los Angeles, CA. Tel: (323) 262-4191.
 - 14. Von Duprin, Indianapolis, IN. Tel. (800) 999-0408.
- B. Substitutions shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures.

2.02 KEYING / CYLINDERS

- A. 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 Storefront Exterior Door)

Each Opening Shall Have:

- 2 – Each Cylinders Best 1E72/1E74 As Required
 (Balance of Hardware by Door Manufacturer)

HW2 (For Storefront Interior Door)

Each Opening Shall Have:

- 2 – Each Cylinders Best 1E72/1E74 As Required
 (Balance of Hardware by Door Manufacturer)

HW3 (For Exterior Single Hollow Metal Doors)

Each Opening Shall Have:

- 3 – Each Hinges Hager BB1279 4 1/2 X 4 1/2 X NRP X 652
- 1 – Lockset Schlage D50RD Rhodes X 626
- 1 – Closer LCN P1460/1460 AL X TBGN
- 1 – Kickplate Rockwood 8 X 2 LDW 0.050 X 630 (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

HW4 (for Exterior Dbl Hollow Metal Doors at Shed)

Each Opening Shall Have:

- 6 – Each Hinges Hager BB1279 4 1/2 X 4 1/2 X NRP X 652
- 1 – Lockset Schlage D80RD 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 – Kickplate 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 Bottom Pemko 2211AV (for Hollow Metal Doors)
- 2 – Silencers

HW5 (For Interior Wood Door @ Crew Room)

Each Opening Shall Have:

- 3 – Each Hinges Hager BB1279 4 1/2 X 4 1/2 X 652
- 1 – Passage Schlage D10S Rhodes X 626
- 1 – Closer LCN 1460 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

HW6 (For Interior Wood Door @ Offices, Closet & Storage Rooms)
 Each Opening Shall Have:

3 – Each Hinges	Hager	BB1279 4 1/2 X 4 1/2 X 652
1 – Lockset	Schlage	D50RD Rhodes X 626
1 – Cylinder	Best	As Required
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		

HW7 (For interior Wood Doors @ HVAC & Elec. Rooms)
 Each Opening Shall Have:

1 – Set Spring Hinges	Hager	1256 4 1/2 X 4 1/2 X 652
1 – Lockset	Schlage	D80RD Rhodes X 626
1 – Cylinder	Best	As Required
1 – Stop	Rockwood	440 X 626
3 – Silencers		

HW8 (for interior Wood Door @ single toilet rooms and Shower)
 Each Opening Shall Have:

3 – Each Hinges	Hager	BB1279 4 1/2 X 4 1/2 X 652
1 – Privacy	Schlage	D40S Rhodes X 626
1 – Indicator Bolt	Falcon	D871 X 626
1 – Closer	LCN	1460 X TBGN X 695
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 630
3 – Silencers		

HW9 (For Interior Wood Door @ Corridor to Corridor Passage)
 Each Opening Shall Have:

3 – Each Hinges	Hager	BB1279 4 1/2 X 4 1/2 X 652
1 – Closer	LCN	1461 AL X TBGN
1 – Push Plate	Rockwood	70 (4 X 16) X 630
1 – Pull	Rockwood	70 (4 X 16) X 630
1 – Kickplate	Rockwood	8 X 2 LDW 0.050 X 630 (Mounted push side)
1 – Stop	Rockwood	440 X 626
3 – Silencers		

HW10 (For Interior Hollow Metal Door @ Area Separation Cor. to Shop)
 Each Opening Shall Have:

3 – Each Hinges	Hager	BB1279 4 1/2 X 4 1/2 X 652
1 – Lockset	Schlage	D50PD Rhodes X 626
1 – Cylinder	Best	As Required
1 – Closer	LCN	1461 AL X TBGN
1 – Kickplate	Rockwood	8 X 2 LDW 0.050 X 630 (Mounted push side)
1 – Stop	Rockwood	440 X 626
3 – Silencers		

END OF SECTION

SECTION 08 80 00 GLAZING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Glass and glazing for Aluminum Framed Entrances and Storefronts, doors, windows and other glazed openings, interior and exterior locations.

- B. Related Sections:
 - 1. Section 08 11 13 - Hollow Metal Doors and Frames.
 - 2. Section 08 14 29 - Prefinished Wood Doors.
 - 3. Section 08 41 13 - Aluminum Framed Entrances and Storefronts.
 - 4. Section 08 51 14 - Aluminum Windows-Single Hung.
 - 5. Section 08 51 15 - Aluminum Windows-Awning

1.02 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-45I.

- C. Heat-Treated Glass Standard: FS DD-G-I403.

- D. Safety Glass Standard: CPSC I6 CFR I20I.

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. Cardinal Glass Industries, Eden Prairie, MN. Tel. (952) 229-2600.
 - 2. PPG Industries, Inc., Pittsburgh, PA. Tel. (800) 377-5267.
 - 3. Viracon, Inc., Owatonna, MN. Tel. (800) 533-2080.
 - 4. Zeledyne, Tulsa, OK. Tel. (800) 331-2607.

- 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.
 - 2. Airspace Thickness: 1/2 - inch.
 - 3. Sealing System: Manufacturer's standard 1 inch sealing system with Argon.
 - 4. Spacer Material: Manufacturer's standard metal-white.
 - 5. Desiccant: Manufacturer's standard, either molecular sieve or silica gel.
 - 6. Corner Construction: Manufacturer's standard.
 - 7. Exterior Pane: Tinted; color – equal to "Bronze" by Cardinal Glass Industries
 - 8. Interior Pane: Clear with MSVD (Sputter) LoE³-366 on 3rd (air space) surface.
 - 9. Unit Performance Requirements for "Bronze" with LoE³-366.
 - a. Light Transmission (visible): 38 percent.
 - b. Center of Glass U-Factor (Btu/hr/ft²/°F) Argon: 0.24
 - c. SHGC: 0.26
 - d. Shading Coefficient: 0.30.
 - 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 1/4 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 1/8" 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 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 09 05 15 COLOR DESIGN

PART 1 - GENERAL

- 1.01 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.
- 1.02 MANUFACTURER'S TRADE NAMES: 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 RELATED SECTIONS: Section 01 33 00 – Submittal Procedures.
- 1.04 SAMPLES: 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: 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: The following manufacturers were used in preparing the Color Schedule:

SECTION / MATERIAL	MANUFACTURER / NUMBER & COLOR NAME	COLOR DESCRIPTION
• 03 30 00 - Concrete Floor Stain	H&C HC#157 Sandstone	(tan)
• 04 20 00 – Brick (Field)	TS #401B Cherry (Red) Velour	(red)
• 04 20 00 – Brick (Accent Bands)	TS #403B Burgundy Velour	(dark red)
• 04 20 00 - Mortar	Gray Mortar	(light gray)
• 04 20 00 - Masonry Weep Vents	Light Gray to match mortar	(light gray)
•		
• 05 50 00 - Metal Bollards	Safety Yellow	(yellow)
• 06 10 00 - Plywood Wainscot	S/W #6106-Kilim Beige	(light tan)
• 06 40 00 - Architectural Woodwork	S/W #6108-Latte	(tan)
• 06 40 00 - Plastic Lam Countertop	Formica #7219-58 Forest Terra	(green /brown)
• 07 61 00 - Sheet Metal Roofing	Firestone Sherwood Green SR	(dark Green)
• 07 61 00 - Met Trim, Gutters & DS	Firestone Sherwood Green SR	(dark Green)
• 07 61 00 - Soffit Panels	Firestone-Sierra Tan	(light tan)
• 07 92 00 - Joint Sealants	Pecora (Match adjacent material inside & outside)	

- 08 11 13 - HM Dr & Frames (Ext) S/W #6468-Hunt Club (dark green)
- 08 11 13 - HM Dr & Frames (Int) S/W #6109-Hopsack (light brown)
- 08 14 00 - Prefinished Wood Doors Graham #700 Dark Brown (brown)
- 08 33 23 - Overhead Coiling Doors Raynor-Tan (tan)
- 08 51 14 - Aluminum Windows Peerless-#395F515 Sarapi Green (green)
- 08 51 15 - Aluminum Windows Peerless-#395F515 Sarapi Green (green)
- 08 71 00 - Door Hardware Satin Chrome (silver)

- 09 29 00 - Gypsum Board (Walls) S/W #6106-Kilim Beige (light tan)
- 09 29 00 - Gypsum Board (Ceilings) S/W #7010 White Duck (white)
- 09 31 13 - Ceramic Tile Floor #1 Daltile Sage Green DC07 (light green)
- 09 31 13 - Ceramic Tile Floor #2 Daltile Hunter DC09 (dark green)
- (Checkedered Pattern)
- 09 31 13 - Ceramic Tile Wall #2 Daltile Almond K165 (beige)
- 09 31 13 - Ceramic Tile Wall #3 Daltile Oak Moss 0195 (dark green)
- 09 31 13 - Grout (Floors) Laticrete Moss 14 (green)
- 09 31 13 - Grout (Walls) Laticrete Almond 85 (beige)
- 09 65 00 - Resilient Floor (VCT #1) Armstrong-#51901Taupe (tan)
- 09 65 00 - Resilient Floor (VCT#2) Armstrong Tile #51808 Lichen Green (light green)
- 09 65 00 - Rubber Base Johnsonite- #86 Hunter Green (green)
- 09 68 00 - Carpeting Patcraft –Radical #I0015-15105 Spiked Hair (brown variegated)

- 10 11 00 - Visual Display Board Claridge-F577 Mint Green (light green)
- 10 11 00 - Tackboard Claridge-Cork 1105 Desert Sand (tan)
- 10 21 15 - Toilet Partition Rockwood-Deep Woods (dark green)
- 10 14 00 - Specialty Signs (Int-border) Mohawk-105 Black (black)
- 10 14 00 - Specialty Signs (Int-background) Mohawk-206 Hunter Green (dk green)
- 10 14 00 - Specialty Signs (Int-copy) Mohawk-226 Beige (beige)
- 10 26 13 - Corner Guards C/S Group #253 Parchment (light tan)
- 10 51 13 - Metal Lockers (Frames) Penco-#012 Tawny Tan (tan)
- 10 51 13 - Metal Lockers (Doors) Penco-#812 Hunter Green (green)
- 10 73 16 - Canopies Mapes-#20-8021HY Designer Beige (beige)
- 10 56 13 - Metal Storage Shelving Penco-Tawny Tan (tan)

- 11 31 15 - Appliances (Range) GE-Bisque (beige)
- 11 31 15 - Appliances (Microwave) GE-Bisque (beige)
- 11 31 15 - Appliances (Refrigerator) GE-Bisque (beige)

- 12 21 13 - Horizontal Louver Blinds Hunter Douglas-269 Chenille (light tan)
- 12 48 43 - Floor Mats C/S Group-Carpet #7304 Sandstone (tan)
- 12 48 43 - Floor Mats C/S Group-Rails Bronze Anodized (brown)

- 13 34 18 - Roof (Shed) Ceco-Galvalume (silver/gray)
- 13 34 18 - Roof Fascia & Rake (Shed) Ceco-Classic Green (green)
- 13 34 18 - Struct. Framing (Shed) S/W #6108-Latte (tan)

- 13 34 19 - Metal Building Main Roof Ceco-Snow White (white)
- 13 34 19 - Wall Panel Ceco-Classic Green (green)
- 13 34 19 - Roof Fascia & Rake Ceco-Classic Green (green)
- 13 34 19 - Struct. Framing (MHQ) S/W #6108- Latte (tan)

- 23 37 13 - Louvers C/S Group-#580 Interstate Green (dark green)

PART 3 - EXECUTION

3.01 EXECUTION

- 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

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Gypsum board work with a tape-and-compound joint treatment system known as "drywall finishing" work.
- B. The types of Work required include the following:
 - 1. Gypsum board applied to wood framing and furring.
 - 2. Gypsum backing boards for application of other finishes.
 - 3. Drywall finishing (joint tape-and-compound treatment).

1.02 SUBMITTALS

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

1.03 QUALITY ASSURANCE

- A. Where work is indicated for fire resistance ratings, including those required to comply with governing regulations, provide materials and installations identical with applicable assemblies which have been tested and listed by recognized authorities, including UL and A.I.A.
- B. Industry Standard: Comply with applicable requirements of GA-216 "Application and Finishing of Gypsum Board" by the Gypsum Association, except where more detailed or more stringent requirements are indicated including the recommendations of the manufacturer.
- C. Allowable Tolerances: 1/8 inch offsets between planes of board faces, and 1/4 inch in 8 ft. for plumb, level, warp and bow.
- D. Manufacturer: Obtain gypsum boards, framing and fasteners, trim accessories, adhesives and joint treatment products from a single manufacturer, or from manufacturers recommended by the prime manufacturer of gypsum boards.

1.04 PRODUCT HANDLING

- A. Deliver gypsum drywall materials in sealed containers and bundles, fully identified with manufacturer's name, brand, type and grade; store in a dry, well ventilated space, protected from the weather, under cover and off the ground.

1.05 PROJECT CONDITIONS

- A. Installer must examine the substrates and the spaces to receive gypsum drywall, and the conditions under which gypsum drywall is to be installed; and shall notify the Contractor, in writing, of conditions detrimental to the proper and timely completion of the work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

- B. Maintain ambient temperatures at not less than 55 degrees F., for the period of 24 hours before drywall finishing, during installation and until compounds are dry.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Obtain gypsum board, framing and fasteners, trim accessories, adhesives and joint treatment products from one of the following:
 1. Certain Teed Corporation, PA Tel: (800) 233-8990.
 2. Georgia-Pacific Corp, Atlanta, GA, Tel. (800) 327-2344.
 3. National Gypsum Company, Charlotte, NC, Tel. (800) 343-4893.
 4. United States Gypsum Company, Chicago, IL, Tel. (800) 874-4968.

2.02 GYPSUM BOARD PRODUCTS

- A. Furnish Gypsum board products in maximum lengths available to minimize end-to-end butt joints. To the extent not otherwise indicated, comply with GA-216, as specified and recommended.
- B. Exposed gypsum board shall be Type X, fire rated type with tapered long edges and as follows:
 1. Edge Profile: Special rounded or beveled edge.
 2. Sheet Size: Maximum length available that will minimize end joints.
 3. Thickness: 5/8 inch, except where otherwise indicated.
 4. Water-resistant Type (WR-1): Provide at exterior walls and at "Wet" areas; equal to 5/8 inch thick DensArmor Plus Fireguard by G-P Gypsum.
 5. Cement Board: Provide water-resistant cement based backer board as a base for ceramic tile, equal to 5/8 inch thick Durock by USG.

2.03 TRIM ACCESSORIES

- A. Manufacturer's standard galvanized steel beaded units with flanges for concealment in joint compound including corner beads, edge trim and control joints; except provide semi-finishing type (flange not concealed) where indicated.
- B. Where metal moldings are specifically called out on the Drawings, provide the appropriate item from below:
 1. Edge Trim - USG No. 200-A.
 2. Control Joint - USG No. 093.

2.04 JOINT TREATMENT MATERIALS

- A. General: ASTM C 475; type recommended by the manufacturer for the application indicated, except as otherwise indicated.
- B. Joint Tape: Perforated type.

- C. Joint Compound: On interior work provide chemical hardening type for bedding and filling, ready-mixed vinyl-type or non-case in-type for topping. On exterior work provide water-resistant type.

2.05 MISCELLANEOUS MATERIALS

- A. Provide auxiliary materials for gypsum drywall work of the type and grade recommended by the manufacturer of the gypsum board. Gypsum board fasteners shall comply with GA-216. Provide anti-corrosive type at exterior applications.

PART 3 - EXECUTION

- 3.01 Install supplementary framing, runners, furring, blocking and bracing at opening and terminations in the Work, and at locations required to support fixtures, equipment, services, heavy trim, furnishings and similar work which cannot be adequately supported directly on gypsum board alone.

3.02 GENERAL GYPSUM BOARD INSTALLATION REQUIREMENTS

- A. Meet at the project site with the installers of related work and review the coordination and sequencing of work to ensure that everything to be concealed by gypsum drywall has been accomplished, and that chases, access panels, openings, supplementary framing and blocking and similar provisions have been completed. In addition to compliance with GA-216 and ASTM C 840, comply with manufacturer's instructions and requirements for fire resistance ratings (if any), whichever is most stringent.
- B. Install wall / partition boards vertically to avoid end- butt joints wherever possible. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs. Form control joints and expansion joints with space between edges of boards, prepared to receive trim accessories.
- C. Install cellulose thermal insulation as indicated, prior to gypsum board unless readily installed after board has been installed.
- D. Floating construction: Where feasible, including where recommended by manufacturer, install gypsum board with "floating" internal corner construction, unless isolation of the intersecting boards is indicated or unless control or expansion joints are indicated.
- E. Space fasteners in gypsum boards in accordance with manufacturer's recommendations.

3.03 SPECIAL GYPSUM BOARD APPLICATIONS

- A. Where drywall is base for thin set ceramic tile and similar rigid applied wall finishes, install water-resistant cement based backing board.
- B. At toilets, showers, labs, janitor closets, drinking fountains and similar "wet" areas without ceramic tile, install water-resistant gypsum board.
- C. Apply with uncut long edge at bottom of work, and space 1/4 inch above fixture lips. Seal ends, cut-edges and penetrations of each piece with water-resistant sealant before installation.

3.04 INSTALLATION OF DRYWALL TRIM ACCESSORIES

- A. Where feasible, use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to the supports. Otherwise, fasten flanges by nailing or stapling in accordance with manufacturer's instructions and recommendations.
- B. Install metal corner beads at external corners of drywall work.
- C. Install metal edge trim whenever edge of gypsum board would otherwise be exposed or semi-exposed. Provide type with face flange to receive joint compound except where semi-finishing type is indicated. Install L-type trim where work is tightly abutted to other work, and install special kerf-type where other work is kerfed to receive long leg of L-type trim. Install U- type trim where edge is exposed, revealed, gasketed, or sealant-filled (including expansion joints.) Install metal control joint (beaded type) where indicated or required for proper installation.

3.05 INSTALLATION OF DRYWALL FINISHING

- A. Apply treatment at gypsum board joints (both directions), flanges of trim accessories, penetrations, fastener heads, surface defects and elsewhere as required to prepare Work for decoration. Pre-fill open joints and rounded or beveled edges, using type of compound specified herein and recommended by manufacturer.
- B. Apply joint tape at joints between gypsum boards, except where a trim accessory is indicated.
- C. Apply joint compound in 3 coats (not including pre-fill of openings in base), and sand between last 2 coats and after last coat.
- D. Base for Ceramic Tile: Do not install drywall finishing where ceramic tile and similar rigid applied finishes are indicated.
- E. Unless otherwise indicated, install drywall finishing at all gypsum board exposed to view and to receive finishes as specified. Where not exposed to view and above ceilings, sanding is not required.
- F. Finishing Gypsum Board Assemblies: Level 4 finish, unless otherwise indicated; Level 1 finish for concealed areas, unless a higher level of finish is required for fire-resistance-rated assemblies and Level 2 finish where panels form substrates for tile, Level 5 finish is required in areas with a gloss or epoxy finished coating

3.06 PROTECTION OF WORK

- A. Installer shall advise Contractor of required procedures for protection of the gypsum drywall Work from damage and deterioration during the remainder of the construction period.

END OF SECTION

SECTION 09 31 13

THIN-SET CERAMIC TILING

PART 1 - GENERAL

1.01 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 05 15 – Color Design.
- C. Section 09 29 00 – Gypsum Board (For cement based backer board).

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 TCA 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 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. Lone Star Porcelain Mosaic Tile, Dallas, Texas
 6. 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 Floor Tile: 8 inches by 8 inches by 5/16 inch, cushioned edge, unglazed, color to be selected from standard colors available.
- B. Ceramic Base Tile: 4-1/4 inches by 4-1/4 inches by 5/16 inch, cushioned edge, bright glaze, cove base round top, color to be selected from standard colors available.
- C. Glazed Wall Tile: Size 4-1/4 inches by 4-1/4 inches by 5/16 inch, cushioned edge, bright glaze, colors to be selected from standard colors available.
- D. 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-buttet square, except use square corner, combination angle and stretcher type cap.
- E. 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.
- F. Adhesive: ANSI A136.1 and ANSI A118.4 when mixed with additive, with Tile Contractor's Association or Adhesive and Sealant Council certification of conformance, for base and wall tile set on each type of substrate. Provide primer-sealer as recommended by adhesive manufacturer. Equal to Laticrete Type 272 Premium or 317 Floor 'N Wall Thin-Set with 333 Super Flex Additive. Equivalent products by Mapei and Bostik are acceptable.
- G. Grout: ANSI A 118.3, with Tile Contractor's Association certification of conformance. Equal to Laticrete Type SpectraLOCK Pro Grout.
1. Equivalent products by Mapei and Bostik 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 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.

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 SUMMARY

A. Section Includes:

1. Lay-in acoustical panels (2 ft. by 2 ft. Grids) for metal ceiling suspension systems.
2. Suspended metal grid system complete with wall trim.

B. Related Sections:

1. Section 07 21 00 – Thermal Insulation.
2. Section 09 29 00 – Gypsum Board.
3. Division 23 for Mechanical Requirements.
4. Division 26 for Electrical Requirements.

1.02 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.

1. Include manufacturer's recommendations for cleaning and refinishing acoustical units, including precautions against materials and methods that may be detrimental to finishes and acoustical performances.

1.03 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).

1.04 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.

1.05 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.

1.06 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 ft. by 2 ft. 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 10 pounds per cubic foot, medium-coarse non-directional texture, NRC 0.50 to 0.60, CAC 25 to 33, light reflectance over 75 percent. Products offered by manufacturers to comply with requirements include the following:
1. No. 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 I, Direct Hung.
1. Hanger Wires: Galvanized carbon steel, ASTM A 641, soft temper pre-stretched, yield-stress load of at least 3 times design load, but not less than 12 gage (0.106 inch).
 2. Type of System: Either direct or indirect-hung suspension system, at Contractor's option.
 3. System Manufacturer: Same as acoustical unit manufacturer or one of the following:
 - a. 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 1/8 inch in 12 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 16 inches on center and not more than 3 inches from ends, leveling with ceiling suspension system to tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
 - 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 00 RESILIENT FLOORING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Vinyl Composition Tile (V.C.T.) 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 Mannington Commercial, P.O. Box 12281, Calhoun, GA 30701, Tel. No. (800) 241-2262.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Armstrong Commercial Flooring, Lancaster, PA. Tel. No. (800) 292-6308.
 - 2. Azrock Commercial Flooring, Florence, AL. Tel. No. (800) 558-2240.
 - 3. 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 TILE FLOORING

- A. Vinyl Composition Tile: ASTM F 1066: Composition 1, Class 2, Premium Visual Tile, as manufactured by Mannington Commercial.
- B. Size: 12 inches by 12 inches.
- C. Thickness: 1/8 inch gage.
- D. Color: Color to be selected by Project Engineer / MDOT Architect from manufacturer's full range of 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, laid 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.
- 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. Sweep or vacuum thoroughly, and remove residual adhesive with a clean white cloth dampened with cleaners as recommended by flooring manufacturer.
 4. Apply 3 coats of manufacturers recommended high-quality cross-linked acrylic floor polish, allowing 60 minutes drying time between applications.
- 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, scrub the floor using a good quality non-alkaline cleaner and a floor machine of 170-250 rpm equipped with a green or blue scrubbing pad.
1. Thoroughly rinse the floor (avoid flooding the floor) and allow the floor to dry completely.
 2. Apply 3 coats of manufacturers recommended high-quality, cross-linked acrylic floor polish, allowing 60 minutes between applications.
 3. After polish is completely dry, spray buff using a diluted (7 - 8 percent solids) floor polish. Before the liquid is dry, buff with a floor machine equipped with a white or tan buffing pad or a soft brush at 170-700 rpm. Buff until the liquid is dry and a thin glossy film remains.
 4. Protect completed Work from traffic and damage until acceptance by the Owner.

END OF SECTION

SECTION 09 68 00 CARPETING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Broadloom carpet of Cut and Loop construction, tufted.
- B. Related Sections include the following:
 - 1. Division 09 Section "Resilient Tile Flooring" for resilient wall base and accessories installed with carpet.
 - 2. Division 09 Section "Color Design" for color selection.

1.02 SUBMITTALS

- A. Samples:
 - 1. Submit two samples, 12 inches x 12 inches in size illustrating color and pattern for each carpet material specified.
 - 2. Samples: Submit finish and color samples of contour edge transition materials.
- B. Manufacturers Installation Instructions: Indicate special procedures.
- C. Maintenance Data: Include maintenance procedures; recommend maintenance material and suggested schedule for cleaning.
- D. Qualification Data: For Installer.

1.03 EXTRA MATERIALS

- A. Provide Owner with overage stock of 10 percent of Carpets.

PART 2 - PRODUCTS

2.01 CARPET

- A. Products: Subject to compliance with requirements, provide the following:

- 1. Manufacturer: Patcraft
 - Style Name& Color: Radical I0015-15105 Spiked Hair
 - Pile Construction: Textrue Weave Loop
 - Face Yarn: Solution Dyed Nylon / Yarn Dyed Nylon
 - Tufted Yarn Weight: 28 Ounces
 - Tufted Pile Height: 7/32 inch high / 4/32 inch low
 - Gauge: 1/10
 - Stitched Per Inch: 11
 - Primary Backing: Polypropylene
 - Secondary Backing: Everbond® EX
 - Density: 6,462
 - Protective Treatment: Patcraft SP
 - Flammability: Passes Methenamine Pill Test (DOC ff#1-70)
 - Flooring Radiant panel: Meets NFPA Class 1 under ASTM E-648
 - Wear Warranty: Patcraft Lifetime

- B. Source: Patcraft Commercial Carpet, A Berkshire Hathaway Company, P O Box 2128, Dalton, GA 30722-2128. Tel. (800) 241-4014.
- C. Equivalent products by the following manufacturers are acceptable:
 - 1. Bentley Prince Interface, Inc. City of Industry, CA. Tel. (800) 423-4709.
 - 2. Designweave, 15305 Valley View Avenue, Santa Fe Springs, CA 90670. Tel. (888) 393-2830.
- D. Alternate manufacturers: Materials produced by other manufacturers that fully meet or exceed the specified requirements may be considered under the provisions of Section 01 62 14-Product Options and Substitution Procedures.

2.02 ACCESSORIES

- A. Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or as recommended by carpet manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet and carpet cushion manufacturers.
- C. Seam Adhesive: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for sealing and taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.
- D. Contact Adhesive: Compatible with carpet material; resealable type. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are smooth and flat with maximum variation not exceeding 1/4 inch in 10 feet and area ready to receive work.
- B. Examine substrate for moisture content and other conditions under which carpeting is to be installed, and notify the Contractor in writing of conditions detrimental to proper completion of the work.
- C. Verify that floor mounted utilities are in correct location.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. General: Comply with CRI 104, Section 7.3, "Site Conditions; Floor Preparation," and with carpet manufacturer's written installation instructions for preparing substrates.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level

cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch, unless manufacturer requires more stringent requirements in their written instructions.

- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet manufacturer.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet.
- E. Sequence carpeting with other Work so as to minimize the possibility of damage and soiling of carpet during the remainder of the construction period.

3.03 INSTALLATION

- A. Comply with CRI 104 and carpet manufacturers' written installation instructions for the following:
 - 1. Direct-Glue-Down Installation: Comply with CRI 104, Section 9, and "Direct Glue-Down Installation."
- B. Double cut carpet to allow intended seam and pattern match. Make cuts straight and free of gaps.
- C. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
- D. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device
- F. Cut and fit carpet tight to interruptions. Terminate carpet with edge strips at dissimilar materials.
- G. Install pattern parallel to walls and borders to comply with CRI 104, Section 15, and "Patterned Carpet Installations" and with carpet manufacturer's written recommendations. Review with Architect's representative on site, prior to installation to verify pattern layout.

3.04 CLEANING AND PROTECTING

- A. Perform the following operations immediately after installing carpet:
 - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
 - 2. Remove excess adhesive from floor, base and wall surfaces without damage, using cleaning recommended by carpet manufacturer.
 - 3. Remove yarns that protrude from carpet surface.
 - 4. Vacuum carpet using commercial machine with face-beater element.
- B. Protect installed carpet to comply with CRI 104, Section 16, and "Protection of Indoor Installations."

- C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer and carpet cushion and adhesive manufacturers.
- 3.5 Schedule:
- A. Refer to drawings for extent of Work in this Section.

END OF SECTION

SECTION 09 90 00

PAINTING AND COATING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- 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.
- B. 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.
- C. "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.
- D. 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.
- E. Extra Materials: Deliver to Owner a 1-gal. Container, properly labeled and sealed, of each color and type of finish coat paint used on Project and with readable labels.

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 RELATED SECTIONS

- A. Section 09 05 15 – Color Design.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's technical information including basic materials analysis and application instructions for each coating material specified.
- B. Paint Systems: Comply with Article 2.04 indicating each type of primer and top coat required for each substrate by product name and number.
- C. Samples: 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.
- D. Bidders desiring to use coatings other than those specified shall submit their proposal in writing to the Architect at least ten (10) days prior to the bid opening. 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.

1.05 QUALITY ASSURANCE

- A. On actual wall surfaces and other exterior and interior building components, duplicate painted finishes as specified. On at least 100 square feet of surface as directed, provide full-coat finish samples until required sheen, color and texture is obtained; simulate finished lighting conditions for review of in-place Work.

1.06 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 under cover, protected from inclement weather and adverse temperature extremes, in original containers or unopened packages, in accordance with manufacturer's instructions.

1.07 PROJECT CONDITIONS

- A. Apply water-base paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 50 degrees F. and 90 degrees F. unless otherwise permitted by the paint manufacturer's printed instructions.
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 45 degrees F. and 95 degrees F. unless otherwise permitted by the paint manufacturer's printed instructions.
- C. 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.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by the Sherwin-Williams Company, 101 Prospect Avenue NW, Cleveland, OH 44115. Tel. (800) 321-8194.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Benjamin Moore & Company, Montvale, NJ. Tel. (800) 344-0400.
 - 2. Farrell-Calhoun Paint, Memphis, TN. Tel. (901) 526-2211.
 - 3. Tnemec Company Inc., Kansas City, Missouri. Tel. (800) 863-6321.

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. Color 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 ACCEPTED. 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.

2.04 PAINT SYSTEMS

- A. Provide the following paint systems for the various substrates, as indicated.
- B. Exterior Paint Systems are as follows:
 - 1. Ferrous and Zinc Coated Metal
 - 1st Coat: S-W ProCryl® Universal Primer, B66-310 Series
(2-4 mils dry)
 - 2nd Coat: S-W Duration® Exterior Latex Acrylic Gloss Coating, K34 Series
(7 mils wet, 2.8 mils dry per coat)
 - 2. Steel Shop Primed (structural steel framing exposed to view including steel lintels)
 - 1st Coat: S-W ProCryl® Universal Primer, B66-310 Series
(2-4 mils dry)
 - 2nd Coat: S-W Centurion® Water Based Urethane, B65-700 Series
 - 3rd Coat: S-W Centurion® Water Based Urethane, B65-700 Series
(2-3 mils dry per coat)
- C. Interior Paint Systems are as follows:
 - 1. Gypsum Drywall (Semi-Gloss)
 - 1st Coat: S-W Harmony Low Odor Interior Latex Primer, B11W900
(4 mils wet, 1.3 mils dry per coat)
 - 2nd Coat: S-W Harmony Low Odor Interior Latex Semi-Gloss, B10 Series
 - 3rd Coat: S-W Harmony Low Odor Interior Latex Semi-Gloss, B10 Series
(4 mils wet, 1.6 mils dry per coat)
 - 2. Gypsum Drywall (Eggshell)
 - 1st Coat: S-W Harmony Low Odor Interior Latex Primer, B11W900
(4 mils wet, 1.3 mils dry per coat)
 - 2nd Coat: S-W Harmony Low Odor Interior Latex Eg-Shel, B9 Series
 - 3rd Coat: S-W Harmony Low Odor Interior Latex Eg-Shel, B9 Series
(4 mils wet, 1.6 mils dry per coat)
 - 3. Gypsum Drywall (in wet areas)
 - 1st Coat: S-W Harmony Low Odor Interior Latex Primer, B11W900
(4 mils wet, 1.3 mils dry per coat)
 - 2nd Coat: S-W Waterbased Catalyzed Epoxy, B70W211/ B60V25
 - 3rd Coat: S-W Waterbased Catalyzed Epoxy, B70W211/ B60V25
(2.5 - 3 mils dry per coat)
 - 4. Gypsum Drywall (under vinyl wall covering)
 - 1st Coat: S-W PrepRite® PreWallcoving Primer, B28W980
(4 mils wet, 1.2 mils dry)

5. Ferrous and Zinc Coated Metal
 - 1st Coat: S-W ProCryl Universal Primer, B66-310 Series
 - 2nd Coat: S-W ProClassic Waterborne Acrylic Semi-Gloss, B31 Series
 - 3rd Coat: S-W ProClassic Waterborne Acrylic Semi-Gloss, B31 Series
(4 mils wet, 1.4 mils dry per coat)
6. Exposed Structural Steel and Roof Deck (shop primed steel)
 - 1st Coat: S-W ProCryl Universal Primer, B66-310 Series - Spot Prime if needed
(2-4 mils dry)
 - 2nd Coat: S-W Waterborne Acrylic Dry Fall, B42W2
 - 3rd Coat: S-W Waterborne Acrylic Dry Fall, B42W2
7. Painted Woodwork
 - 1st Coat: S-W Harmony Low Odor Interior Latex Primer, B11W900
(4 mils wet, 1.3 mils dry per coat)
 - 2nd Coat: S-W ProClassic Waterborne Acrylic Semi-Gloss, B31 Series
 - 3rd Coat: S-W ProClassic Waterborne Acrylic Semi-Gloss, B31 Series
(4 mils wet, 1.4 mils dry per coat)
8. Stained Woodwork
 - 1st Coat: S-W Minwax 250 VOC Stains
 - 2nd Coat: S-W WoodClassics Waterborne Polyurethane Varnish, A68 Series
 - 3rd Coat: S-W WoodClassics Waterborne Polyurethane Varnish, A68 Series
(4 mils wet, 1.0 mil dry per coat)
9. Concrete Floor Stain & Sealer (Opaque Color)
 - 1st Coat H&C Concrete Sealer Solid Color Solvent Based
 - 2nd Coat H&C Concrete Sealer Solid Color Solvent Based
Include Optional - H&C SharkGrip Slip Resistant Additive to the 2nd coat
Note - New concrete must be etched prior to application, comply with manufacturer's written instructions
10. Concrete Floor Sealer (Clear)
 - 1st Coat H&C Concrete Sealer Solid Color Solvent Based - Clear
 - 2nd Coat H&C Concrete Sealer Solid Color Solvent Based - Clear
Include Optional - H&C SharkGrip Slip Resistant Additive to the 2nd coat, comply with manufacturer's written instructions

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. 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 contaminants from the cleaning process with not fall onto wet, newly painted surfaces.

B. Ferrous Metals:

1. Clean ferrous surfaces, which are not galvanized or shop-coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.
2. Touch-up shop-applied prime coats wherever damaged or bare. Where required by other Sections of these Specifications, clean and touch-up with the same type shop primer.

C. Galvanized Surfaces: Clean free of oil and surface contaminants with acceptable non-petroleum based solvent.

D. Wood: Clean wood surfaces to be painted of all dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer before application of the priming coat.

1. Prime, stain, or seal wood required being job-painted, as soon as practicable upon delivery to job. Prime edges, ends, faces, under sides, and backsides of such wood, including cabinets, counters, cases, paneling, etc. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dry.
2. When transparent finish is required, use sealer as recommended by manufacturer. Seal tops, bottoms, and cutouts of unprimed wood doors with sealer immediately upon delivery to project.

3.03 MATERIALS PREPARATION

- A. Mix and prepare painting materials in accordance with manufacturer's directions. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing and application of paint in a clean condition, free of foreign materials and residue. Stir materials before application to produce a mixture of uniform density, and stir as required during the application of the materials. Do not stir surface film into the material. Remove the film and if necessary, strain the material before using.

3.04 APPLICATION

- A. Apply paint in accordance with the manufacturer's directions. Use applicators 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 Painting: 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 Plumbing, HVAC and Electrical Sections.
 - 1. Mechanical items to be painted include, but are not limited to, the following:
 - a. Piping, pipe hangers, and supports.
 - b. Heat exchangers.
 - c. Tanks.
 - d. Ductwork.
 - e. Motor, mechanical equipment and supports.
 - f. Accessory items.
 - 2. Electrical items to be painted include, but are not limited to, the following:
 - a. Conduit and fittings.
 - b. Switchgear.
- I. Prime Coats: Apply a prime coat of material which is required to be painted or finished, and which has not been prime coated by others. Re-coat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.
- J. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, or other surface imperfections will not be acceptable.
- K. Transparent (Clear) Finishes: Use multiple coats to produce glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections. Provide satin finish for final coats, unless otherwise indicated.
- L. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint Work not in compliance with specified requirements.

3.05 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.

END OF SECTION

SECTION 09 96 77

HIGH-PERFORMANCE COATING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
1. Materials and installation methods for a polyurethane metallic pigmented coating used to seal rusted areas / surfaces.
 2. Providing materials, preparation of surfaces and installation methods for a water-based, high-performance top coating used to cover existing exterior metal roof panels of existing Equipment Shed and Fuel Tanks / Pump Pedestals at Fuel Station.

1.02 DESCRIPTION

- A. Rust Grip® is a one-part polyurethane metallic pigmented coating containing 51.3 percent solids by volume. It is designed to seal rusted surfaces.
- B. Super Threm® is a water-based, high-performance coating which exhibits strength and toughness while providing a unique protection from heat radiation. Using a combination of low-density ceramics in an industrial grade resin system, Super Threm® also guards against corrosion while providing mold and mildew, and vapor and moisture resistance.

1.03 PERFORMANCE REQUIREMENTS (SUPER THREM®)

- A. American Society of Testing and Materials (ASTM):
1. ASTM B-117 / D-1654; Salt Spray (Fog); Results; Passed 450 Hours.
 2. ASTM C-411; High-Temperature Surface Performance; Results; no warping, cracking, delamination, or color change.
 3. ASTM C-1371; Emissivity; Results; 0.91%.
 4. ASTM C-1371; Reflectivity; Results; 0.85%.
 5. ASTM D-412; Tensile Strength; Results; 444 psi.
 6. ASTM D-522; Mandrel Bend; Results; 1" (25mm) bend, 1/4" (6mm) bend.
 7. ASTM D-1653; Water Vapor Permeability; Results; Passed.
 8. ASTM D 3273-82T / D 3274; Fungal Resistance; Results; Passed.
 9. ASTM D-4060; Abrasion Resistance (Taber test); Results; 0.06g.
 10. ASTM D-6904; Resistance to Wind Driven Rain for Exterior Coatings (Fed Spec TT-C-555B)
 11. ASTM D-7088; Resistance to Hydrostatic Pressure for Coatings (Fed Spec TT-C-555B)
 12. ASTM E-84 (NFPA 255); Flame Spread / Smoke Developed; Results; Class "A" Rating.
 13. ASTM E 84-89; Flame Spread / Smoke Developed; Results; Flame Index "0", Smoke Index "0".
 14. ASTM E-96; Water Vapor Transmission; Results; Less than .01

Note: All tests run in triplicate. Above values are the average results.

1.04 SUBMITTALS

A. Manufacturer's current product data sheet which includes the following information:

1. Generic type of coating.
2. Performance data with certified test reports.
3. Recommended dry film thickness.
4. Application instructions.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. All work shall be performed by skilled craftsmen qualified to perform the required work in a manner comparable with the best standards of practice and shall be an approved/certified applicator of the manufacturer of the coating.
2. Continuity of personnel shall be maintained and transfers of key personnel shall be coordinated with the Architect.
3. The Contractor shall provide a supervisor/superintendent at the work site during the cleaning and application operation.
4. The supervisor/superintendent shall have the authority to sign change orders, coordinate work and make decisions pertaining to the fulfillment of the Contract.
5. The manufacturer of the coatings may have a factory representative on site if desired by the factory.

1.06 HANDLING, STORAGE AND SAFETY

- A. Materials delivered to job-site shall be in original sealed and labeled containers of the coating manufacturer.
- B. Coatings shall be stored in facilities designed for the purpose of coating storage and mixing. Storage areas shall be located away from open flames, be well ventilated, and be capable of maintaining ambient storage temperature as recommended by the coating manufacturer.
- C. Coatings, reducing agents, and other solvents must be stored in original containers until opened. If not resealable, then they must be transferred to UL approved safety containers.
- D. Provide proper ventilation, personal protection and fire protection for storage before, during and after application.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Coatings shall be applied during good weather.
- B. Surface temperature shall be at least 5 degrees F above dew point.
- C. Air and surface temperatures shall be within limits prescribed by the manufacturer for the coating being applied and work areas shall be reasonable free of airborne dust at the time of application and while coating is drying.

1.08 WARRANTY

- A. Submit a specimen of the Manufacturer's ten-year vertical wall warranty.
 - 1. Applicator shall be certified by the Manufacturer.
 - 2. Applicator shall comply with the Manufacturer's warranty procedures and requirements.
 - 3. Applicator shall provide a copy of the project drawings, plus photographs which include descriptions of the project and all unusual details, with the form. Before, during, and after photos shall be submitted with project profile to the Manufacturer at the end of the project prior to issuance of warranty.
 - 4. Completed warranty registration forms must be returned to the Manufacturer's Warranty Department with appropriate signatures of the contractor and building owner no later than 15 days after completion of the project.
 - 5. A Representative of the Manufacturer will inspect the project upon completion and within 6 months after completion. All defective work shall be repaired in accordance with this specification and to the satisfaction of the Manufacturer/Architect/Owner.
 - 6. Applicator shall provide warranty inspections throughout the duration of the warranty period.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on coatings manufactured by Superior Products International II, Inc., Shawnee, Kansas, Tel. (913) 962-4848.
- B. 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.

2.03 MATERIALS

- A. Rust Repair Coating: The coating utilized shall be Rust Grip®, which is a one-part polyurethane metallic pigmented coating containing 51.3 percent solids by volume. Comply with manufacturer's recommended technical data for other requirements.
- B. Colors: Where not specified, shall be "White." Coatings may be color tinted by the Manufacturer. MDOT Architect will select colors from manufacture's complete range of available colors
- C. Walls: The coating utilized shall be Super Therm®, which is a water based, ceramic coating containing 68 percent solids by volume. Film thickness must be 10.0 mils dry film thickness. Comply with manufacturer's recommended technical data for other requirements.
- D. All materials are to be lead and chromate free.

2.04 EQUIPMENT

- A. The applicator's coating equipment shall be designed for application of materials specified and shall be maintained in first class working condition. Equipment shall be subject to approval of the Project Engineer/MDOT Architect.
 - 1. Recommended spray equipment is airless sprayer (3,000 psi or less) with carbon steel or titanium tip sized between .029 and .032

- B. In accordance with requirements set forth by regulatory agencies applicable to the construction industry, the manufacturer's printed instructions and appropriate technical bulletins, the contractor shall provide and require use of protective life-saving equipment for persons working in or around the project site.
- C. Equipment shall include protective helmets which shall be worn by all persons while in the vicinity of the work.
- D. Where ventilation is used to control hazardous exposure, all equipment shall be explosion-proof. Ventilation shall reduce the concentration of air contaminants to the degree that a hazard does not exist.
- E. Wherever the occupational noise, exposure exceeds State and Federal maximum allowable sound levels, the contractor shall provide and require the use of approved ear protective devices.
- F. Temporary ladders and scaffolding shall conform to applicable safety requirements. They shall be erected where requested by the Project Engineer/MDOT Architect to facilitate inspection and be moved by the contractor to locations requested by the Project Engineer/MDOT Architect.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine surfaces scheduled to be coated prior to commencing work.
- B. Report in writing to the Owner's representative any condition that may affect proper application and overall performance of the coating system.
- C. Do not proceed with work until such conditions have been corrected.
- D. Commencing with work indicates acceptance of existing conditions and responsibility for performance of applied coating.

3.02 SURFACE PREPARATION

- A. General:
 - 1. Comply with manufacturer's written instructions and recommendations applicable to substrates and coating systems indicated.
 - 2. Material applied prior to approval of the surface by the Architect shall be removed and reapplied to the satisfaction of the Architect at the expense of the Contractor.
 - 3. Dust, dirt, oil, grease or any foreign matter that will affect the adhesion or durability of the coating shall be removed by washing with citrus cleaner. Surface must be complete dry and clean.
 - 4. Surface preparation and repairs shall be approved by the Architect/Owner before primer is applied.
- B. Present Surface Conditions:
 - 1. Remove all dirt, oil, tar, grease, or contaminants using citrus cleaner.
 - 2. Unsound surface materials shall be repaired or replaced prior to coating application.
 - 3. Repair holes and open seams prior to coating application.

C. Dirt, Oil, Tar, Grease, and Contaminants Removal:

1. Power wash surface (3,500 psi) with citrus cleaner to remove all dirt, oil, tar, grease, or contaminants and previous coatings not tightly bonded.
2. When surface is clean, rinse well with water. Surface must be completely dry and clean.

3.03 MIXING INSTRUCTIONS

- A. Prior to application Super Therm[®] shall be mixed mechanically or by hand for three minutes.
- B. Super Therm[®] should not be diluted or thinned. Water should not normally be mixed with Super Base H/S and Super Therm[®]. However, if coating becomes dry in pail, then add small amount of water, remix, and continue application.
- C. Colors shall be mixed by the manufacturer.

3.04 APPLICATION INSTRUCTIONS

- A. Super Therm[®] can be applied by brush, roller, or airless sprayer.
 1. If application is by brush, use a soft or medium bristle brush. Two coats will be required to achieve the desired thickness when using a brush.
 2. If application is by roller, use a 3/4 inch nap roller. Two coats will be required to achieve the desired thicknesses when using a roller.
 3. If application is by spray, use a standard airless sprayer (3,000 psi or less) with a carbon steel or titanium tip sized between .029 and .032.
 4. Remove filters from the gun handle and spray machine prior to application as they will trap the ceramics.
- B. Super Therm[®] shall be applied at no less than at total of 16 mils wet/10 mils dry (100 sq/ft per gallon).
- C. If Super Therm[®] is applied during a period of high humidity or if there is rain after application, bubbles may appear on the surface. Do not puncture the bubbles. This is normal and the coating will continue to cure with no effect on the performance or appearance of the coating. Bubbles will disappear without a trace or imprint.

3.05 INSPECTION

- A. After application of coating in the specified system and its surface has cured, measure its thickness with a properly calibrated Nordson Microtest Dry Film Thickness Gauge, or equivalent. (Use an instrument such as a Tooke gauge if a destructive tester is deemed necessary). Follow standard method for measurement of dry paint thickness. The Project Engineer/MDOT Architect shall, at his discretion, use the contractor's or his own equipment to perform similar inspections.
- B. Make as many determinations as needed to ensure the specified thickness are achieved. The contractor shall apply additional coat(s), at no extra cost to the Owner, to all surfaces having less dry film thickness than specified until the specified thickness is achieved.
- C. The coating applicator shall permit the Owner's representative and/or coatings manufacturer (as requested by Owner) to inspect his work for conformance to this specification. Owner reserves the right to reject all work which does not comply with this specification.

3.06 CLEAN UP

- A. Upon completion, clean up and remove from site all surplus materials, tools, appliance, empty cans, cartons and rubbish which result from painting work. Site shall be left in a neat and orderly condition.
- B. Remove all protective drop clothes and masking from surfaces not being coated. Provide touch-up around same areas as directed by Owner's representative.
- C. Remove all splatters and drippings.
- D. Upon completion of the work, all staging, scaffolding and containers shall be removed from the site or destroyed in a manner approved by the Project Engineer/MDOT Architect.
- E. Keep the area of work in a clean condition and do not permit cleaning materials to accumulate as to constitute a nuisance or hazard to the execution of the work or the operation of the existing facilities.

3.07 PROTECTION

- A. Diligence shall be taken to ensure that vehicles, equipment, fixtures, miscellaneous hardware, etc. are protected against coating spillage, over-spray, etc.
- B. Surfaces not to be coated will be marked, removed, or otherwise covered to protect against cleaning and coating application procedures and weather. Such damages shall be corrected at no expense to the Owner. Finished surfaces shall be free from defects or blemishes.
- C. Protective coverings or drop clothes shall be used to protect floors, fixtures, and equipment.
- D. Surfaces, from which materials cannot be removed satisfactorily, shall be repainted as required to produce a finish satisfactory to the Project Engineer / MDOT Architect.

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 Visual Aid Boards and Tackboard.

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. Visual Aid Board: Equal to Claridge No. 209 Premier Lecture Cabinet Unit with satin anodized finish, LCS marker board back panel, and Fabricork vinyl finish on inside doors in colors and textures as selected by Project Engineer / MDOT Architect from manufacturer's standards. Include fluorescent light fixture with 15 foot cord, pad of white sketching paper, map hooks, felt eraser, and assorted LCS markers. Size, 4 feet by 4 feet. One unit required unless additional units are indicated on the Drawings.
- B. Tackboard: Equal to Claridge Series # 1 type "CO" factory built 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. 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 equal 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. Adjust length of light cord to remove slack. Coordinate with electrical, electrical outlet shall be centered under (or over as required) the Premier Lecture Cabinet Unit.
- C. 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.

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.
- 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. Substitutions shall fully comply with specified requirements and Section 0 162 14-Product Options and Substitution Procedures

2.02 SIGN SYSTEM

- A. Exterior signage: Wall mounted LC Series, Helvetica and Helvetica Medium styles, size as shown on Drawings.
- B. 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 and Font Type: Baked enamel in manufacturer's standard color, Helvetica Medium font.
- C. Location and Size: Location and Height of letters as shown on Drawings.

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.

3.03 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 21 15 SOLID PLASTIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Solid plastic, floor-mounted, overhead braced toilet compartments and wall-hung urinal screens.

1.02 RELATED SECTIONS

- A. Section 09 05 15 – Color Design.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's sample warranty, color charts and detailed technical data for materials, fabrication, and installation, including catalog cuts of anchors, hardware, fastenings, and accessories.
- B. Shop Drawings: Submit job-specific shop drawings for fabrication and erection of toilet compartment assemblies not fully described by product drawings, templates, and instructions for installation of anchorage devices built into other Work.

1.04 QUALITY ASSURANCE

- A. Field Measurements: Take field measurements prior to preparation of Shop Drawings and fabrication where possible, to ensure proper fitting of Work. However, allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.
- B. Coordination: Furnish inserts and anchorage, which must be built into other work for installation of toilet partitions and related work; coordinate delivery with other work to avoid delay.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Upon receipt of toilet partitions and other materials, installer shall examine the shipment for damage and completeness. Materials shall be stored in a clean, dry place. Stack all materials to prevent damage.

1.06 WARRANTY

- A. Manufacturer to supply a written warranty covering all plastic components against breakage, warping, corrosion and delamination for a period of 15 years.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by Rockville Partitions, P. O. Box 159, Pisgah, AL 35785. Tel. (256) 451-1300.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Comtec Industries, Scranton, PA. Tel (800) 445-5148.
 - 2. Knickerbocker Partition Corp, Freeport, NY. Tel. (516) 546-0550.

3. The Mills Company, Willoughby, OH. Tel. (440) 951-8877.
4. Santana Products Co., Inc., Scranton, PA. Tel (510) 343-7921.

C. Substitutions shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures.

2.02 MATERIALS

A. General: Provide materials that have been selected for surface flatness and smoothness. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discoloration, telegraphing of core material, or other imperfections on finished units are not acceptable.

B. Doors, partitions, pilasters and urinal screens shall be fabricated from High Density Polyethylene (HDPE) material manufactured under high pressure forming a single component section which is waterproof, non- absorbent and has a self-lubricating surface that resists marring with pens, pencils or other writing utensils. All to arrive at job site with special protective plastic covering.

C. Characteristics: Dual component compression molded High Density Polyethylene (HDPE) of solid virgin resin materials in colors that extend throughout the surface; doors, partitions and pilaster shall have (HDPE) as the core material).

1. Doors, partitions, pilasters and urinal screens shall be a minimum of 1 inch thick and all edges machined to a radius of 0.250 inch and all exposed surfaces to be free of saw marks.
2. Doors and dividing panels shall be 55 inches high and mounted 14 inches above the finish floor.
3. Pilasters shall be 82 inches high and fastened into a 3-inch high stainless steel pilaster shoe with a stainless steel, torx head sex bolt.
4. Urinal screens shall be 24 inches wide X 42 inches high with 41 inch continuous aluminum wall brackets.
5. Finish shall be similar and equal to standard color chart selections from Rockville. Color of doors and pilasters to be selected by the Project Engineer / MDOT Architect from Manufacturer's full color range.
6. Aluminum (heat sinc) edging strips to be fastened to the bottom edge of all doors and panels using vandal proof stainless steel fasteners.

2.03 HARDWARE

A. Door hardware: Door hardware shall be as follows:

1. Hinges shall be manufacturer's aluminum continuous for door height.
2. Each door shall be supplied with one coat bumper / hook made of chrome plated zamak. Each handicapped door to include one door pull and one wall stop.
3. Door strike and keeper shall be fabricated from heavy-duty aluminum extrusion (6463-T5 alloy) with clear anodized finish with wrap around flange surface mounted and through bolted to pilaster with one-way sex bolts. Size of strike shall be 6 inches in length.
4. Door latch housing shall be fabricated from heavy-duty aluminum extrusion (6463-T5 alloy) with clear anodized finish; surface mounted and through bolted to door with one-way sex bolts. Slide bolt and button shall be heavy aluminum with a black anodized finish.

- B. Wall Brackets: Wall brackets shall be full-length continuous aluminum. Brackets shall be used for all pilasters to pilaster and pilasters to wall connections. Attach brackets to adjacent wall construction with No. 14 by 1-1/2 inch stainless steel Phillips head screws. Anchor screws directly behind the vertical edge of pilasters at 12-inch intervals along the full length of bracket and at each 12-inch interval alternately spaced between anchor connections.
- C. Headrail: Headrail shall be made of heavy-duty extruded aluminum (6463-T5 alloy) with anti-grip design. The headrail shall have a clear anodized finish and shall be fastened to the headrail bracket by a stainless steel, torx head sex bolt, and fastened to the tops of pilasters with stainless steel, tamper resistant torx screws.
- D. Headrail Brackets: Headrail brackets shall be 16-gage stainless steel with a satin finish, and secured to the wall with #14 stainless steel screws.
- E. Accessories: Furnish units with chromium-plated finish, unless otherwise indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Installer shall examine the areas and conditions under which toilet partitions and related items are to be installed, including supporting anchors and supports installed by others, and must notify 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 manner acceptable to the Installer.

3.02 INSTALLATION

- A. Comply with manufacturer's recommended procedure and installation sequence. Install partitions rigid, straight, plumb, and level. Secure partitions in position with manufacturer's recommended anchoring devices. Provide clearances of not more than 1/2 inch between pilasters and panels, and not more than one inch between panels and walls. Clearance at vertical edges of doors shall be uniform top to bottom and shall not exceed 1/4 inch.

3.03 ADJUSTING AND CLEANING

- A. Adjusting: Adjust and lubricate hardware for proper operation. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors (and entrance swing doors) to return to fully closed position.
- B. Cleaning: Clean exposed surfaces of partition systems using materials and methods recommended by manufacturer, and provide protection as necessary to prevent damage during remainder of construction period.

END OF SECTION

SECTION 10 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
7. Mop Holder
8. Underlavatory Guards (required where hot water line is exposed).

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. Locate at toilets where indicated at heights shown. Contractor has option to use one 36-inch grab bar and one 42-inch grab bar, but installation must meet all ADA requirements.
- D. Soap Dispensers: Provide surface mounted liquid type stainless steel soap dispenser units equal to Bradley model 6562 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, unless coat hooks are provided with toilet partition doors.
- G. Mop Holder: Provide surfaced mounted stainless steel mop and broom holder equal to Bradley model 9933. One piece construction with welded gusset and hooks. Holder consists of spring activated rubber cams on plated steel retainers. Unit measures 14 inches high by 34 inches long, with 4 hooks and 3 holders. Shelf projects 8 inches. Locate at each service sink where shown and at height shown or if not shown then per the Project Engineer's instructions.
- H. Underlavatory Guard:
 - 1. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping, and allow service access without removing coverings.
 - 2. Material and Finish: Antimicrobial, molded-plastic, white

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 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.
- 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, dry-chemical and class K wet 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-80BC, 10 lb. nominal capacity.
- C. Class K Wet Chemical for Cabinet Mounting: Equal to J.L. Industries Saturn 15, UL rated 2-A:1-B: C: K, 6 liters nominal capacity. Locate in Kitchen.

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 1032F17 with ADAC option. Provide Fire-FX option where located in a fire rated wall. Cabinet shall accommodate the Cosmic 10E extinguisher. Provide black die-cut letters, vertical.
- B. Equal to J.L. Industries Cosmopolitan stainless steel cabinet with return trim, rolled edge recessed model 2032F17 including ADAC option with flush pull handle. Provide Fire-FX option where located in a fire rated wall. Cabinet shall accommodate the Saturn 15 extinguisher. Provide black die-cut letters, vertical.

PART 3 - EXECUTION

3.01 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 four units are required unless additional units are indicated otherwise on Drawings. Units shall be required within 20' of all Mechanical Rooms and exits. Type K units shall be required in all Kitchens.
- 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 51 13

METAL LOCKERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Locker units with hinged doors, metal bases, tops, filler panels, closed bases, finished end panels, accessories and hardware.

1.02 REFERENCES

- A. ANSI/ASTM A446 – Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- B. ANSI/ASTM A526 – Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's installation instructions and product data on locker types, sizes and accessories.
- B. Shop Drawings: Submit shop drawings indicating locker plan layout, numbering plan, key codes, sizes and configurations.
- C. Color Selection: Provide samples of materials, texture, color and finishes available for Project Engineer / MDOT Architect's selection.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and specifications are based on products manufactured by Penco Products, Inc., 99 Brower Ave, Oaks, PA 19456. Tel. (800) 562-1000.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Art Metal Products, Deerfield, FL. Tel. (800) 252-5633.
 - 2. Lyon Metal Products, Aurora, IL. Tel. (800) 323-0082.
 - 3. Republic Storage System Co, Inc., Canton, OH. Tel. (800) 477-1255.
- C. Substitutions shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures.

2.02 SELECTED UNIT

- A. Vanguard Model 6175V Single Tier Locker with standard louvered doors. Size: 72 inches overall height by 15 inches width by 21 inches depth. Provide closed bases and finished end panels.

2.03 MATERIALS

- A. All parts shall be made from prime grade mild cold rolled sheet steel free from surface imperfection, and capable of taking a high grade enamel finish.

2.04 ACCESSORIES

- A. Each locker tier shall have chrome plated zinc alloy die-cast case and door handle, door latch channel assembly, polished aluminum number plate (2-1/4 inches wide x 1 inch high with 3/8 inch high black etched numerals), hat shelf approximately 9 inches below top of locker and coat rod.

2.05 FINISHES

- A. Chemically pretreat metal with a six stage cleaning phosphatizing and metal preparation process. Finish coat shall be hot airless electrostatically applied baked on enamel.
- B. Paint locker bodies and doors in contrasting colors as selected by the Project Engineer / MDOT Architect from manufacturer's standard range of 17 colors. Refer to Section 09 05 15-Color Design.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install metal lockers at location show on Drawings in accordance with manufacturer's instructions for plumb, level, and flush installation.
- B. Secure lockers with anchor devices to suit substrate materials. Minimum pullout force: 100 lbs. Bolt adjoining lockers units together to provide rigid installation.
- C. Install bases, end panels, filler panels and accessories

3.02 ADJUSTING

- A. Adjust doors and latches to operate without binding. Verify that latches are operating satisfactorily.

3.03 TOUCH UP PAINT

- A. Touch up all marred finished with factory supplied paint. Color shall match finished product.

3.04 CLEANING

- A. Clean locker interiors and exterior surfaces.

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.
- B. 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.
- C. Open Work Bench: Model No. 34532, Tuff Top™ (Resin Board) top fixed bench, 72 inches wide, 28 inches deep, and 34 inches high.
- D. 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 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. Securely attach to supporting structure, in accordance with manufacturer's installation instructions. One unit required unless additional units are indicated on the Drawings.

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 10 73 16

CANOPIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Extruded aluminum wall-supported canopies as shown on the Drawings and specified herein.

1.02 RELATED SECTIONS

- A. Section 07 92 00 – Joint Sealants.
- B. Section 13 34 19 – Metal Building Systems

1.03 SUBMITTALS

- A. Shop Drawings: Showing fabrication and installation of canopies including plans, elevations and details of components and attachments to other units of work. Indicate materials, profiles of each metalwork member and fitting, joinery, finishes, fasteners, anchorage and accessory items.
- B. Where installed products are indicated to comply with certain design loading, include structural computations, material properties, and other information needed for structural analysis which has been prepared by, or under the supervision of, a qualified professional engineer registered in the State of Mississippi.
- C. Samples for initial selection purposes in form of manufacturer's color charts consisting of actual units or sections of units showing full range of colors and other finish characteristics available for each item indicated below:
 - 1. Include 6-inch long samples of linear shapes.
 - 2. Include 6-inch square samples of plates.
 - 3. Include full-size samples of castings and forgings.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Store materials in clean, dry location, away from polyethylene sheeting in a manner that permits air circulation within covering. Handle metalwork on site to a minimum; exercise care to avoid damaging metal finishes.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and specifications are based on products manufactured by Mapes Industries, Inc., 2929 Cornhuskers Hwy, Lincoln, NE 68504. Tel. (800) 228-2391.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. E.L. Burns Co., Inc., Shreveport, LA 71149. Tel. (318) 636-2722.
 - 2. Dittmer Arch. Alum., Winter Springs, FL 32708. Tel (800) 822-1755.
 - 3. Mason – Florida, LLC, Leesburg, FL 34748. Tel. (877) 577-0300.

- C. Substitutions shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures.

2.02 MATERIALS

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

2.03 MANUFACTURED UNITS

- A. Equal to “Lumishade” all weather aluminum hangar rod canopy with roll-formed interlocking deck members and style “J”, 1/8 inch thick by 8 inches high heavy extruded aluminum, fascia.
- B. Comply with IBC 2009 and AHJ requirements for wind Loads.

2.04 FINISHES

- A. Standard POWDER COATED FINISH. Color to be selected by the Project Engineer / MDOT Architect from manufacturer’s complete selection of standard and premium colors. Refer to Section 09 05 15 – Color Design for color selected.

PART 3 - EXECUTION

3.01 FIELD MEASUREMENTS

- A. Take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of metalwork. Do not delay job progress; allow for adjustments and fitting where taking of field measurements before fabrication might delay work.

3.02 ERECTION AND INSTALLATION

- A. Shall be performed by the manufacturer or his approved installer. All workmanship must be of the very best with neat miters and fitted joints. Installation shall be in accordance with manufacturer’s instructions.
- B. Contractor shall coordination with metal building manufacturer to provide secondary framing as required to support canopies.

3.03 PROTECTION, REPAIR AND CLEAN-UP

- A. Protect existing materials from damage during the installation process. Extreme care shall be taken to prevent damage or scratching. When installation is complete, repair or replace items damaged, replacement items shall match the original. After work is complete, remove all waste materials and dispose of it off the owner's property.

END OF SECTION

SECTION 10 75 00 FLAG POLES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Aluminum flagpoles, ground mount, halyards and accessories.

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Furnish anchor devices and foundation tube sleeve to Section 03 30 00 Cast-in-Place Concrete for placement.

1.03 RELATED SECTIONS

- A. Section 03 30 00 Cast-in-Place Concrete: Concrete base construction.

1.04 REFERENCES

- A. AASHTO M-36 – Corrugated Metal Culvert Pipe.
- B. ANSI / ASTM B221 – Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube.

1.05 SYSTEM DESCRIPTION

- A. Type: Ground set fixed type.
- B. Pole Design: Cone tapered.
- C. Nominal Height: 30 feet measured from ground (Single section pole).
- D. Halyard: External type.

1.06 PERFORMANCE

- A. Pole without flag: Resistant without permanent deformation, 90 miles per hour wind velocity, non-resonant, safety design factor of 2.5.

1.07 SUBMITTALS

- A. Product Data: Provide product data on pole, accessories, and configurations.
- B. Shop Drawings: Indicate detailed dimensions, base details, anchor requirements, imposed loads, and manufacturer's installation instructions.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Spiral wrap flagpole with protective covering and pack in protective shipping tubes or containers.
- B. Protect flagpole and accessories on site from damage or moisture.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and specifications are based on products manufactured by American Flagpole, P.O. Box 547, Abingdon, VA 24210. Tel. (540) 628-4188.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Concord Industries, Inc., Addison, TX. Tel. (972) 380-8186.
 - 2. Eder Flag Mfg., Oak Creek, WI. Tel. (414) 764-3522.
 - 3. Morgan-Francis Flagpoles, Arlington, IN. Tel. (800) 814-9568.
 - 4. Pole-Tech, Inc., P.O. Box 715, East Setauket, NY 11733. Tel. (516) 689-5525.
- C. Substitutions shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures

2.02 POLE MATERIALS

- A. Aluminum; ANSI / ASTM B221; 6063 alloy, T6 temper

2.03 COMPONENTS AND ACCESSORIES

- A. Finial Ball: Aluminum; 6 inches diameter.
- B. Truck Assembly: Cast aluminum; double revolving; stainless steel ball bearings, non-fouling.
- C. Cleats: Two 9-inch size, cast aluminum, each attached with two 5/16-inch stainless steel screws.
- D. Halyard: 5/16-inch diameter polypropylene, braided, white.
- E. Connecting Sleeves for Multiple Section Pole: Aluminum, 6063 alloy, T6 temper, precision fit for field assembly of pole, concealed fasteners.
- F. Primer: Zinc chromate type.

2.04 MOUNTING COMPONENTS

- A. Foundation Tube Sleeve: AASHTO M-36, corrugated 16-gage steel, galvanized, depth as indicated.
- B. Pole Base Attachment: Tube; with base cover.
- C. Lightning Ground Rod: 18-inch long rod, 3/4-inch diameter.
- D. Lightning Ground Cable: Copper No. 6 AWG, soft drawn.

2.05 POLE FABRICATION

- A. Outside Butt Diameter: 6 inches.
- B. Outside Tip Diameter: 3-1/2 inches.
- C. Nominal Thickness: 0.188 inches.

2.06 FINISHES

- A. Metal Surfaces in Contact with Concrete: Asphaltic paint.
- B. Concealed Steel Surfaces: Prime paint.
- C. Exposed to view Steel Surfaces: Galvanized to 2.0 oz. per sq. ft.
- D. Aluminum: Clear anodized.
- E. Finial: Gold anodized finish.

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, unless additional units are indicated otherwise on the Drawings.
- B. Install flagpole, base assembly, and fittings in accordance with manufacturer's instructions.
- C. Electrically ground flagpole installation.
- D. Install foundation plate and centering wedges for flagpole base set in concrete base and fasten. Fill foundation tube with sand and compact.

3.02 TOLERANCES

- A. Maximum Variation from Plumb: One inch.

3.03 ADJUSTING AND CLEANING

- A. Clean surfaces.
- B. Adjust operating devices so that halyard functions smoothly.

END OF SECTION

SECTION 11 31 15

RESIDENTIAL APPLIANCES AND EQUIPMENT

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. Ice-O-Matic, Denver, CO. Tel. (303) 371-3737.
 3. Magic Chef Co., Cleveland, TN. Tel. (423) 472-3371.
 4. Manitowoc Ice, Inc., Manitowoc, WI. Tel. (800) 545-5720.
 5. Scotsman Ice System, Vernon Hills, IL. Tel. (847) 215-4500.
 6. Sears 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. Electric Range: 30 inch slide-in electric range equal to GE Model JSP39DNCC, with (if required) Optional Backguard JXS32CC and Body Sides JXS77CC, Bisque.
- B. Refrigerator: 25.0 cu. ft. capacity Side-By-Side with Dispenser equal to GE Model GSH25JFXCC with factory-installed icemaker, Bisque.
- C. Microwave: 1.70 cu. ft. oven cavity, 1000 watts, over-the-range vented type, equal to GE Model JVM1750DMCC with Re-circulating Charcoal Filter Kit Model JX81A, Bisque.
- D. Equal to Model ICE 1406 AF by Ice-O-Matic. Power supply shall be 208-230/60/1. Ice Storage Bin Model B100PS – 670 lbs. ARI Bin storage capacity.

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 1 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 180 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 18

METAL BUILDING SHED

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. 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.
- B. Exterior Walls: Field assembled, un-insulated panels attached to framing.
- C. Roof system: Standing-seam roof with thermal insulation blankets, concealed clips and factory-applied sealant.
- D. Components and Accessories: Manufacturer's standard building components and accessories may be used, provided components, accessories, and complete structure conform to design indicated and specified requirements.

1.02 RELATED SECTIONS

- A. Plywood wainscot is specified in Section 06 10 00. Personnel doors and frames and finish hardware are specified in Sections 08 11 13 and 08 71 00. Overhead service doors, including operators, are specified in Section 08 36 13. Colors are specified in Section 09 05 15 - Color Design. Painting for ferrous metal exposed to view is specified in Section 09 90 00 - Painting and Coating. Canopies are specified in Section 10 73 16.

1.03 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.

1.04 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.
- 1.05 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.

1.06 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 to the Owner during the warranty period.

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. Gulf States, Starkville, MS. Tel. (800) 844-4853.
 2. Ruffin, Oak Grove, LA. Tel. (800) 421-4232.

3. 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. Glass-fiber blanket. Comply with ASTM C 991, 0.5 lb. per cubic foot density, 3 inches thickness, R10, 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 .0015" white polypropylene film, 4 X 5 tri-directional scrim reinforcing layer, and .0005" metallized polyester film backing layer. The facing shall have a water vapor transmission rate of .02 US perm (ASTM E96, Procedure A), a beach puncture of 125 scale units and a mullen burst of 100 psi. Tensile strength shall be 55# in the machine direction and 50# 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

- 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 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.

2.06 ROOFING AND SIDING PANELS

- A. Roof Panel: CXP Standing Seam Panel, 2 inches high (2-7/8 inches including standing leg) with 24 inches wide coverage, 24-gage, Galvalume.
- B. Wall Panel: MVW Ribbed-type panel, 1-3/16 inches deep with 36 inches wide coverage and rib spacing at 12 inches on center, 26-gage, Galvalume with Kynar 500 (70% PVDF) finish. Standard colors from manufacturer's full range of colors to be selected by Project Engineer / MDOT Architect.

2.07 STRUCTURAL FRAMING

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

2.08 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 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% 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, galvanized steel, ASTM A653 with G90 coating and Kynar 500 (70% 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 6 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.

2.10 FASTENERS

- A. Wall fasteners shall be No. 14 self-tapping, 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 SECTION INCLUDES

- A. 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.
- B. Exterior Walls: Field assembled, un-insulated panels attached to framing.
- C. Roof system: Standing-seam roof with thermal insulation blankets, concealed clips and factory-applied sealant.
- D. Components and Accessories: Manufacturer's standard building components and accessories may be used, provided components, accessories, and complete structure conform to design indicated and specified requirements.

1.02 RELATED SECTIONS

- A. Plywood wainscot is specified in Section 06 10 00. Cellulose thermal insulation is specified in Section 07 21 28. Personnel doors and frames and finish hardware are specified in Sections 08 11 13 and 08 71 00. Overhead service doors, including operators, are specified in Sections 08 33 23 and 08 36 13. Colors are specified in Section 09 05 15 - Color Design. Painting for ferrous metal exposed to view is specified in Section 09 90 00 - Painting and Coating. Canopies are specified in Section 10 73 16.

1.03 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.

1.04 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.
- 1.05 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.

1.06 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 to the Owner during the warranty period.

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. Gulf States, Starkville, MS. Tel. (800) 844-4853.
 2. Ruffin, Oak Grove, LA. Tel. (800) 421-4232.

3. 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 (Metal Building)

- A. Glass-fiber blanket. Comply with ASTM C167, 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 .0015" white polypropylene film, 4 X 5 tri-directional scrim reinforcing layer, and .0005" metallized polyester film backing layer. The facing shall have a water vapor transmission rate of .02 US perm (ASTM E96, Procedure A), a beach puncture of 125 scale units and a mullen burst of 100 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

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

- F. Extra Materials: Furnish 5 percent excess over required amount of nuts, bolts, screws, washers, and other required fasteners for each building. Pack in cartons labeled to identify contents and store on site where directed.
- G. Shop Painting: Clean surfaces of loose mill scale, rust, dirt, oil, grease, and other matter. Follow procedures of SSPC-SP3 for power-tool cleaning, SSPC-SP7 for brush-off blast cleaning, and SSPC-SP1 for solvent cleaning.
 - 1. Prime framing members with rust-inhibitive primer.
 - 2. Prime galvanized members after phosphoric acid pretreatment with zinc dust-zinc oxide primer.

2.06 ROOFING AND SIDING PANELS

- A. Roof Panel: CXP Standing Seam Panel, 2 inches high (2-7/8 inches including standing leg) with 24 inches wide coverage, 24 gage, Galvalume. Roof shall have a Kynar 500 color coating finish. Standard colors from manufacturer's full range of colors to be selected by Project Engineer / MDOT Architect.
- B. Wall Panel: MVW Ribbed-type panel, 1-3/16 inches deep with 36 inches wide coverage and rib spacing at 12 inches on center, 26-gage, Galvalume with Kynar 500 (70% PVDF) finish. Standard colors from manufacturer's full range of colors to be selected by Project Engineer / MDOT Architect.

2.07 STRUCTURAL FRAMING

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

2.08 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.
- C. 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.

2.09 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, 2-gage, roll formed, galvanized steel, ASTM A653 with G90 coating and Kynar 500 (70% 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, galvanized steel, ASTM A653 with G90 coating and Kynar 500 (70% 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 6 feet on center maximum (minimum of 3 required per downspout) and be the same material and finish as downspout. Strap edges shall be rolled or smooth.
- C. Roof Curbs (for equipment) shall be prefabricated using minimum 18 gage AZ 55 prime galvalume steel, or heavier gage (as required). Fully mitered and welded corners. Integral base plates and water cricket or diverter. All welds prime painted after fabrication. Internally reinforced with steel angle on curbs on sides longer than 3'-0". Factory insulated curbs with 1-1/2 inches thick, 3 pounds density fiberglass insulation.
 - 1. Minimum height of curb shall be 8 inches above finished roof.
 - 2. Slope roof curb to match roof pitch and provide a level top

2.10 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 22 05 10

PLUMBING GENERAL REQUIREMENTS

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 plumbing 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 appropriately apply to work specified in this division.

1.02 CODES, ORDINANCES, AND PERMITS:

- A. All plumbing materials and workmanship shall comply with the following codes and standards as applicable:
 - 1. The National Electric Code (2002 Edition)
 - 2. The International Building Code (2003 Edition)
 - 3. The International Plumbing Code (2003 Edition)
 - 4. The International Fuel Gas Code (2003 Edition)
- B. Applicable Publications: 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 Standard (2003)
 - 8. Underwriters Laboratories Inc. (UL)
- C. All work done under this Contract shall comply with all state and local code authorities having jurisdiction and with the requirements of the Utility Companies whose services may be used. All modifications required by these codes and entities shall be used 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. Where applicable, N.F.P.A. requirements shall be met.

- 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 shall 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.).
- 1.03 APPLICABILITY: The work specified herein shall include all labor, materials, equipment, tools, supplies and supervision required to install and place in operation the plumbing systems and appurtenances specified herein and/or indicated on the drawings or reasonably implied as necessary for completion of the various systems.
- 1.04 COORDINATION OF PLUMBING DOCUMENTS: The plumbing work listed in these documents shall be coordinated with the work indicated on all other drawings, schedules, schematics, and specifications that are part of these construction documents. Should a conflict occur, the contractor shall submit a request for clarification to the engineer prior to bid opening. NO ALLOWANCES shall be made for any assumptions made by the contractor or any sub-contractors that are indirect conflict with the intent of the construction documents; in the event a conflict is discovered after construction has commenced, the resolution of the conflict shall be decided by the Engineer of Record, whose interpretation of the documents shall be final.
- 1.05 WELDERS QUALITY ASSURANCE: All welders shall be certified by ANSI B31.1.0-1967 "Standard Qualification Welding Procedures, Welders and Welding Operators" or "Qualification Tests" in Section IX, ASME Boiler and Pressure Vessel Code. Welder performance qualification tests shall be made in strict accordance with the above codes. Welders shall be certified for the type of pipe material specified herein. All costs incident to procedures and welder's qualification tests shall be assumed by the Contractor. Two copies of the qualification test report and certification with the welder's identification number, recommendation letter, etc. shall be delivered to the Architect before any welding commences.

PART 2 - PRODUCTS

- 2.01 COORDINATION OF PRODUCTS: The products of particular manufacturers have been used as the basis of design in preparation of these documents. Any modifications to the plumbing 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 shop drawing submittals and shall be clearly indicated on the shop drawings. Any related modifications shall be the responsibility of the contractor and shall be performed without any additional cost to the Contract.
- 2.02 DESCRIPTION: All components of the plumbing systems shall be new. All equipment and products for which independent laboratory testing and labeling is applicable and/or required shall bear the Underwriter's Laboratories, Inc. (UL) label.

PART 3 EXECUTION

3.01 GENERAL:

- B. The Contractor shall provide and prepare all openings for plumbing work as required in walls, roof, ceilings, etc.; he shall also do all painting as may be required. He shall coordinate the installation of all plumbing equipment in the exterior wall and roof.
- B. The plumbing plans do not give exact elevations or locations of lines, nor do they show all the offsets, control lines, or other installation details. The Contractor shall carefully lay out his work at the site to conform to the structural conditions, to provide proper grading of lines, to avoid all obstructions, to conform to details of installation supplied by the manufacturers of the equipment to be installed, and to thereby provide an integrated, coordinated and satisfactorily operating installation.
- C. If the Contractor proposes to install equipment and piping 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, including plans, sections, elevations, etc., sufficient to indicate that the revised layout will fit and allow for required access to clearance.
- D. The Contractor is 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, cores, etc.
- E. The Contractor shall so coordinate the work of the several various trades that it may be installed in the most direct and workmanlike manner without hindering or handicapping the other trades. Piping interference 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.
- F. Except where otherwise noted, all piping in finished areas shall be installed in chases, furred spaces, above ceilings, etc. In all cases, pipes shall be installed as high as possible. Runs of piping shall be grouped whenever it is feasible to do so.
- G. The Electrical Contractor shall bring adequate power to and make final connections to all equipment furnished under this contract. All control wiring shall be by the Controls Contractor.
- H. Piping and equipment shall not be installed in electrical equipment rooms except as serving only those rooms. Outside of electrical equipment rooms, do not run piping or ductwork, or locate equipment, with respect to switchboards, panel-boards, power panels, motor control centers, or dry type transformers:
 - 1. Within 42" in front (and rear if free standing) of equipment; or
 - 2. Within 36" of sides of equipment,
 - 3. Clearances apply vertically from floor to structure.

4. Provide access to equipment and apparatus requiring operation, service or maintenance within the life of the system. Including, but not limited to, motors, valves, filters, dampers, shock absorbers, etc. Equipment located above lay-in type ceilings is considered accessible.
- 3.02 ELECTRICAL WORK: All electrical equipment provided under this Division shall comply with the electrical system characteristics indicated on the electrical drawings and specified in Division 26.
- 3.03 PROTECTION OF EQUIPMENT:
- A. Store equipment, including pipe and valves, off the ground and under cover. For storage outdoors, minimum 4-mil thick plastic shall be fitted to withstand splattering, ground water, precipitation and wind.
 - B. Plug ends of pipe when work is stopped and close ends of ducts with plastic taped in place until work resumes.
 - C. Damaged equipment shall be repaired or replaced at the option of the Engineer of Record.
- 3.04 PAINTING:
- A. Factory painted equipment that has been scratched or marred shall be repainted to match original factory color.
 - B. All un-insulated black ferrous metal items exposed to sight inside the building, such as piping, equipment hangers and supports not provided with factory prime coat, shall be cleaned and painted with one coat of rust inhibitor primer. In addition, such items in finished spaces shall also be painted with two coats of finish paint in a color to match adjacent surfaces or as otherwise selected by the Architect.
 - C. Black ferrous metal items exposed outside the building, such as equipment support beams, un-insulated pipe and pipe supports not provided with factory prime coat, shall be cleaned and painted with one coat of rust inhibiting primer and two coats of an asphalt base aluminum paint. Insulated pipes outside the building shall be cleaned and painted with one 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. Labels shall also be protected from becoming illegible due to weathering.
 - F. Galvanizing broken during construction shall be re-coated with cold galvanizing compound.
- 3.05 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. Schedule work so existing systems will not be interrupted when they are required for normal usage of the existing building. Obtain approval from the Architect at least 7 days prior to any interruption to service of utilities.

3.06 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.
- B. All surfaces shall be patched to the condition of the adjacent surfaces.
- C. The Contractor shall make suitable provisions for adequately water-proofing at his floor penetrations of water proof membrane floors. This shall include but not be limited to floor drains, open sight drains, hub drains, clean-outs, and sleeves for the various piping. This also applies to membrane roofing systems.

3.07 SLEEVES, FLOOR AND CEILING PLATES:

- A. The Contractor shall install, as required, 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, except as otherwise indicated, and/or frames shall be installed flush with finished surfaces and grouted in place. Surfaces around opening 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 3" above finished floor. Where pipes pass through walls, sleeves shall be standard weight black steel pipe or 20-gage galvanized sheet metal with ends flush with wall surfaces.
- D. Each pipe passing through walls, floors, ceilings or partitions shall be provided with sleeves having internal diameter one inch larger than the outside dimensions of insulated pipes.
- E. All pipe sleeves through floors, roofs and masonry walls shall be built in place as the affected walls, floors, and roofs are built.
- F. All penetrations through rated walls and floors shall be packed, sealed and encapsulated per the applicable U.L. details(s).
- G. Sleeves through exterior wall shall be steel or cast iron pipe, flush with the exterior surfaces, and with the space between the pipe and the sleeves caulked watertight in an approved manner.
- H. Inserts shall be cast iron or galvanized steel individual type, with accommodations for removable nuts and threaded rods up to $\frac{3}{4}$ " diameter, and permitting lateral adjustment.

3.08 ESCUTCHEONS:

- A. Escutcheons shall be installed on all pipes where they pass through floors, ceilings, walls, or partitions in finished 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, stamped brass type designed to fit the pipe, and to cover the terminating pipe sleeve, in chrome plated finish unless otherwise specified, with securing device to hold the escutcheon tight to the pipe.

3.09 CLEANING:

- A. Flush new water piping systems until water runs clean. Mild chemical cleaning may be required. If so, flush all cleaning chemicals out of the piping system before recharging with water.
- B. Remove all stickers, rust, stains, labels, and temporary covers before final acceptance.
- C. The exterior surfaces of all mechanical equipment, piping, etc., shall be cleaned of all grease, oil, paint, dust and other construction debris.
- D. Bearings that require lubrication shall be lubricated in accordance with the manufacturer's recommendations. Provide written certification of lubrication.
- E. Equipment rooms shall be left broom clean.
- F. End of open pipes shall be covered during construction except when working directly on such one prohibits covering.
- G. Clean and polish identification plates.

3.10 EQUIPMENT, MATERIALS AND BID BASIS:

- A. It is the intention of these Specifications to indicate a standard of quality for all material incorporated in this work. 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 named manufacturers, although acceptable as manufacturers, must prove their product will perform satisfactorily and will meet space requirements, etc., and shall obtain pre-approval of their equipment, before submitting shop drawings, when their equipment achieves the required results in a manner different than that of the first named manufacturer. Where only one manufacturer is named, unless the Specifications state otherwise, manufacturers of similar quality products will be considered. Such unnamed manufacturer's products will, however, be considered as substitutions and 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, text data, samples, etc., as well as any other pertinent data necessary to demonstrate that the proposed substitutions are acceptable equals to the specified product. No substitutions shall be made without the written consent of the Architect.
- B. The use of one named manufacturer in the schedules on the Drawings is for guide purposes. The provisions of the above paragraph will govern in the selection of products to be used.

- 3.11 GUARANTEE: All systems and components shall be provided with a one year guarantee from the time of final acceptance or beneficial occupancy (Coordinate with the Architect). The guarantee shall cover all materials and workmanship. During this guarantee period, all defects in materials and workmanship shall be corrected by repair or replacement without incurring additions to the Contract.

- 3.12 FOUNDATIONS: All concrete foundations required by equipment furnished under the Plumbing Division shall be constructed in conformance with the recommendations of the manufacturer of the respective equipment actually applied, and with the approval of the Architect. All corners of the foundations shall be neatly chamfered. Foundation bolts shall be placed in the forms when the concrete is poured. Allow one inch (1") 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, if necessary. After removal of the forms, the surface of the foundation shall be rubbed. Unless otherwise noted, foundations shall be four inches 4" - 6" high. All concrete work performed shall conform entirely to the requirements of the General Specifications that describe this class of work.
- 3.13 RECORDS AND INSTRUCTIONS FOR OWNER:
- A. The Contractor shall accumulate during the job's progress the following data in triplicate prepared in neat brochures or packet folders and turned over to the Architect/Engineer for check and subsequent delivery to the Owner:
1. Provide all warranties and guarantees, manufacturer's directions and material covered by the Contractor.
 2. Provide approved fixture brochures, wiring diagrams, and control diagrams.
 3. Provide copies of approved shop drawings.
 4. Three sets of operating instructions for plumbing equipment and systems. Operating instructions shall also include recommended periodic maintenance and suggested procedures in operation of all systems in this particular building to promote energy conservation. These instructions must be written expressly for this project and shall refer to equipment, valves, etc., by mark number from project schedules. Operating instructions and procedures shall be submitted in draft form, for approval prior to final issue of complete brochures. Manufacturer's advertising literature or catalogs will not be acceptable for operating and maintenance instructions.
 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.
- B. All of the above data shall be submitted to the Architect/ Engineer for approval at such time as the Contractor asks for his last estimate prior to his final estimate, but in no case, less than two weeks before final inspection.
- C. The Contractor shall also give not less than 1 day 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 written operating instructions referred to in paragraph above shall be used as a basis for this on-the-job instruction.

3.14 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 buried or concealed work. In addition, 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. The "Record Drawings" shall consist of a set of mylar sepia prints 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 mylar sepia prints to be used for the "Record Drawings".
- B. Record dimensions shall clearly and accurately delineate the work as installed; locations shall be suitably identified by at least two (2) dimensions to permanent structures.
- C. The Contractor shall mark all "Record Drawings" on the front lower right hand corner with a rubber stamp impression that states the following:

"RECORD DRAWINGS – "3/8" high letters to be used for recording field deviations, and "5/16" high letters to be used for dimensional data only.

3.15 INSTALLATION: All equipment shall be installed in strict conformance with manufacturer's recommendations, as specified herein. If any conflict arises between these instructions, notify the Engineer immediately for clarification.

3.16 ACCESS DOORS:

- A. Furnish and install access doors at each point required to provide access to concealed valves, cleanouts, and other devices requiring operation, adjustment, or maintenance. Access doors shall be 16 gauge steel, prime coat finish, with mounting straps, concealed hinge and screwdriver locks, designed for the doors to open 180 degrees.
- B. Access doors installed in firewalls or partitions shall be UL Labeled to maintain the fire rating of the wall or partition.
- C. Access doors shall be provided under this section of the specifications and furnished to the General Contractor to be installed.
- D. Access doors shall be MILCOR or approved equal in accordance with the following:

Style AT Door for Acoustical Tile Ceilings
Style AP Door for Acoustical Plaster Ceilings
Style K Door for Plastered Wall and Ceiling Surfaces
Style DW Door for Drywall
Style ATR for Suspended Drywall Ceilings
Style M Door for Masonry, Ceramic Tile, Etc.
Fire-Rated 1-1/2 hr. (B-label) Door where required.
Security access doors for all security walls and ceilings shall have minimum 3/16" x 2" x 2" welded steel frame with 10 gauge door panel and heavy duty stainless steel hinge welded to door and frame. Door shall have detention type deadbolt lock.
- E. Size and type shall be as required for proper service and/or as may be directed by the Architect.

- F. Access door finish shall be chemically bonded to steel with a prime coat of baked on electrostatic powder. Color shall be as selected by Architect.

3.17 FLAME SPREAD AND SMOKE DEVELOPED PROPERTIES OF MATERIALS:

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

3.18 EQUIPMENT FURNISHED BY OWNER:

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

3.19 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 specification Division 22. Any requirements for such are beyond the scope of this contract and shall be done only by those persons contracted to do so.

- 3.20 PROTECTION OF EXPOSED PIPING: All piping exposed to freezing shall be heat traced as per manufacturer's recommendations per Section 22 05 33 "Heat Tracing for Plumbing Piping" and insulated per Section 22 07 00 "Plumbing Insulation".

END OF SECTION

SECTION 22 05 11

PLUMBING SUBMITTAL DATA

PART 1 - GENERAL

- 1.01 RELATED DOCUMENTS: The requirements of the General Conditions, Supplementary Conditions, and Section 22 05 10 Plumbing General Requirements, apply to all work herein.
- 1.02 QUALITY ASSURANCE:
- A. 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. The Contractor shall submit to the Architect a sufficient number of copies of all such Shop Drawings or catalog data to provide him with as many reviewed copies as he may need, plus two (2) copies for retention; one by the Architect and one by the Engineer.
 - 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 of the official review by the Architect. Any 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 Specification unless he has, in writing, specifically called attention to such deviations at the time of submission and has obtained the permission of the Architect. Also, it shall not 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 this is not mentioned, 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.

PART 2 - PRODUCTS

- 2.01 GENERAL: All products shall be new and bear all labels which are identified by the applicable specification section and Contract Documents.

PART 3 - EXECUTION

3.01 SUBMITTAL DATA:

E. 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. 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 where required, accessories specified, manufacturer, make and model number, weights where specified, starters where required by Division 22, 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 the 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.
 3. Plumbing submittal data shall be bound into separate volumes, each plumbing volume shall contain one copy of all specified equipment/shop drawing submittals. Each bound copy shall be provided with an index of materials and 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. FAILURE to provide **BOUND AND IDENTIFIED SUBMITTALS** will result in the **AUTOMATIC REJECTION** of the submittal data with **NO EXCEPTION**.
- F. The bound submittals are to be submitted for review within 30 days after the Contract is awarded. No submittal will be checked until ALL required submittals have been received by the Engineer. Only piping fabrication drawings may be submitted after the completed bound submittal is reviewed and accepted by the Engineer.
- G. The Contractor shall submit with the bound and 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 has been fully coordinated with the electrical contractor. No submittal data 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 performed without any additions to the Contract Sum. Submit attachment and fastening methods for piping and equipment to the Structural Engineer for approval. Shop Drawings shall be submitted for each of the following:
- Air Compressors and Air Dryers
 - Backflow Preventers
 - Cleanouts
 - Disconnect Switches
 - Gas Cocks
 - Insulation
 - Meters
 - Motor Starters
 - Plumbing Drains
 - Plumbing Fixtures, Carriers and Fittings
 - Starters
 - Thermometers, Gauges, etc.
 - Valves
 - Vibration Isolators (to be submitted with equipment being isolated)
 - Water Heaters

- D. The Contractor shall submit three copies of a letter, signed by an officer of the company, which states that the items listed below meet or exceed the criterion of the plans and specifications. This letter is to include a listing of each item to be used on the project along with the manufacturer name and model numbers.

Strainers
Test Wells
Vacuum Breakers
Thermometers
Gauges Gauge Cocks and Snubbers
Heat Cable
Pipe Guides
Expansion and Compression Tanks and Capacities
Cleanouts
Drains
Water Supplies and Stops
Pipe Hangers and Supports
Hydrants
Shock Absorbers

3.02 OPERATING AND MAINTENANCE INSTRUCTIONS:

A. Description

1. Complete operating and maintenance instructions shall be provided to the Owner. Two (2) separate copies shall be provided, and each copy shall be bound in separate volumes. 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 instruction 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 instruction.
3. Prior to final acceptance or beneficial occupancy, provide the services of a competent representative to instruct the Owner in the operation of all systems for a period of not less than one (1) day. This instruction shall include a complete walk-through of all equipment and systems. The Architect reserves the right to attend any such meeting and shall be duly notified.

3.03 OTHER SUBMITTALS – CLOSEOUT DOCUMENTS:

- A. Submit two copies of the following prior to occupancy of the project by the Owner. See contract close-out requirements in Division 01.
1. As built drawings for plumbing systems.
 2. Request for final payment.
 3. Letter or "Release of Liens".
 4. Letter of "Guarantee".
 5. Submit two (2) copies of welder's certificate.
 6. Consent of Surety Company to final payment.
 7. Certify disinfection of domestic water service.
 8. Power of Attorney.
 9. Contractor's Affidavit of Payment of Debts and Claims.

END OF SECTION

SECTION 22 05 29

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

- 1.01 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General Conditions, Supplemental Conditions, and Specifications Section 22 05 10 "Plumbing General Requirements" apply to work of this section.
- 1.02 DESCRIPTION OF WORK:
- A. 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.
 - B. "C" CLAMPS may be used as point of attachment to building structure for pipe hangers and/or all-thread rods; however, piping shall not be supported directly by "C" clamps.
 - C. Do not pierce waterproofing with support bolts.
 - D. All ferrous metal hangers and supports, not otherwise coated, shall be provided with a field-applied coat of zinc chromate primer prior to any installation. In lieu of field painting, the contractor may furnish cadmium plated, or galvanized hangers and supports.
- 1.03 QUALITY ASSURANCE:
- A. 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-69.
 - B. Provide an adequate suspension system in accordance with recognized engineering practices, using where possible, standard commercially accepted pipe hangers and accessories. Submit fastening methods to the Structural Engineer for approval and as approved copy to the engineer.
 - C. 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.
 - D. For the purpose of this specification, Grinnell product figure numbers are given. Equal products by B-Line and Michigan Hanger Co. (M-Co) are acceptable.
- 1.04 DESIGN:
- A. Supporting steel not shown for the equipment will be designed, supplied and erected by the Contractor; the supporting steel is that steel which is connected to the structural steel shown on the drawings and carries the weight of the mechanical items. This supporting steel design must carry the dead weight and dynamic load imposed by the equipment, piping and other mechanical components.

- B. The supporting steel shall be connected to the structural steel in such a manner as not to overload the structural steel. It is the responsibility of the General Contractor, Mechanical Contractor and the steel fabricator to verify that this purpose is accomplished. It is the responsibility of the General Contractor to call to the attention of the Architect-Engineer any deficiency prior to bidding.
- C. Where thermal movement in the pipe line will occur, the pipe hanger assembly must be capable of supporting the line in all operating conditions. Accurate weight balance calculations shall be made to determine the supporting force at each hanger in order to prevent excessive stress in either pipe or connected equipment.

PART 2 - PRODUCTS

2.01 UPPER ATTACHMENTS:

- A. New Concrete Construction:
 - 1. Support piping in new concrete construction with adjustable type inserts, Grinnell Fig. 282. Where the pipe load exceeds the recommended load of the insert, use two inserts with a trapeze-type connecting member below the concrete.
 - 2. Where hangers are required between structural members, (beams) provide side beam brackets, Grinnell Fig. 202, 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 and shall receive a field coat of zinc chromate primer.
- B. Existing Concrete Construction:
 - 1. Support piping in existing concrete construction with Cadmium plated, malleable iron, expansion case, Grinnell Fig. 117.
 - 2. Where hangers are required between structural members (beams) side beam brackets Grinnell Fig. 20, attached to the upper 1/3 of the beam, and all auxiliary steel for the installation of the pipe hanger. Supports shall be designed in accordance with the AISC Steel Handbook and shall receive a field coat of zinc chromate primer.
- C. Steel Construction:
 - 1. Support piping in steel construction with adjust-able beam clamps and tie rods, Grinnell Fig. 218, or side beam brackets bolted or welded to the side of the beam.
 - 2. Where hangers are required between structural members (beams or joist) provide all auxiliary steel for the installation of the pipe hanger. Supports shall be designed in accordance with the AISC steel Handbook and shall receive a field coat of zinc chromate primer.
- D. Wood Construction:
 - 1. Support piping in wood construction with Side Beam Bracket, Grinnell Fig. 202 or Hanger Flange, Grinnell Fig 128R, using lag screws.

2.02 WALL SUPPORTS: Where piping is run adjacent to walls or steel columns welded steel brackets Grinnell Fig. 195 and 199 may be used. The bracket shall be bolted to the wall and a back plate of such size and thickness as to properly distribute the weight.

2.03 FLOOR SUPPORTS:

- A. Where pipe lines are located next to the floor and no provision for expansion are required support piping with Grinnell Fig. 258, pipe rest with nipple and floor flange.
- B. Where provisions for expansion are required support piping with Grinnell adjustable pipe stand Fig. 274, or pipe roll stand Fig. 271.
- C. Vertical piping shall be supported at every other floor using riser clamps Grinnell Fig. 261, for steel and cast iron pipe, and copper clad riser clamp Grinnell Fig. CT-121 for all copper piping.

2.04 SUPPORTS FOR PIPING OUTSIDE THE STRUCTURE: Support piping outside the structure on adjustable pipe supports Grinnell Fig. 264.

2.05 INTERMEDIATE ATTACHMENTS: Supports for horizontal piping shall be all-thread galvanized steel rods, ASTM A-107, Grinnell Fig. 146, of the following sizes:

Pipe Size	Hanger Rod Diameter
2" and smaller	3/8"
2-1/2" and 3"	1/2"
4" and 5"	5/8"
6"	3/4"
8" to 12"	7/8"
14" and 16"	1"

2.06 PIPE ATTACHMENTS:

- A. Hangers for insulated pipe shall be sized to bear on the outside of the insulation.
- B. Hangers for steel and cast-iron horizontal piping where provision for expansion are not required shall be Grinnell Fig. 260, clevis type with vertical adjustment.
- C. Hangers for uninsulated copper pipe 4" and smaller shall be copper plated adjustable band hangers Grinnell Fig. CT. 99C, for pipe sizes over 4" provide Grinnell copper clad clevis type hanger with a copper clad saddle at each hanger location.
- D. Hanger for PVC pipe shall be Grinnell Fig. CT. 99, adjustable band hanger.
- E. Hangers for steel and copper piping where provisions for expansion are required shall be Grinnell Fig. 171 or Fig. 181, adjustable roller hanger with Grinnell Fig. 160, pipe covering protection saddles.
- F. Support hot and cold water piping in spaces behind plumbing fixtures with plastic coated brackets and plastic coated U-bolts.
- G. Pipe guide shall be Grinnell Fig. 256.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Support horizontal equipment such as in-line pumps, strainers, air separators, independently of the piping system.
- B. Hang pipe from substantial building structure. Pipe shall not be hung from other piping.
- C. Support each horizontal length of NO-HUB cast iron pipe within 2-1/2 feet of each joint and a maximum of 5'-0" on centers.
- D. Provide a hanger within one foot of each elbow.
- E. Provide a hanger within one foot of each riser in addition to the riser clamp support at every other floor.
- F. Unless specified otherwise, provide the following support spacing.

1. Pipe Size	Support Spacing
1" and smaller	5'-0"
1-1/4" and larger	10'-0"

END OF SECTION

SECTION 22 05 53 IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 APPLICABILITY:

- A. All work specified in this Section shall comply with Section 22 05 10 "Plumbing General Requirements".
- B. All above ground piping inside the building shall be identified with color bands at each shut-off valve, each piece of equipment, branch take-off, and 40'-0" maximum spacing on exposed straight pipe runs.
- C. All underground plastic sewer, water and gas piping outside the building shall have #14-copper (TW) tracer wire attached to pipe. Install directly above pipe a continuous 6-inch wide vinyl plastic tape with printing identifying buried service, 12 inches below finished grade, during backfilling operation.

PART 2 - PRODUCTS

2.01 PIPE MARKINGS:

- A. Pipe markings shall be manufactured preprinted markings in accordance with the following:
 - 1. No tape or self-adhering markers will be allowed.
 - 2. Snap on pipe markers, W. H. Brady Co. or approved equal are acceptable.
 - 3. Markers shall be strapped on with nylon fasteners.
 - 4. Markers will be non-corrosive, non-conductive, mildew resistant and impervious to moisture.

2.03 BAND AND LETTER SIZE: Band and letter sizes shall conform to the following table:

O.D. of Pipe	Width of Color Band	Size of Letter/Numbers
1-1/4" and smaller	8"	1/2"
1-1/2" to 2"	8"	3/4"
2-1/2" to 6"	12"	1- 1/4"
6" to 10"	24"	2- 1/2"
Over 10"	32"	3- 1/2"

2.04 IDENTIFICATION:

- A. Band legend and color and letter color shall conform to the following table:

Piping Band	Legend	Letters	Band Color
Cold Water (Domestic)	CW (Dom)	White	Green
Hot Water (Domestic)	HW (Dom)	Black	Yellow
Hot Water Circulation (Domestic)	HWC (Dom)	Black	Yellow
Compressed Air	AIR	Black	Royal Blue
Natural Gas	Nat. Gas	Black	Yellow
Drain	D	Black	Green

- B. All equipment, such as water heaters, pumps, etc., furnished by this Contractor, shall be permanently labeled, in an approved manner, corresponding to the mark or name shown on the drawings and/or specifications, or Owners' sequences.
 - C. For applications where existing color schemes may already be in place, all new work requiring identification and color coding shall match the existing color schemes.
- 2.05 PIPE MARKING LOCATIONS: The following are examples of types of identification to be used for piping located above ceilings:



PART 3 - EXECUTION

3.01 EXECUTION:

- A. Locate pipe identification in the following areas:
 - 1. Each riser and each valve,
 - 2. One on each side where piping pass thru walls and floors,
 - 3. Locate at or near each change in direction,
 - 4. Every 40 feet along continuous runs,
 - 5. Located within 4 feet of exit or entrance to a vessel or tank.
- B. Indicate pipe content flow direction with arrows of matching style and placed so the arrow points away from the legend.

END OF SECTION

SECTION 22 07 00

PLUMBING INSULATION

PART 1 - GENERAL

- 1.01 RELATED DOCUMENTS: Drawing and general provisions of Contract, including General and Supplementary Conditions and Specification section 22 05 10 "Plumbing General Requirements" apply to work of this section.
- 1.02 DESCRIPTION:
- A. All insulation products used outside of mechanical rooms 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.** All insulation shall be installed in accordance with the insulation manufacturer's recommendations. Insulation 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 Foamlite Insulation, Calcium Silicate or Perlite and shall be 2" longer than the pipe shields. Pipe shoes welded to the pipe shall be used for roll type hangers.
 - D. All required tests of the relevant section of pipe or equipment 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°F.
 - G. Items not to be insulated:
 - 1. Chromium plated brass connections to plumbing fixtures.
 - 2. Underground domestic cold water piping.
 - 4. Vents from pressure relief valves.
 - 5. Chrome plated piping at plumbing fixtures.
 - 6. Exposed to sight piping at work tables.
 - H. Clean and dry all surfaces to be insulated from loose scale, dirt, oil, moisture and other foreign matter.
 - I. Insulate completely all metal surfaces of piping and equipment other than hangers.
 - J. Surface finishes shall present a tight smooth appearance.
 - K. Permit expansion and contraction without causing damage to insulation or surface finish.
 - L. Surface finish shall be extended to protect all surfaces, ends, and raw edges of insulation.

- M. Vapor barriers must be continuous and uninterrupted throughout the system where specified except where insulation is interrupted for fire dampers. See details for special conditions.

1.03 PIPING:

- A. Insulate all valves, strainers and fittings. For the purposes of this Specification, fittings include unions and flanges. Use premolded material where available. Insulate valves up to and including bonnets.
- B. Pipe Hangers that are installed in direct contact with the surface of the pipe, such as a pipe clamp shall have the insulation applied over the hanger as well as the pipe. Provide a rain shield on piping supported on hangers outdoors to prevent bulk water from entry.

1.04 QUALITY ASSURANCE:

- A. 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.
- B. 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. Material shall be furnished to the job bearing the manufacturer's label.
- C. Insulation products shall be as manufactured by Pittsburgh Corning Corporation, Knauf, Owens-Corning, Certainteed or Armstrong.

PART 2 - PRODUCTS

2.01 PRE-MOLDED FIBERGLASS PIPE INSULATION:

- A. Insulation shall be heavy density, one- piece insulation made from inorganic glass fibers bonded with a thermosetting resin and accurately molded to conform to the outside diameter of the pipe. Insulation shall be one piece snap-on or self-sealing type with white all service jacket. Insulation shall be suitable for use on either hot or cold water pipes with temperature range of +20 degrees to 400 degrees F. Thermal conductivity shall not exceed 0.23 at 75 degrees F. mean temperature.
- B. Safe burning characteristics are UL Classified and does not exceed 25 flame spread, 50 smoke developed when tested in accordance with ASTM E84, NFPA 255 and UL723.
- C. Insulation jacket shall have a water vapor transmission of 0.02 perms or less as tested by ASTM E96, Procedure A.
- D. All pipe fittings and accessories insulated with fiberglass shall be fitted with heavy gauge PVC covers and jackets as manufactured by Johns Manville Zeston 300 Series. Fitting covers shall be two-piece PVC made for short and long radius elbows in shapes for 45° and 90° bends. Covers and jackets to have a white glossy finish and UV resistant. Material thickness to be minimum 30 mil and carry a flame spread of 25 or less with a smoke development of 50 or less.

- E. Pre-molded fiberglass insulation shall be used on the following pipe systems. Pipe insulation shall be equal to Manville Fiberglass Micro-Lok AP-T Plus.

**INSULATION THICKNESS IN INCHES
 FOR PIPE SIZES**

	Temperature Up to	Up to 1"	1 ¼" to 2"	2 ½" to 3 ½"	4" & Over
Cold Water	50°-65°F	½"	1"	1"	1"
Hot Water and Hot Water Circulating	200°F	½"	1"	1"	1 ½"
Indirect Refrigerator Waste	40°-55°F	½"	1"	1"	1 ½"
Drains Connecting A/C Equipment	40°-55°F	½"	1"	1"	1 ½"

2.02 FOAMED PLASTIC SHEET AND TUBING:

- A. Sheet Insulation shall be equal to Armstrong Armaflex. Minimum of 4.5 lbs. per cu. ft. Thermal conductivity shall not exceed 0.28 at 75° F mean temperature.
- B. Insulate the following piping system as indicated:
 - 1. Water cooler waste and trap with 1/2" thick foamed plastic tubing
 - 2. Domestic hot water piping below ground with 1/2" thick foamed plastic tubing.
- C. Piping outside the building shall be insulated with 1" thick flexible foamed plastic insulation with weatherproof aluminum as hereinafter specified.

2.03 ADHESIVES, MASTIC, COATINGS:

- A. Benjamin Foster, Childers, Insul-Coustic, EPOLUX, Minnesota Mining and Manufacturing Co.
- B. Treatment of pipe jackets to impart flame and smoke safety shall be permanent. The use of water-soluble treatments is prohibited.
- C. Vapor barriers shall have a perm rating of not more than .05 perms. Adhesives, coatings and mastics shall have a perm rating of not more than .25 perms.

2.04 TAPE: Wherever tape is used for sealing purposes, it shall be of the type and shall be applied as recommended by the non-conductive covering manufacturer. Where recommendation is lacking, the tape used shall be sealed with Minnesota Mining Adhesive EC-1329.

2.05 WEATHERPROOFING:

- A. Protect exposed water piping from freezing down to 0°F in unheated areas with self-regulating heater cable with built-in thermostat. Cable shall be installed in contact with pipe and beneath pipe insulation. Protect piping insulation with Pabco insulating division aluminum sheets of .016 thickness and aluminum formed elbows with leak-proof beads and epoxy coated interior.

PART 3 - EXECUTION

3.01 GENERAL:

- A. Surfaces to be insulated shall be clean, dry, and free of foreign material, such as rust, scale and dirt when insulation is applied. Perform pressure tests required by other Sections before applying insulation.
- B. Where existing insulation is damaged due to the new work, repair damage to match existing work or replace damaged portion with insulation specified for new work.

3.02 INSULATION FOR ALL PIPING SYSTEMS:

- A. Insulate pipe, fittings, flanges, unions and valves.
- B. Install insulation materials with smooth and even surfaces, jackets drawn tight and cemented down smoothly at longitudinal seams and end laps. Do not use scrap pieces of insulation where a full length section will fit.
- C. Install insulation, jackets and coatings continuous through wall and floor openings and sleeves.
- D. Fittings, valves and flanges shall be insulated with field fabricated multiple mitered segments of molded fiberglass insulation of the same thickness as adjoining pipe insulation. Secure fitting insulation segments with 20 gauge galvanized steel wire and apply a smoothing coat of insulating cement. White fabric and mastic shall be used on exposed fittings.
- E. Application of all materials shall be in accordance with the manufacturer's instructions.
- F. Butt all joints of pipe insulation together and secure all jacket laps with lap adhesive. Seal all butt joints with joint straps furnished with insulation.
- G. Care shall be taken so as not to place insulation over vent and drain inlets and outlets.
- H. Staples are not permitted on pipe insulation.

END OF SECTION

SECTION 22 10 00 PLUMBING PIPING AND PUMPS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. This Section of the Specifications and related drawings describe requirements pertaining to the plumbing piping and equipment.

B. Refer to the following sections for related work:

22 05 11	Plumbing Submittal Data
22 05 29	Hangers and Supports for Plumbing Piping and Equipment
22 05 53	Identification for Plumbing Piping and Equipment
22 33 00	Electric Domestic Water Heaters
22 42 00	Commercial Plumbing Fixtures

1.02 RECORD DOCUMENTS: Provide corrected Record Documents in accordance with the Project Record Documents Sections and the Mechanical General Section.

1.03 GENERAL PROVISIONS AND BASIC MATERIALS: The requirements of Plumbing General Requirements Section 22 05 10 apply to this work.

1.04 CODE:

A. The work shall comply with the International Plumbing Code, International Fuel Gas Code, and NFPA 54; acceptability under the codes shall not authorize any substitution, smaller size, lighter weight or less durable materials for the items specified.

B. The Contractor shall obtain and pay for all required permits and inspections and shall deliver one copy of each inspection certificate to the Architect before the date of Substantial Completion.

PART 2 - PRODUCTS

2.01 WATER PIPING:

A. Aboveground piping 3" and smaller: Type "L" copper tubing with tin-antimony soldered joints and wrought copper socket fittings.

B. Underground piping 3" and smaller: Type "K" hard drawn copper tubing, with 95-5 silver soldered joints and wrought copper socket fittings.

C. Underground piping outside building all sizes: Polyvinyl chloride (PVC) plastic piping Schedule 40, ASTM D-1785 with 150 PSI minimum pressure rating. Fittings shall conform to ASTM D-2466 with solvent weld joints conforming to ASTM D-2564.

D. Underground piping 1" and smaller below building slab: Below slab Type "L" soft drawn copper tubing, with no joints.

2.02 BASIC PIPING SPECIALTIES:

A. Unions:

1. Unions shall be the same material and working pressure as the fittings specified for the piping system. Unions on piping 2-1/2" in size and larger shall be bolted flanged joint and on smaller than 2-1/2" shall be screwed connection.
2. Unions and flanges provided between copper and ferrous pipe connections shall be insulating (dielectric) type to electrically separate dissimilar metal connections in piping system.

B. Dielectric Adapters:

1. Dielectric adapters shall be the union type for pipes 2" in size and larger. Adapters shall have working pressure of 250 psi for union type and 165 psi for flanged type. The insulating gaskets shall have an operating range of 40 degrees F to 240 degrees F and shall limit the galvanic corrosion to a maximum of 1% of the short circuit current. Dielectric adapters shall be Ebco, Crane or Capitol.
2. Provide a dielectric adapter between any ferrous and copper connection including piping and equipment.

C. Pressure Gauges:

1. Pressure gauges shall be connected to the piping system with threaded brass pipe and screwed brass fittings. Gauges shall be flangeless type and shall have 4-1/2" dials, cast aluminum cases, stainless steel rotary gear movements, phosphor bronze bourdon types, forged brass rod sockets and tips, 1/2% accuracy of scale range, plexiglass dial covers, safety blow-out disc and 1/4" lower connections. Gauges shall be Weksler Type AA1, Terice No. 500X Series or Weiss Series PG.
2. Each gauge shall be provided with a needle valve type gauge cock suitable for the pressure and temperature of the system in which it is installed, and compatible with the gauge to which it attaches. Gauge cocks shall be Weksler Type A, Terice No. 880 or Weiss Type LC.
3. Gauges in pump suction lines shall be the compound type. Gauges in all other locations shall be the plain pressure type. Select to operate at midpoint of scale during normal system operation.
4. Gauge cocks shall consist of a brass lever handle cock connected to the piping system with threaded brass pipe and screwed brass fittings. Gauge cocks shall be Weksler Type A, Terice No. 880 or Weiss Type LC.

D. Thermometers:

1. Thermometers shall be the red-reading mercury filled adjustable angle type. Thermometers shall be adjustable to any angle through a 180 degree arc and shall be provided with a locking device. Thermometers shall have V-cast aluminum case with baked enamel finish and 9 inch scale. Thermometers shall be provided with separable sockets and, where installed on insulated pipes, sockets shall be extended neck type. Thermometer scale range shall be 0 to 160 degrees F. Thermometers shall be Weksler Adjust-Angle Series Type AA-5, Terrice Adjustable Angle Series Type BX, or Weiss Vari-Angle Series Type VS.

E. Pipe Sleeves:

1. The Contractor shall install, as required, 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, equipment and devices furnished under each section of the Specification.
2. 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, except as otherwise indicated, and/or frames shall be installed flush with finished surfaces and grouted in place. Surfaces around opening shall be left smooth and finished to match surrounding surface.
3. Where pipes pass through floor slabs, sleeve shall be standard weight black steel pipe with top of sleeve 3" above finished floor. Where pipes pass through walls, sleeves shall be standard weight black steel pipe or 20-gage galvanized sheet metal with ends flush with wall surfaces.
4. Each pipe passing through walls, floors, ceilings or partitions shall be provided with sleeves having internal diameter one inch larger than the outside dimensions of insulated pipes.
5. All pipe sleeves through floors, roofs and masonry walls shall be built in place as the affected walls, floors, and roofs are built.
6. All penetrations through rated floors shall be packed with mineral wool and capped off with a silicon caulk. As an alternate, an approved, fire rated sealant as manufactured by 3M or Hilti may be used.
7. Sleeves through exterior wall shall be steel or cast iron pipe, flush with the exterior surfaces, and with the space between the pipe and the sleeves caulked watertight in an approved manner.
8. Inserts shall be cast iron or galvanized steel individual type, with accommodations for removable nuts and threaded rods up to ¾ inch diameter, and permitting lateral adjustment.

F. Floor, Wall and Ceiling Plates:

1. Escutcheons shall be installed on all pipes where they pass through floors, ceilings, walls, or partitions in finished areas.

2. The interior of closets, adjacent to finished areas, shall be considered as finished for the intent of these Specifications.
3. Escutcheons shall be split, hinged, stamped brass type designed to fit the pipe, and to cover the terminating pipe sleeve, in chrome plated finish unless otherwise specified, with securing device to hold the escutcheon tight to the pipe.

2.05 BACKFLOW PREVENTERS:

- A. Reduced Pressure Principle - Provide reduced pressure principle backflow preventer assembly including shutoff valves on inlet and outlet, and strainer on inlet. Backflow preventer shall include test cocks, air-gap drain funnel, and pressure-differential relief valve located between two (2) positive seating check valves. Assembly shall be constructed in accordance with ASSE Standard 1013 and University of Southern California (USC) Foundation for Cross-Connection Control and Hydraulic Research. Extend drain to nearest floor drain.
- B. Double Check Valve - Provide double check valve backflow preventer assembly including shutoff valves on inlet and outlet, and strainer on inlet. Backflow preventer shall include test cocks, and shall be suitable for supply pressures up to 175 psi. Assembly shall be constructed in accordance with ASSE Standard 1013 and University of Southern California (USC) Foundation for Cross-Connection Control and Hydraulic Research.
- C. Provide backflow preventers as indicated on drawings. Backflow preventers shall be Watts or approved equal as follows:

Size	Double Check	Reduced Pressure Zone
½" to 3"	007QT-S	009QT-S
4" to 10"	709NRS-S	909NRS-S

2.06 WATER HAMMER ARRESTORS: Water hammer arrestors shall be piston operated, type "K" copper, pressure rated for 250 psi, tested and certified in accordance with PDI standard WH-201; Precision Plumbing Products, Inc., or approved equal.

2.07 VALVES:

- A. All shutoff valves shall be gate or ball valves unless otherwise noted. All drain valves shall be globe or angle valves unless otherwise noted.
- B. Gate valves 2" and smaller shall be of Class 125, body and bonnet shall be of ASTM B-62 cast bronze composition, solid disc, copper-silicon alloy stem, brass packing gland, solder ends, Teflon-impregnated packaging, and malleable handwheel; NIBCO S-11 or approved equal.
- C. Class 150 valves meeting the above specifications shall be used where pressure requires; NIBCO S-134 or approved equal.
- D. Ball valves 2" and smaller shall be 600 psi CWP, have cast brass bodies, replaceable reinforced Teflon seats, conventional port, blowout proof stems, chrome-plated brass ball, solder ends with extended solder cups; NIBCO S-580-BR-R-70 or approved equal.

- E. Gate valves 2-1/2" and larger shall be Class 125 iron body, bronze mounted, with body and bonnet conforming to ASTM A-126 Class B cast iron, flanged ends, with Teflon-impregnated packing and two-piece packing gland assembly; NIBCO F-617-0 or approved equal.
 - F. Globe valves 2" and smaller shall be of Class 125, body and bonnet of ASTM B-62 cast bronze composition, solder ends, copper silicon alloy stem, brass packing gland, Teflon-impregnated packing and malleable handwheel; NIBCO S-235-Y or approved equal.
 - G. Globe valves 2-1/2" and larger shall be of Class 125 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; NIBCO F-178-B or approved equal.
 - H. Check valves 2" and smaller shall be of Class 125, solder ends, with bodies and caps conforming to ASTM B-62 cast bronze composition, swing type disc; NIBCO S-413-BYW or approved equal.
 - I. Check valves 2-1/2" and larger shall be iron body, bronze mounted, with body and cap conforming to ASTM A-126 Class B cast iron, flanged ends, swing type disc; NIBCO F-918-B or approved equal.
 - J. Calibrated Balancing Valve 4" and smaller shall be of Class 125 at 150 Degree 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 have an attached calibrated nameplate to indicate degree of closure; Taco CS or approved equal.
- 2.08 PLUMBING SYSTEM INSULATIONS: All water piping shall be insulated in accordance with specification section 22 07 00 "Plumbing Insulation".
- 2.09 WEATHERPROOFING: Protect exposed water piping from freezing down to 0°F in unheated areas with self-regulating heater cable with built-in thermostat. Cable shall be installed in contact with pipe and beneath pipe insulation. Protect piping insulation with Pabco insulating division aluminum sheets of .016 thickness and aluminum formed elbows with leak-proof beads and epoxy coated interior.
- 2.10 PIPE HANGERS AND SUPPORTS: Provide pipe hangers and supports in accordance with Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment".

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Install piping and make all joints in accordance with the pipe manufacturer's recommendations. Make provisions for thermal expansion and contraction.
- B. Rough-in for fixtures in accordance with the fixture manufacturer's roughing-in drawings to provide the heights and locations indicated on the Architectural drawings or as specified.
- C. Install piping and pipe supports as specified. Keep pipe ends closed except for vent and drain openings; protect vent and drains from the entrance of materials that could cause stoppage.

- D. Install shut-off valves where indicated on the drawings and required by the code including valves at all fixture groups, and equipment.
 - E. Install drain valves at low points of all new water piping except buried piping.
- 3.02 EXCAVATION, TRENCHING AND BACKFILLING:
- A. Perform all excavation, trenching and backfilling for work under Division 22. During excavation, material for backfilling shall be piled back from the banks of the trench to avoid overloading and to prevent slides and cave-ins. All excavated materials not to be used for backfilling shall be removed and disposed of. Grading shall be done to prevent surface water from flowing into trenches and other excavation and any water accumulating therein shall be removed by pumping. All excavations shall be made by open cut. No tunneling shall be done.
 - B. Bottom of trench shall be uniformly graded to provide firm support and even bearing surface for pipe.
 - C. Pipe shall be laid on firm soil, laid in straight lines and on uniform grades. Provide bell holes so that barrels of pipe rest evenly on bottom of trench along entire length of pipe.
 - D. Pipe shall be inspected and tested prior to backfilling. No roots, rocks or foreign materials of any description shall be used in backfilling the trenches. Trench shall be hand filled to a minimum of 12" above the top of the pipe with clean earth and tamped to 95 percent compaction after first layer using the modified Proctor test method of compaction.
- 3.03 TESTS OF PIPING:
- A. Install temporary connections and plugs or valves at all points necessary for venting air from the piping, filling, holding test pressure, draining and flushing the piping.
 - B. Test all new pressure piping roughing hydrostatically to show zero leakage in eight (8) hours at the following pressures measured at the low points: Domestic water (C.W., and H.W.), 125 psi.
- 3.04 FLUSHING AND STERILIZING:
- A. Flush all new water piping after pressure tests and repairs are completed by draining from the low points; refill with clean water.
 - B. Sterilize the above ground water piping after fixtures and equipment are installed with 50 ppm chlorine solution distributed throughout all C.W. and H.W. piping; let stand for 24 hours, then flush enough water at drinking fountains and lavatories to reduce the residual chlorine content to less than one (1) ppm. Domestic water heater shall have the heat source shut off while sterilization is in progress.
 - C. Furnish three copies of a Certificate of Performance of Complete Sterilization to the Architect before final inspection of the work, all certified by a registered chemical engineer.
- 3.06 WATER TESTS: The Contractor shall have representative water samples from the fixtures tested by the local Health Department or a laboratory approved by the Health Department. If the tests do not indicate potable water, the sterilizing procedure and the test shall be repeated. Submit test report to the Architect.

- 3.07 START-UP, ADJUSTMENT, INSTRUCTIONS: Start-up, lubricate, adjust and test equipment installed under this Section and furnish instructions to the Owner as specified in the Mechanical General Section.
- 3.08 OPERATIONAL TESTS: When installation and adjustment of all fixtures and equipment is complete, perform operational tests of all plumbing system components at normal operating pressures as specified under the Plumbing General Requirements Section and includes the following tests:
1. Operate all manual and automatic valves at least one full open-closed cycle; examine for stem leakage, failure to close or other malfunction.

END OF SECTION

SECTION 22 13 00

FACILITY SANITARY SEWERAGE

PART 1 - GENERAL

1.01 DESCRIPTION:

A. This Section of the Specifications and related drawings describe requirements pertaining to the sanitary sewerage piping and drainage accessories.

B. Refer to the following sections for related work:

22 05 11	Plumbing Submittal Data
22 05 29	Hangers and Supports for Plumbing Piping and Equipment
22 05 53	Identification for Plumbing Piping and Equipment

1.02 RECORD DOCUMENTS: Provide corrected Record Documents in accordance with the Project Record Documents Sections and the Plumbing General Requirements Section.

1.03 GENERAL PROVISIONS AND BASIC MATERIALS: The requirements of Section 22 05 10 "Plumbing General Requirements" apply to this work.

1.04 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. Josam Mfg. Co.
2. Smith (Jay R.) Mfg. Co.
3. Wade Div., Tyler Pipe
4. Zurn Industries, Hydromechanics Div.

1.05 CODE:

A. The work shall comply with the International Plumbing Code; acceptability under the codes shall not authorize any substitution, smaller size, lighter weight or less durable materials for the items specified.

B. The Contractor shall obtain and pay for all required permits and inspections and shall deliver one copy of each inspection certificate to the Architect before the date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS FOR DRAINAGE SYSTEMS:

- A. Drainage piping all sizes except within return air plenums: Polyvinyl chloride pipe (PVC) ASTM D2665, PVC Type DWV fittings with solvent weld joints.
- B. Aboveground piping all sizes within return air plenums: Service weight (SV) No-hub cast iron soil pipe and fittings CISPI301 with "husky" heavy duty stainless steel clamps, CISPI301 and neoprene gaskets, ASTM C-564.
- C. Condensate Drain Piping: Polyvinyl chloride pipe (PVC) ASTM D2665, PVC Type DWV fittings with solvent weld joints.
- D. All traps shall have brass cleanout plug except where buried.

2.02 ROOF FLASHING: Vent pipes passing through roof shall be flashed with a one piece pipe flashing unit constructed of E.P.D.M. rubber with an aluminum reinforcing ring suitable for a temperature range of -25°F to 250°F as manufactured by Butler Manufacturing Company or approved equal. Flashing shall be installed in accordance with metal building manufacturer recommendations. Vents shall offset in roof joist area or ceiling cavity if necessary so that no vent shall be closer than 4'-0" from outside wall line.

2.03 DRAINAGE ACCESSORIES:

- A. Provide factory fabricated drainage piping products of the size and type as indicated on drawings, including features as specified herein. Where not indicated, provide proper selection as determined by installer to comply with installation requirements and governing regulations.
- B. Floor drains shall be provided with trap primer connections where indicated on drawings.
- C. All floor drains without trap primers shall be provided with deep seal "P" traps.
- D. All floor drains and floor sinks located on elevated floors shall be provided with seepage holes and flashing collar or clamping rings to provide for leak proof installation.

2.04 CLEANOUTS

- A. Vertical and horizontal lines exposed - Test Tee – Smith 4510.
- B. Vertical lines concealed – Smith 4472 with stainless steel access cover.
- C. Horizontal lines under unfinished floors – Smith 4405.
- D. Finished floors – Smith 4023 cast iron adjustable floor level cleanout assembly with round polished bronze top.
- E. Finished Floors - Linoleum, Terrazzo or Tile – Smith 4143 cast iron adjustable floor level cleanout assembly with round polished bronze top. Top depression to be covered with surrounding floor pattern bonded with waterproof adhesive.
- F. All lines outside of building - Smith 4400.

- G. Finished floors - Carpet Smith 4023-Y cast iron adjustable floor level cleanout assembly with nickel bronze top an 1-1/2" diameter stainless steel carpet marker. Carpet shall cover top of cleanout with carpet marker exposed above carpet to serve as cleanout locator.

2.05 BASIC PIPING SPECIALTIES:

A. Pipe Sleeves:

1. The Contractor shall install, as required, 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, equipment and devices furnished under each section of the Specification.
2. 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, except as otherwise indicated, and/or frames shall be installed flush with finished surfaces and grouted in place. Surfaces around opening shall be left smooth and finished to match surrounding surface.
3. Where pipes pass through floor slabs, sleeve shall be standard weight black steel pipe with top of sleeve 3" above finished floor. Where pipes pass through walls, sleeves shall be standard weight black steel pipe or 20-gage galvanized sheet metal with ends flush with wall surfaces.
4. Each pipe passing through walls, floors, ceilings or partitions shall be provided with sleeves having internal diameter one inch larger than the outside dimensions of insulated pipes.
5. All pipe sleeves through floors, roofs and masonry walls shall be built in place as the affected walls, floors, and roofs are built.
6. All penetrations through rated floors shall be packed with mineral wool and capped off with a silicon caulk. As an alternate, an approved, fire rated sealant as manufactured by 3M or Hilti may be used.
7. Sleeves through exterior wall shall be steel or cast iron pipe, flush with the exterior surfaces, and with the space between the pipe and the sleeves caulked watertight in an approved manner.
8. Inserts shall be cast iron or galvanized steel individual type, with accommodations for removable nuts and threaded rods up to 3/4 inch diameter, and permitting lateral adjustment.

B. Floor, Wall and Ceiling Plates:

1. Escutcheons shall be installed on all pipes where they pass through floors, ceilings, walls, or partitions in finished areas.
2. The interior of closets, adjacent to finished areas, shall be considered as finished for the intent of these Specifications.
3. Escutcheons shall be split, hinged, stamped brass type designed to fit the pipe, and to cover the terminating pipe sleeve, in chrome plated finish unless otherwise specified, with securing device to hold the escutcheon tight to the pipe.

- 2.06 PIPE HANGERS AND SUPPORTS: Provide pipe hangers and supports in accordance with Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment".

PART 3 EXECUTION

3.01 INSTALLATION:

- A. Install soil and vent piping pitched to drain at minimum slope of 1/4" per foot (2%) for piping 3" and smaller, and 1/8" per foot (1%) for piping 4 " and larger.
- B. Install piping and make all joints in accordance with the pipe manufacturer's recommendations. Make provisions for thermal expansion and contraction.
- C. Install cleanouts on drainage piping where indicated on the drawings and as required by the code, and at every change in direction of more than 45 degrees in horizontal piping. Locate wall cleanouts as low as possible but high enough for the cover plate to clear the base. Locate test tees where necessary to separate sections of piping for testing.
- D. Rough-in for fixtures in accordance with the fixture manufacturer's roughing-in drawings to provide the heights and locations indicated on the Architectural drawings or as specified.
- E. Set floor cleanouts so that the top rims are level and flush with the finished floor surface and so that square and rectangular tops are parallel to the walls, unless otherwise noted.
- F. Install piping and pipe supports as specified. Keep pipe ends closed except for vent and drain openings; protect vent and drains from the entrance of materials that could cause stoppage.
- G. Vents shall terminate at 1'-0" above roof.

3.02 EXCAVATION, TRENCHING AND BACKFILLING:

- A. Perform all excavation, trenching and backfilling for work under Division 15. During excavation, material for backfilling shall be piled back from the banks of the trench to avoid overloading and to prevent slides and cave-ins. All excavated materials not to be used for backfilling shall be re moved and disposed of. Grading shall be done to prevent surface water from flowing into trenches and other excavation and any water accumulating therein shall be removed by pumping. All excavations shall be made by open cut. No tunneling shall be done.
- B. Bottom of trench shall be uniformly graded to provide firm support and even bearing surface for pipe.
- C. Pipe shall be laid on firm soil, laid in straight lines and on uniform grades. Provide bell holes so that barrels of pipe rest evenly on bottom of trench along entire length of pipe.
- D. Pipe shall be inspected and tested prior to backfilling. No roots, rocks or foreign materials of any description shall be used in backfilling the trenches. Trench shall be hand filled to a minimum of 12" above the top of the pipe with clean earth and tamped to 95 percent compaction after first layer using the modified Proctor test method of compaction.

3.03 TESTS OF PIPING:

- A. Install temporary connections and plugs or valves at all points necessary for venting air from the piping, filling, holding test pressure, draining and flushing the piping.
- B. Test all new soil, waste and vent piping under 10 feet head of water (except for the uppermost 10 feet) as required by the Plumbing Code, with zero leakage allowed. The test pressure shall be maintained for at least 30 minutes before inspection starts and maintained for the time necessary to inspect all joints but not less than 15 minutes.

3.04 OPERATIONAL TESTS:

- A. When installation and adjustment of all fixtures and equipment is complete, perform operational tests of all plumbing system components at normal operating pressures include the following tests:
 - 1. Pour at least five (5) gallons of water into every floor drain to test for pipe stoppage.
- B. All floor drain strainers shall be securely fastened to drain body.
- C. During construction drains shall be kept covered so that traps, sediment buckets and dome type strainers are kept free from debris and trash.

END OF SECTION

SECTION 22 15 00

GENERAL SERVICE COMPRESSED- AIR SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. All work specified in this Section is subject to the provisions of Section 22 05 10 "Plumbing General Requirements".
- B. Refer to the following sections for related work in connection with the compressed air piping system:

22 05 11	Plumbing Submittal Data
22 05 29	Hangers and Supports for Plumbing Piping and Equipment
22 05 53	Identification for Plumbing Piping and Equipment

1.02 DESCRIPTION OF WORK: Extent of the compressed air piping system work is indicated on Drawings.

1.03 QUALITY ASSURANCE:

- A. Manufacturing firms shall be regularly engaged in the manufacture of compressed air piping system 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. Installation contracting firm shall have at least three (3) years of successful installation experience on projects with compressed air piping systems work similar to that required for project.
- C. Comply with applicable portions of Plumbing Code pertaining to materials, construction and installation of products.
- D. Comply with applicable American National Standards pertaining to products and installation of compressed air piping systems.

PART 2 - PRODUCTS

2.01 COMPRESSED AIR PIPING MATERIALS AND PRODUCTS: Provide piping materials and factory fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not 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 pipe materials used in compressed air piping systems.

2.02 COMPRESSED AIR PIPING: Aboveground Piping, Pipe Sizes Up To and Including 2": Black steel pipe, Schedule 40, ASTM-A53 with threaded joints and Class 150 malleable iron threaded fittings.

2.03 VALVES:

- A. Ball Valves: Bronze body valves shall be 2-piece with threaded end, Teflon packed stainless steel stem, and vinyl cover steel handle. Valves shall be Lunkenheimer Valve Co. #70S-HST, Conbraco Apollos Co. #70-100 or Nibco #T-508.
- B. Check Valves: Bronze body valves with screwed ends, swing check, bronze disc and suitable for 200 P.S.I. working air pressure. Valve shall be Jenkins Co. 92-A, Crane Co. #41 or Walworth Co. #420.

2.04 PRESSURE RELIEF VALVES: All bronze body with threaded connections. Valves set to relieve at 15% above working pressure, and shall be Lonergan Model No. TL, Crane Co., Cash Co. or Quincy Co.

2.05 PRESSURE REGULATING VALVES: Bronze body valves with threaded ends; diaphragm operated adjustable type valves equal to A.W. Cash Co. E55, Spencer Regulator, Watts or Leslie Co.

2.06 AIR COMPRESSOR:

- A. Air compressor package shall be of the Simplex design, consisting of one (1) pump, motor, and control package mounted on one (1) tank. Compressor pumps shall be of 2-stage design, air cooled, splash lubricated, one piece integrally cast cylinder and head assembly, with domed pistons and cylinders, circular cage valves, spring and disc design loadless starting, heavy duty, enclosed filter/silencers, and factory authorized five (5) year warranty.
- B. Compressor pump shall produce no less than 19.1 CFM of free air, at a rated pressure of 125 PSIG, be V-belt driven by electric motor of no less than 5 H.P., and designed to operate on an available power supply of 208 volts, 1 phase, 60 cycle.
- C. Pump and motor shall be mounted on a vertical ASME national board coded tank, of not less than 80 gallons capacity. Package shall be equipped with totally enclosed belt guards, ASME safety valve, automatic pressure switches, bucket high tank drain, tank pressure gauge, tank service valve, and shall include one (1) magnetic motor starter, factory mounted and wired.
- D. Additional equipment shall include:
 - air-cooled aftercooler
 - automatic tank drain
 - tank vibration mountes (set of 4)
- E. Air compressor shall be as manufactured by Champion or approved equal.

2.08 REFRIGERATED AIR DRYER:

- A. Dryer shall be of the refrigerated, non-cycling type capable of reducing the temperature of 19.1 SCFM of saturated air at 100 PSIG from 100 to 35 F at line pressure dewpoint, and removing the condensed water via an integral automatic drain design. Dryer shall include air-cooled reciprocating refrigeration unit, water separator, suction pressure gauge, and NEMA 4 electrical enclosure. Dryer shall be prewired and factory tested. Heat exchanger, interconnecting air piping, and low pressure refrigerant piping shall include automatic drain valve and shall be rated to 200 PSIG working pressure. Unit suitable for 115 volt, 1 phase, 60 hz, service.
- B. Air dryer shall be as manufactured by Champion, Ingersol-Rand, Dayton or Saylor-Beall.

2.08 FLOOR, WALL AND CEILING PLATES: Where exposed piping, bare and insulated, passes through floors, walls and ceiling, except in Mechanical Rooms, escutcheons shall be provided. Escutcheons shall be chrome-plated steel plates, hinged type with set screw. Escutcheons shall be as manufactured by Bea-Cor, F&S or Grinnell. Escutcheons for chrome plated connections at plumbing fixtures shall be as specified under the plumbing fixtures.

2.09 PRESSURE GAUGES AND GAUGE COCKS:

- A. Gauges shall be flangeless type and shall have 4-1/2" dials, cast aluminum cases, stainless steel rotary gear movements, phosphor bronze bourdon tubes, forged brass rod sockets and tips, 1/2% accuracy of scale range, plexiglass dial covers, safety blow-out disc and 1/4" lower connections. Gauges shall be Weksler, Trerice or Weiss. Scale range shall be suitable for the pressure ranges in which they are to operate, shall be as follows:
 - 1. System with working pressure less than 100 PSIG: Scale range 0-150 PSI.
 - 2. System with working pressure between 100 PSIG and 150 PSIG: Scale range 0-200 PSI.
 - 3. System with working pressure between 150 PSIG and 300 PSIG: Scale ranges 0-400 PSI.
- B. Gauge pointer shall be micrometer adjustment type, recalibrated from the front of the gauge.

2.10 UNIONS:

- A. Unions shall be of the same material as the fittings specified and suitable for use at the working pressure and temperatures of the system in which they are installed.
- B. Unions in piping, 2" and smaller shall be screwed or push-to-connect. Unions in piping 2½" and larger shall consist of flanges or grooved joint couplings.
- C. Unions shall be installed at locations shown on the Drawings and where necessary to accommodate the proper installation and servicing of equipment.

2.11 DIELECTRIC ADAPTERS:

- A. All connections between dissimilar metals subject to galvanic action shall be made with an insulating type dielectric adapter or waterway fitting.

- B. No insulating type dielectric adapter or connection between dissimilar metals shall be installed in an inaccessible area.
 - C. Dielectric adapters shall be the union type for pipes 2" in size and smaller and flanged type for pipe 2-1/2" in size and larger. Adapters shall have working pressure of 250 psi for union type and 175 psi for flanged type. The insulating gasket shall have an operating range of 40°F. to 240°F and shall limit the galvanic corrosion to a maximum of 1% of the short circuit current. Dielectric adapters shall be Ebco, Crane or Capital.
 - D. Provide a dielectric adapter or waterway fitting between any ferrous and copper connection including piping and equipment.
- 2.12 BASIC SUPPORTS, ANCHORS AND SEALS: Provide supports, anchors and seals complying with Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment".

PART 3 - EXECUTION

3.01 GENERAL:

- A. All piping shall be pitched to low points. Low points shall be piped to the floor and shall be provided with drip legs and drain valves.
- B. All branch connections must be made to the top of the pipe.

3.02 CLEANING:

- A. Drain and clean all dirt pockets and drain legs.
- B. Thoroughly air blow all compressed air piping.

3.03 TESTING:

- A. Test all compressed air piping at 175 psi for a minimum of two (2) hours. No drop in air pressure will be permitted after air temperature has stabilized.
- B. Tests of all systems shall be witnessed by Engineer. Ample notice of the performance of test must be given by the Contractor to the Engineer.

END OF SECTION

SECTION 22 33 00 ELECTRIC DOMESTIC WATER HEATERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. All work specified in this section is subject to the provisions of Section 22 05 10 "Plumbing General Requirements".
- B. Refer to the following sections for related work in connection with electric water heaters:

	22 05 11	Plumbing Submittal Data
Equipment	22 05 29	Hangers and Supports for Plumbing Piping and
	22 05 53	Identification for Plumbing Piping and Equipment
	22 10 00	Plumbing Piping and Pumps

1.02 DESCRIPTION OF WORK: The number and size of the electric water heaters are indicated on the drawings and schedules.

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. Provide water heaters which comply with ASHRAE 90.1b-1992 for energy efficiency.
- C. U.L. and NEMA Compliances - Provide electrical components required as part of electric water heaters, which have been listed and labeled by Underwriters Laboratories and comply with NEMA Standards.
- D. 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 plumbing equipment 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: Electric water heaters shall be of same manufacturer. 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, 150 psi working pressure.
- B. Lining - All interior tank surfaces shall be glass lined.
- C. Elements - Electric heating elements shall be low watt density with zinc plated copper sheath.
- D. Enclosure - Heater shall be factory insulated and provided with steel enclosure with baked enamel finish.
- E. Controls - Adjustable thermostat, high temperature cut off and low water cut off.
- F. Accessories - Provide the following water heater accessories:

- Magnesium anode
 - ASME combination temperature and pressure relief valve.
 - Brass tank blowdown drain valve.
 - Thermometer
 - Automatic air vent
 - Watts No. 530 adjustable bleeder pressure relief valve.

- G. Warranty - Furnish three (3) year limited warranty for tank leakage.
- H. Manufacturer - Provide water heaters meeting specification requirements of one of the following manufacturers:

- A.O. Smith
 - Lochinvar
 - Rheem
 - Ruud
 - State Industries

2.03 ELECTRIC INSTANTANEOUS HEATER:

- A. Electric instantaneous point of use water heater shall have cast aluminum alloy housing, with heating coils to be flow switch operated. Contractor shall coordinate heater housing size with available space within multi-lav. units being furnished on project and provide compatible heater.
- B. Provide flow control fitting at inlet of heater. Provide ball valve at inlet and outlet of heater.
- C. Instantaneous heater shall be equal to Eemax, Inc.

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.
- B. Connections - Make connections between water heaters and domestic water piping shutoff valves with unions or flanges as indicated. Provide dielectric isolation at all tank connections.
- C. Pipe heater drain and relief valve drain full size to location shown on drawings.
- D. Install bleeder pressure relief valve in tank drain line, set 25 psi below relief valve setting.
- E. Drain Pans - Provide drain pans constructed of 20 gauge galvanized sheet metal for all water heaters suspended above finished floor. Provide a minimum 1 inch drain from bottom of pan to nearest floor drain.
- F. 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.
- G. Testing - Upon completion of installation, pressure test water heaters hydrostatically to assure structural integrity and freedom from leaks.
- H. 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.

END OF SECTION

SECTION 22 42 00 COMMERCIAL PLUMBING FIXTURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specification sections, apply to work of this section.
- B. All work specified in this Section is subject to Section 22 05 10 "Plumbing General Requirements".

1.02 DESCRIPTION OF WORK:

- A. Extent of plumbing fixtures and trim work is indicated by drawings and schedules, and by requirements of this section.
- B. Refer to Division-26 sections for electrical connections to water coolers and other plumbing fixtures; not work of this section.

1.03 QUALITY ASSURANCE:

- A. Manufacturing: Firms shall be regularly engaged in the manufacturing of plumbing fixtures of the type, style and configuration required, whose products have been in satisfactory use in similar service for not less than five (5) years.
- B. Comply with applicable portions of the Plumbing Code, latest edition, pertaining to materials and installation of plumbing fixtures.
- C. Comply with applicable ANSI standards pertaining to plumbing fixtures and systems, and bathtub units.
- D. Comply with ANSI A117.1 standard and the Americans with Disabilities Act (ADA) pertaining to plumbing fixtures for handicapped.
- E. Comply with standards established by Plumbing and Drainage Institute pertaining to plumbing fixture supports.
- F. Comply with applicable FS WW-P-541/-Series sections pertaining to plumbing fixtures.
- G. Provide water coolers which are rated and certified in accordance with applicable Air Conditioning and Refrigeration Institute standards and are listed by Underwriter's Laboratories.

1.04 SUBMITTALS:

- A. Submit manufacturer's specifications for plumbing fixtures and trim, including catalog cut of each fixture type and trim item furnished, roughing-in dimensioned drawings, templates for cutting substrates, fixture carriers, and installation instructions.
- B. Submit maintenance data and parts lists for each fixture type and trim item, including instructions for care of finishes. Include this data in maintenance manual.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING:

MDOT – 5th District – Scott 22 42 00 - 1 Commercial Plumbing Fixtures

- 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.

PART 2 - PRODUCTS

2.01 PLUMBING FIXTURES:

- A. Provide factory-fabricated fixtures of type, style and material scheduled on drawings. 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. 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.
- B. 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, discoloration, 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. At locations where water is supplied (by manual, automatic or remote control), 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 shut-down of water supply piping systems.
- B. Include removable P-traps where drains are indicated for direct connection to drainage system.
- C. Provide manufacturer's standard exposed fixture bolt caps finished to match fixture finish.
- D. Where fixture supplies and drains penetrate walls in exposed locations, provide chrome plated cast-brass escutcheons with set screw.
- E. Provide aerators on all faucet sets of types approved by Health Departments having jurisdiction.
- F. Comply with additional fixture requirements contained in fixture schedule.

2.04 MANUFACTURERS:

MDOT – 5th District – Scott

22 42 00 - 2

Commercial Plumbing Fixtures

A. Subject to compliance with requirements, provide plumbing fixtures and trim of one of the following:

1. Plumbing Fixtures
American Standard, U.S. Plumbing Products
Eljer Plumbing-ware Division, Wallace-Murray Corporation
Kohler Company
2. Plumbing Trim
American Standard, U.S. Plumbing Products
Chicago Faucet Company
Eljer Plumbing-ware Division, Wallace-Murray Corporation
Kohler Company
Delta Commercial Faucet Co.
T & S Brass and Bronze Works, Inc.
Eastman Brasscraft
McGuire Manufacturing Co.
3. Flush Valves
Coyne & Delaney Company
Sloan Valve Company
Zurn Industries, Inc., Hydromechanics Div.
4. Fixture Seats
Bemis Mfg. Co.
Beneke Corp., Div. of Beatrice Foods
Church
Olsonite Corp., Olsonite Seats
5. Water Coolers
Oasis
Elkay Mfg. Co.
Halsey Taylor Div.
Haws Drinking Faucet Co.
6. Service Sinks/Mop Sinks
American Standard, U.S. Plumbing Products
Eljer Plumbing-ware Div., Wallace-Murray Corp.
Fiat Products, Unit of Mark Control Corp.
Kohler Co.
Stern-Williams Co., Inc.
7. Stainless Steel Sinks
American Standard, U.S. Plumbing Products
Elkay Mfg. Co.
Just Mfg. Co.
Kohler Co.

8. Fixture Carriers

Josam Mfg. Co.
J.R. Smith
Wade
Zurn Industries, Inc., Hydromechanics Div.

9. Emergency shower
Guardian Equipment
Haws

PART 3 - EXECUTION

3.01 INSPECTION AND PREPARATION:

- A. Examine roughing-in work of domestic water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Also examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping, and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until unsatisfactory conditions have been corrected.
- B. Install plumbing fixtures of types indicated where shown and at indicated heights; in accordance with fixture manufacturer's written instructions, roughing-in drawings, and with recognized industry practices. Ensure that plumbing fixtures comply with requirements and serve intended purposes. Comply with applicable requirements of the Plumbing Code pertaining to installation of plumbing fixtures.
- C. Fasten plumbing fixtures securely to indicated supports or building structure; and ensure that fixtures are level and plumb. Secure plumbing supplies behind or within wall construction so as to be rigid, and not subject to pull or push movement.
- D. Where fixtures are mounted against or abut walls, caulk along fixture.

3.02 CLEAN AND PROTECT:

- A. Clean plumbing fixtures of dirt and debris upon completion of installation.
- B. Protect installed fixtures from damage during the remainder of the construction period.

3.03 FIELD QUALITY CONTROL:

- A. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.
- B. Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Feasibility and match shall be judged by Architect. Remove cracked or dented units and replace with new units.

3.04 EXTRA STOCK: Furnish special wrenches and other devices necessary for servicing
MDOT – 5th District – Scott 22 42 00 - 4 Commercial Plumbing Fixtures

Project No. BWO-5195-62(001) 502308

Project No. BWO-5196-62(001) 502308

plumbing fixtures and trim to Owner with receipt. Furnish one (1) device for every ten (10) units.

END OF SECTION

SECTION 23 05 10

HVAC GENERAL REQUIREMENTS

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, and heating 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 appropriately apply to work specified in this division.

1.02 CODES, ORDINANCES, AND PERMITS:

- A. All heating, ventilating and air conditioning materials and workmanship shall comply with the following codes and standards as applicable:
 - 1. The National Electric Code (2005 Edition)
 - 2. The International Fuel Gas Code (2006 Edition)
 - 3. The International Building Code (2006 Edition)
 - 4. The International Mechanical Code (2006 Edition)
- B. Applicable Publications: 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 Standard (NFPA)
 - 8. Sheet Metal and Air Conditioning Contractor's National Association Inc. (SMACNA)
 - 9. Underwriters Laboratories Inc. (UL)

- C. All work done under this Contract shall comply with all state and local code authorities having jurisdiction and with the requirements of the Utility Companies whose services may be used. All modifications required by these codes and entities shall be used 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. Where applicable, N.F.P.A. requirements shall be met.
 - 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 shall 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.).
- 1.03 APPLICABILITY: The work specified herein shall include all labor, materials, equipment, tools, supplies and supervision required to install and place in operation the mechanical systems and appurtenances specified herein and/or indicated on the drawings or reasonably implied as necessary for completion of the various systems.
- 1.04 TEMPORARY HVAC:
- A. New HVAC equipment, i.e. air handling units, fans, etc. shall not be placed into service until the facility has been turned over to the Owner. All HVAC equipment warranties shall start on the day of the Owner's acceptance of the facility.

NOTE: The temporary use of the building HVAC systems during the construction period SHALL NOT be permitted with the following exceptions:

- 1. HVAC systems may be placed in operation only when temperature and humidity control is critical for the installation of final finishes, i.e. interior painting, lay-in ceilings, hardwood floors, paneling, etc. All air systems must be equipped with heavy duty, high efficiency air filters. Each air system shall be checked on a daily basis to determine the filter status.
- 2. HVAC systems must be operational during the time required for the TAB Sub-contractor to do the final testing, adjusting and balancing.

The above exceptions shall be permitted only at a point in time when the building has been cleared of all debris and swept clean and all air systems are fitted with high quality, construction grade air filters. The Architect and/or Engineer shall also be notified of any and all temporary use of the HVAC systems and shall be documented by the General Contractor. NO EXCEPTIONS.

NOTE: HVAC systems SHALL NOT be in operation when sheet rock sanding is being performed.

- B. If space conditioning is required before the above conditions are satisfied, such space conditioning shall be the responsibility of the Contractor. If the Contractor elects to utilize the permanently installed building HVAC systems to provide the space conditioning, it shall be the responsibility of the General Contractor to ensure that the required warranty periods for all equipment provided are effective from the date of acceptance of the project.

- 1.05 COORDINATION OF HVAC DOCUMENTS: The HVAC work listed in these documents shall be coordinated with the work indicated on all other drawings, schedules, schematics, and specifications that are part of these construction documents. Should a conflict occur, the contractor shall submit a request for clarification to the engineer prior to bid opening. NO ALLOWANCES shall be made for any assumptions made by the contractor or any sub-contractors that are in direct conflict with the intent of the construction documents; in the event a conflict is discovered after construction has commenced, the resolution of the conflict shall be decided by the Engineer of Record, whose interpretation of the documents shall be final.
- 1.06 WELDERS QUALITY ASSURANCE: All welders shall be certified by ANSI B31.1.0-1967 "Standard Qualification Welding Procedures, Welders and Welding Operators" or "Qualification Tests" in Section IX, ASME Boiler and Pressure Vessel Code. Welder performance qualification tests shall be made in strict accordance with the above codes. Welders shall be certified for the type of pipe material specified herein. All costs incident to procedures and welder's qualification tests shall be assumed by the Contractor. Two copies of the qualification test report and certification with the welder's identification number, recommendation letter, etc. shall be delivered to the Architect before any welding commences.

PART 2 - PRODUCTS

- 2.01 COORDINATION OF PRODUCTS: 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 shop drawing submittals and shall be clearly indicated on the shop drawings. Any related modifications shall be the responsibility of the contractor and shall be performed without any additional cost to the Contract.
- 2.02 DESCRIPTION: All components of the mechanical systems shall be new. All equipment and products for which independent laboratory testing and labeling is applicable and/or required shall bear the Underwriter's Laboratories, Inc. (UL) label.

PART 3 - EXECUTION

- 3.01 GENERAL:
- A. The Contractor shall provide and prepare all openings for ducts and other HVAC work as required in walls, roof, ceilings, etc.; he shall also do all painting as may be required. He shall coordinate the installation of all mechanical equipment in the exterior wall and roof.
 - B. The HVAC plans do not give exact elevations or locations of lines, nor do they show all the offsets, control lines, or other installation details. The Contractor shall carefully lay out his work at the site to conform to the structural conditions, to provide proper grading of lines, to avoid all obstructions, to conform to details of installation supplied by the manufacturers of the equipment to be installed, and to thereby provide an integrated, coordinated and satisfactorily operating installation.

- C. 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, including plans, sections, elevations, etc., sufficient to indicate that the revised layout will fit and allow for required access to clearance.
 - D. The Contractor is 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, cores, etc.
 - E. The Contractor shall so coordinate the work of the several various trades that it may be installed in the most direct and workmanlike manner without hindering or handicapping the other trades. Piping interference 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.
 - F. Except where otherwise noted, all piping and ductwork in finished areas shall be installed in chases, furred spaces, above ceilings, etc. In all cases, pipes and ducts shall be installed as high as possible. Runs of piping shall be grouped whenever it is feasible to do so.
 - G. The Electrical Contractor shall bring adequate power to and make final connections to all equipment furnished under this contract. All control wiring shall be by the Controls Contractor.
 - H. Piping, equipment, or ductwork shall not be installed in electrical equipment rooms except as serving only those rooms. Outside of electrical equipment rooms, do not run piping or ductwork, or locate equipment, with respect to switchboards, panel-boards, power panels, motor control centers, or dry type transformers:
 - 1. Within 42" in front (and rear if free standing) of equipment; or
 - 2. Within 36" of sides of equipment,
 - 3. Clearances apply vertically from floor to structure.
 - 4. Provide access to equipment and apparatus requiring operation, service or maintenance within the life of the system. Including, but not limited to, motors, valves, filters, dampers, shock absorbers, etc. Equipment located above lay-in type ceilings is considered accessible.
- 3.02 ELECTRICAL WORK: All electrical equipment provided under this Division shall comply with the electrical system characteristics indicated on the electrical drawings and specified in Division 26.
- 3.03 PROTECTION OF EQUIPMENT:
- A. Store equipment, including pipe and valves, off the ground and under cover. For storage outdoors, minimum 4-mil thick plastic shall be fitted to withstand splattering, ground water, precipitation and wind.

- B. Protect air handling units coil by use of protective sheet metal panels or plywood.
- C. Plug ends of pipe when work is stopped and close ends of ducts with plastic taped in place until work resumes.
- D. Damaged equipment shall be repaired or replaced at the option of the Engineer of Record.

3.04 PAINTING:

- A. Factory painted equipment that has been scratched or marred shall be repainted to match original factory color.
- B. All un-insulated black ferrous metal items exposed to sight inside the building, such as piping, equipment hangers and supports not provided with factory prime coat, shall be cleaned and painted with one coat of rust inhibitor primer. In addition, such items in finished spaces shall also be painted with two coats of finish paint in a color to match adjacent surfaces or as otherwise selected by the Architect.
- C. Black ferrous metal items exposed outside the building, such as cooling tower support beams, un-insulated pipe and pipe supports not provided with factory prime coat, shall be cleaned and painted with one coat of rust inhibiting primer and two coats of an asphalt base aluminum paint. Insulated pipes outside the building shall be cleaned and painted with one 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. Labels shall also be protected from becoming illegible due to weathering.
- F. Galvanizing broken during construction shall be re-coated with cold galvanizing compound.
- G. All ductwork, piping, insulation, conduit or other appurtenances visible from finished spaces through grilles, diffusers or other such required openings shall be painted flat black.

3.05 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. Schedule work so existing systems will not be interrupted when they are required for normal usage of the existing building. Obtain approval from the Architect at least 7 days prior to any interruption to service of utilities.

3.06 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.
- B. All surfaces shall be patched to the condition of the adjacent surfaces.

- C. The Contractor shall make suitable provisions for adequately water-proofing at his floor penetrations of water proof membrane floors. This shall include but not be limited to floor drains, open sight drains, hub drains, clean-outs, and sleeves for the various piping. This also applies to membrane roofing systems.

3.07 SLEEVES, FLOOR AND CEILING PLATES:

- A. The Contractor shall install, as required, 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, except as otherwise indicated, and/or frames shall be installed flush with finished surfaces and grouted in place. Surfaces around opening 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 3" above finished floor. Where pipes pass through walls, sleeves shall be standard weight black steel pipe or 20-gage 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 diameter one inch larger than the outside dimensions of insulated pipes or ducts.
- E. All pipe sleeves through floors, roofs and masonry walls shall be built in place as the affected walls, floors, and roofs are built.
- F. All penetrations through rated walls and floors shall be packed, sealed and encapsulated per the applicable U.L. details(s).
- G. Sleeves through exterior wall shall be steel or cast iron pipe, flush with the exterior surfaces, and with the space between the pipe and the sleeves caulked watertight in an approved manner.
- H. Inserts shall be cast iron or galvanized steel individual type, with accommodations for removable nuts and threaded rods up to 3/4" diameter, and permitting lateral adjustment.

3.08 ESCUTCHEONS:

- A. Escutcheons shall be installed on all pipes where they pass through floors, ceilings, walls, or partitions in finished 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, stamped brass type designed to fit the pipe, and to cover the terminating pipe sleeve, in chrome plated finish unless otherwise specified, with securing device to hold the escutcheon tight to the pipe.

3.09 CLEANING:

- A. Remove all stickers, rust, stains, labels, and temporary covers before final acceptance.

- B. The exterior surfaces of all mechanical equipment, piping, ducts, etc., shall be cleaned of all grease, oil, paint, dust and other construction debris.
- C. Ducts, plenums and casings shall be cleaned of all debris and blown free of all particles of rubbish and dust before installing outlet faces.
- D. Bearings that require lubrication shall be lubricated in accordance with the manufacturer's recommendations. Provide written certification of lubrication.
- E. Equipment rooms shall be left broom clean.
- F. Any fans operated during construction shall have temporary filters. Temporary filters shall be changed regularly to prevent contamination of the equipment and duct systems. Permanent filter shall be installed prior to final inspection.
- G. End of open ducts and pipes shall be covered during construction except when working directly on such one prohibits covering. Cover with minimum four (4) mil thick polyethylene taped, tied or wired in place.
- H. Clean and polish identification plates.

3.10 EQUIPMENT, MATERIALS AND BID BASIS:

- A. It is the intention of these Specifications to indicate a standard of quality for all material incorporated in this work. 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 named manufacturers, although acceptable as manufacturers, must prove their product will perform satisfactorily and will meet space requirements, etc., and shall obtain pre-approval of their equipment, before submitting shop drawings, when their equipment achieves the required results in a manner different than that of the first named manufacturer. Where only one manufacturer is named, unless the Specifications state otherwise, manufacturers of similar quality products will be considered. Such unnamed manufacturer's products will, however, be considered as substitutions and 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, text data, samples, etc., as well as any other pertinent data necessary to demonstrate that the proposed substitutions are acceptable equals to the specified product. No substitutions shall be made without the written consent of the Architect.
- B. The use of one named manufacturer in the schedules on the Drawings is for guide purposes. The provisions of the above paragraph will govern in the selection of products to be used.

3.11 GUARANTEE:

- A. All systems and components shall be provided with a one year guarantee from the time of final acceptance or beneficial occupancy (Coordinate with the Architect). The guarantee shall cover all materials and workmanship. During this guarantee period, all defects in materials and workmanship shall be corrected by repair or replacement without incurring additions to the Contract.
- B. All air conditioning compressors shall be guaranteed for an additional four years. This additional guarantee shall be non-prorated on all parts, refrigerant, and labor.

- 3.12 FOUNDATIONS: All concrete foundations required by equipment furnished under the HVAC Division shall be constructed in conformance with the recommendations of the manufacturer of the respective equipment actually applied, and with the approval of the Architect. All corners of the foundations shall be neatly chamfered. Foundation bolts shall be placed in the forms when the concrete is poured. Allow one inch (1") 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, if necessary. After removal of the forms, the surface of the foundation shall be rubbed. Unless otherwise noted, foundations shall be four inches 4" - 6" high. All concrete work performed shall conform entirely to the requirements of the General Specifications that describe this class of work.
- 3.13 RECORDS AND INSTRUCTIONS FOR OWNER:
- A. The Contractor shall accumulate during the job's progress the following data in triplicate prepared in neat brochures or packet folders and turned over to the Architect/Engineer for check and subsequent delivery to the Owner:
1. Provide all warranties and guarantees, manufacturer's directions and material covered by the Contractor.
 2. Provide approved fixture brochures, wiring diagrams, and control diagrams.
 3. Provide copies of approved shop drawings.
 4. Three sets of operating instructions for heating and cooling and other mechanical systems. Operating instructions shall also include recommended periodic maintenance and seasonal changeover procedures, and suggested procedures in operation of all systems in this particular building to promote energy conservation. These instructions must be written expressly for this project and shall refer to equipment, valves, etc., by mark number from project schedules. Operating instructions and procedures shall be submitted in draft form, for approval prior to final issue of complete brochures. Manufacturer's advertising literature or catalogs will not be acceptable for operating and maintenance instructions.
 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.
- B. All of the above data shall be submitted to the Architect/ Engineer for approval at such time as the Contractor asks for his last estimate prior to his final estimate, but in no case, less than two weeks before final inspection.
- C. The Contractor shall also give not less than 1 day 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 written operating instructions referred to in paragraph above shall be used as a basis for this on-the-job instruction.
- D. A competent technician employed by the Temperature Control Subcontractor shall be required to instruct the Owner in proper operating procedures and shall explain the significance of the temperature control literature filed in the maintenance manual over a period of 6 hours while the system is in continuous operation as specified above.

3.14 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 buried or concealed work. In addition, 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. The "Record Drawings" shall consist of a set of mylar sepia prints 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 mylar sepia prints to be used for the "Record Drawings".
- B. Record dimensions shall clearly and accurately delineate the work as installed; locations shall be suitably identified by at least two (2) dimensions to permanent structures.
- C. The Contractor shall mark all "Record Drawings" on the front lower right hand corner with a rubber stamp impression that states the following:

"RECORD DRAWINGS – "3/8" high letters to be used for recording field deviations,
and "5/16" high letters to be used for dimensional data only.

3.15 INSTALLATION: All equipment shall be installed in strict conformance with manufacturer's recommendations, as specified herein. If any conflict arises between these instructions, notify the Engineer immediately for clarification.

3.16 ACCESS DOORS:

- A. Furnish and install access doors at each point required to provide access to concealed valves, clean-outs, fire dampers and other devices requiring operation, adjustment, or maintenance. Access doors shall be 16 gauge steel, prime coat finish, with mounting straps, concealed hinge and screwdriver locks, designed for the doors to open 180 degrees.
- B. Access doors installed in firewalls or partitions shall be UL Labeled to maintain the fire rating of the wall or partition.
- C. Access doors shall be provided under this section of the specifications and furnished to the General Contractor to be installed.
- D. Access doors shall be MILCOR or approved equal in accordance with the following:

Style AT Door for Acoustical Tile Ceilings
Style AP Door for Acoustical Plaster Ceilings
Style K Door for Plastered Wall and Ceiling Surfaces
Style DW Door for Drywall
Style ATR for Suspended Drywall Ceilings
Style M Door for Masonry, Ceramic Tile, Etc.
Fire-Rated 1-1/2 hr. (B-label) Door where required.

Security access doors for all security walls and ceilings shall have minimum 3/16" x 2" x 2" welded steel frame with 10 gauge door panel and heavy duty stainless steel hinge welded to door and frame. Door shall have detention type deadbolt lock.

- E. Size and type shall be as required for proper service and/or as may be directed by the Architect.
- F. Access door finish shall be chemically bonded to steel with a prime coat of baked on electrostatic powder. Color shall be as selected by Architect.

3.17 FLAME SPREAD AND SMOKE DEVELOPED PROPERTIES OF MATERIALS:

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

3.18 EQUIPMENT FURNISHED BY OWNER:

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

3.19 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 specification Division 23. Any requirements for such are beyond the scope of this contract and shall be done only by those persons contracted to do so.

3.20 PROTECTION OF EXPOSED PIPING: All piping exposed to freezing shall be heat traced as per manufacturer's recommendations per Section 23 05 33 "Heat Tracing for HVAC Piping" and insulated per Section 23 07 00 "HVAC Insulation".

END OF SECTION

SECTION 23 05 11 HVAC SUBMITTAL DATA

PART 1 - GENERAL

- 1.01 RELATED DOCUMENTS: The requirements of the General Conditions, Supplementary Conditions, and Section 23 05 10 HVAC General Requirements, apply to all work herein.
- 1.02 QUALITY ASSURANCE:
- A. 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. The Contractor shall submit to the Architect a sufficient number of copies of all such Shop Drawings or catalog data to provide him with as many reviewed copies as he may need, plus two (2) copies for retention; one by the Architect and one by the Engineer.
 - 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 of the official review by the Architect. Any 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 Specification unless he has, in writing, specifically called attention to such deviations at the time of submission and has obtained the permission of the Architect. Also, it shall not 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 this is not mentioned, 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.

PART 2 - PRODUCTS

- 2.01 GENERAL: All products shall be new and bear all labels which are identified by the applicable specification section and Contract Documents.

PART 3 - EXECUTION

3.01 SUBMITTAL DATA:

- E. 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. 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 where required, accessories specified, manufacturer, make and model number, weights where specified, starters where required by Division 15, 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 the 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.

3. HVAC submittal data shall be bound into separate volumes, each HVAC volume shall contain one copy of all specified equipment/shop drawing submittals. Each volume shall be provided with an index of materials and 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. FAILURE to provide **BOUND AND IDENTIFIED SUBMITTALS** will result in the **AUTOMATIC REJECTION** of the submittal data with **NO EXCEPTION**.
- F. The bound submittals are to be submitted for review within 30 days after the Contract is awarded. No submittal will be checked until ALL required submittals have been received by the Engineer. Only Automatic Temperature Controls, ductwork and piping fabrication drawings may be submitted after the completed bound submittal is reviewed and accepted by the Engineer.
- G. The Contractor shall submit with the bound and 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 has been fully coordinated with the electrical contractor. No submittal data 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 performed without any additions to the Contract Sum. Submit attachment and fastening methods for piping and equipment to the Structural Engineer for approval. Shop Drawings shall be submitted for each of the following:

- Air Conditioning Units with fan, filter and coil data
- Automatic Temperature Controls
- Coils
- Compressors
- Condensers/ Condensing Units
- Disconnect Switches
- Distilled Water System
- Ductwork Accessories and Details
- Evaporators
- Fans
- Furnaces
- Gas Cocks
- Grilles, Registers and Diffusers
- Heaters
- Insulation
- Louvers
- Motor Starters
- Refrigerant Piping Diagrams and Layouts approved by the compressor Manufacturer

Starters
Test, Adjusting and Balancing Reports and Forms
Thermometers, Gauges, etc.
Valves
Vibration Isolators (to be submitted with equipment being isolated)

- D. The Contractor shall submit three copies of a letter, signed by an officer of the company, which states that the items listed below meet or exceed the criterion of the plans and specifications. This letter is to include a listing of each item to be used on the project along with the manufacturer name and model numbers.

Flexible Duct
Flexible Connectors
Ductwork Access Doors and Panels
Automatic Air Vents
Level Gauges
Filters
Pipe Guides
Flow Measuring Devices
Dampers
Draft Control Equipment
Louvers
Roof Curbs
Pipe Hangers and Supports

3.02 OPERATING AND MAINTENANCE INSTRUCTIONS:

A. Description

1. Complete operating and maintenance instructions shall be provided to the Owner. Two (2) separate copies shall be provided, and each copy shall be bound in a separate volume. 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 instruction 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 instruction.
3. Prior to final acceptance or beneficial occupancy, provide the services of a competent representative to instruct the Owner in the operation of all systems for a period of not less than one (1) day. This instruction shall include a complete walk-through of all equipment and systems. The Architect reserves the right to attend any such meeting and shall be duly notified.

3.03 OTHER SUBMITTALS – CLOSEOUT DOCUMENTS:

- A. Submit two copies of the following prior to occupancy of the project by the Owner. See contract close-out documents in Division 01 of specifications.
1. As built drawings for HVAC systems.
 2. Request for final payment.

3. Letter or "Release of Liens".
4. Letter of "Guarantee".
5. Submit two (2) copies of welder's certificate.
6. Consent of Surety Company to final payment.
7. Power of Attorney.
9. Manufacturer's representative shall certify that HVAC equipment and valves are installed in accordance with the manufacturer's recommendations.
10. Contractor's Affidavit of Payment of Debts and Claims.

END OF SECTION

SECTION 23 05 13 COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.01 SCOPE:

- A. All electrical work specified in this section shall comply with the provisions of Division 26. All mechanical work specified shall be in accordance with Division 23.
- B. All motors shall be provided as noted herein.
- C. A motor starter shall be provided under this section for each motor including package units which shall be furnished with integral starters. Motor starters shall be installed either in a motor control center or separately mounted adjacent to the motor served as shown, indicated and/or required. Motor starters not provided in the motor control center under Electrical Specifications Division 26, shall be provided.
- D. Motor power wiring is defined as those conductors between the energy source and the motor. This power wiring shall be terminated at motor terminals and will be provided under Division 26 work.
- E. All control wiring required for automatic starting and stopping of motors shall be provided under this Division unless specifically shown on the electrical drawings.
- F. Power wiring will be connected through all line voltage control devices such as firestats and thermostats by Division 26 work.
- G. Smoke detectors by Division 26.
- H. System power wiring to be under Division 26.

PART 2 - PRODUCTS

2.01 STARTERS:

- A. The Mechanical Contractor shall provide for each and every motor that is a part of his equipment, a properly sized motor starter. This includes, but is not limited to the following: Air handling unit motors, chiller starters, pumps, boilers, system controls, variable speed control devices, cooling towers, pilot lights, push button controls, etc., and shall be furnished complete as a part of the motor apparatus which it operates. All components shall be in conformance with the requirements of the National Electrical Codes (NEC) and Division 26 of this specification. Starters for fractional horsepower motors shall be furnished and installed under Division 26 and as noted herein.
- B. All motor starters shall be turned over to the Electrical Contractor for installation with the following exceptions:
 - 1. Starters for all motors that are ½ horsepower and smaller and are 120 volts, single phase shall be provided and installed by the Electrical Contractor.
 - 2. Motor starters and motor control devices will be furnished and installed in Division 26 where motor control centers are provided by the Electrical Contractor.

- C. Manual operated motor with magnetic controllers shall be pushbutton type. All automatic controlled motors shall have automatic (H.O.A.) switches. All magnetic starters shall have red and green pilot lights on cover. Power wiring and control circuits shall be run in rigid conduit and shall conform to the NEC standards.
- D. All poly-phase motors and all motors that are automatically controlled shall be furnished with magnetic starters, full voltage, non-reversing type, complete with necessary auxiliary contacts for controls unless otherwise noted. Heaters shall be of the melting alloy type, sized to the exact nameplate running current of the motor. Overloads shall have visual trip indicators and shall be trip-free with reset button held in. All magnetic motor starters or controllers shall be equipped with one overload element in each phase. All starters for 3-phase motors, 3hp/3kw and larger, shall include protection against loss of any one phase or phase reversal and voltage fluctuations.
- E. Starters for motors 1/3 horsepower or smaller shall be manual unless remote or automatic starting is required, in which case the starters shall be magnetic, full voltage, non-reversing, single speed, unless otherwise indicated.
- F. Each starter for a three-phase motor shall be combination magnetic type with circuit breaker and shall be furnished with three (3) overload relays sized for the full load running current of the motor actually provided. Provide an external "RESET" button or "HAND-OFF-AUTO" selector switch as scheduled with red "RUNNING" light. Provide a green pilot light to indicate motor "STOPPED". Each pilot light shall have a legend plate indicating reason for signal.
- G. Each overload relay shall have normally open alarm contact which will close only when actuated by an overload (not to be confused with N.O. or N.C. auxiliary contacts). These contacts shall be properly wired to their respective blue pilot light provided on the starter front cover and having a "TRIPPED" legend plate.
- H. Provide two sets each of normally open and normally closed auxiliary contacts for all magnetic starters. See equipment schedules on plans for voltage requirements.
- I. Individually mounted motor starters shall be in a NEMA Type 1 general purpose enclosure in unfinished areas and shall be flush mounted in all finished areas. Each starter shall have a laminated nameplate to indicate Division 23 unit number, function and circuit number. Outdoor starters shall be rain-tight weatherproof.
- J. All motor starters, push buttons and pilot lights shall be of the same manufacture as the switchboard.
- K. COMBINATION STARTERS: Combination starters shall consist of a circuit breaker and a motor starter mounted in a common NEMA Type 1 general purpose enclosure. The circuit breaker component shall be a minimum 22,000 RMS interrupting capacity and shall be as required in the Electrical Division.

2.03 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.

- B. Each motor shall be suitable for the brake horsepower of the driven unit, rated with 1.15 minimum service factor and shall be NEMA design B. The motor temperature rise shall not exceed 104° F. for drip proof motors, 122° F. for splash proof motors and 131° F for totally enclosed or explosion proof motors. The motor shall be capable of operating continuously at such temperature rises, and shall be capable of withstanding momentary overloads of 25 percent 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, shaft capacities, etc.
- E. Motors larger than 1/2 horsepower shall have bearings with pressure grease lubrications fittings.
- F. Motors connected to drive equipment by belt shall be furnished with adjustable slide rail bases except for fractional horsepower motors, which shall 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.
- H. Unless otherwise indicated, motors smaller than 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 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. Variable speed motors operating over an adjustable range of speeds shall be motors specifically designed and rated for this duty.
- J. 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 and shall then coordinate the change and shall pay all additional charges in connection with the change.

2.04 IONIZATION SMOKE DETECTORS:

- A. Provide and install ionization smoke detectors in all air handling units. Detectors are to be installed in both the supply and return air duct connections at each unit. Detectors are to be installed by the Mechanical Contractor and furnished and wired by the Electrical Contractor in Division 26.
- B. Detectors shall de-energize air systems when and if particles of combustion are detected in the air stream. Detectors shall be fitted with sampling tubes that are sized to fit duct widths. Provide a manual reset switch and interlock with the building fire alarm system if such exists.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Provide control wiring and install all motor starters, unless integrally factory mounted on a piece of equipment.
- B. Provide control wiring to all motors except packaged units that are prewired between the starter and motor.
- C. Where line voltage control devices are mounted at or inside a unit, such as aquastats, firestats for single phase devices, etc., the power wiring to the unit shall be connected through such a control device by the work of Division 26.
- D. On final inspection, it shall be demonstrated to the Engineer or his representative that each overload relay control circuit is properly wired and functioning correctly by manually tripping each overload relay individually, one at a time. This inspection procedure shall not involve removal of any wiring or disconnecting any current carrying parts.
- E. Standard minimum one-year warranty on all electrical equipment provided herein shall apply.

3.02 ELECTRICAL WORK:

- A. All electrical equipment provided under this Division shall comply with the electrical system characteristics indicated on the electrical drawings and specified in Division 26.
- B. All power wiring and final power connections to the system shall be provided under Division 26.
- C. Control wiring (120V. and less) shall be provided under Division 23 and extended from the 120V power circuits indicated on the Electrical Drawings. All wiring for voltages higher than 30 volts shall be done by a licensed electrician.
- D. All electrical characteristics shall be taken from the Electrical Drawings and Specifications and coordinated before equipment is ordered or submitted.

END OF SECTION

SECTION 23 05 15 DESIGN CONDITIONS

PART 1 - GENERAL

1.01 DESCRIPTION: The requirements of the General Conditions, Supplementary conditions, and Section 23 05 10 "HVAC General Requirements" apply to all work herein.

PART 2 - DESIGN CONDITIONS

2.01 DESIGN CONDITIONS:

A. Outside conditions are as follows:

	Dry Bulb Deg. F.	Wet Bulb Deg. F.
Summer Outside Air Temperature	98	80
Winter Outside Air Temperature	0	

B. The indoor design condition for cooling is 72 deg. F. dry bulb/50% relative humidity.

C. The indoor design condition for heating is 72 deg. F. dry bulb.

D. Range of indoor design goals for HVAC sound control:

1. All occupied space shall have an Noise Criterion (NC) curve range not to exceed NC 30.

E. Building envelope design criteria - these values are repeated here to alert the General Contractor to the properties of materials used in the calculation of heating and cooling loads for this project. It shall be the responsibility of the General contractor to notify the Architect and Engineer if materials with properties other than those stated below are used in the construction of this project:

1. Typical vision glass shading coefficient – 0.82
2. Typical vision glass "U" values – 0.60
3. Insulated exterior walls transmission coefficient - 0.069 BTU/ (hr.)(F deg.)(sq.ft.)
4. Roof heat transmission coefficient - 0.047 Btu/ (hr.)(F. deg.)(sq. ft.)

2.02 QUALITY ASSURANCE: 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 govern.

PART 3 – EXECUTION

3.01 PRESSURE TESTING / RECORDING: All pressure tests shall be observed by the Engineer. He may delegate others, i.e. Architect, General Contractor, Clerk of Works, etc., to observe tests in his absence. Said tests and time duration shall be recorded and posted onto the pipe segments as indicated on the project set of construction documents.

END OF SECTION

SECTION 23 05 29 HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

- 1.01 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General Conditions, Supplemental Conditions, and Specifications Section 23 05 10 "HVAC General Requirements" apply to work of this section.
- 1.02 DESCRIPTION OF WORK:
- A. 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.
 - B. "C" CLAMPS may be used as point of attachment to building structure for pipe hangers and/or all-thread rods; however, piping shall not be supported directly by "C" clamps.
 - C. Do not pierce waterproofing with support bolts.
 - D. All ferrous metal hangers and supports, not otherwise coated, shall be provided with a field-applied coat of zinc chromate primer prior to any installation. In lieu of field painting, the contractor may furnish cadmium plated, or galvanized hangers and supports.
- 1.03 QUALITY ASSURANCE:
- A. 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-69.
 - B. Provide an adequate suspension system in accordance with recognized engineering practices, using where possible, standard commercially accepted pipe hangers and accessories. Submit fastening methods to the Structural Engineer for approval and as approved copy to the engineer.
 - C. 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.
 - D. For the purpose of this specification, Grinnell product figure numbers are given. Equal products by B-Line and Michigan Hanger Co. (M-Co) are acceptable.
- 1.04 DESIGN:
- A. Supporting steel not shown for the equipment will be designed, supplied and erected by the Contractor; the supporting steel is that steel which is connected to the structural steel shown on the drawings and carries the weight of the mechanical items. This supporting steel design must carry the dead weight and dynamic load imposed by the equipment, piping and other mechanical components.
 - B. The supporting steel shall be connected to the structural steel in such a manner as not to overload the structural steel. It is the responsibility of the General Contractor, Mechanical Contractor and the steel fabricator to verify that this purpose is accomplished. It is the responsibility of the General Contractor to call to the attention of the Architect-Engineer any deficiency prior to bidding.

- C. Where thermal movement in the pipe line will occur, the pipe hanger assembly must be capable of supporting the line in all operating conditions. Accurate weight balance calculations shall be made to determine the supporting force at each hanger in order to prevent excessive stress in either pipe or connected equipment.

PART 2 - PRODUCTS

2.01 UPPER ATTACHMENTS:

A. New Concrete Construction:

1. Support piping in new concrete construction with adjustable type inserts, Grinnell Fig. 282. Where the pipe load exceeds the recommended load of the insert, use two inserts with a trapeze-type connecting member below the concrete.
2. Where hangers are required between structural members, (beams) provide side beam brackets, Grinnell Fig. 202, 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 and shall receive a field coat of zinc chromate primer.

B. Existing Concrete Construction:

1. Support piping in existing concrete construction with Cadmium plated, malleable iron, expansion case, Grinnell Fig. 117.
2. Where hangers are required between structural members (beams) side beam brackets Grinnell Fig. 20, attached to the upper 1/3 of the beam, and all auxiliary steel for the installation of the pipe hanger. Supports shall be designed in accordance with the AISC Steel Handbook and shall receive a field coat of zinc chromate primer.

C. Steel Construction:

1. Support piping in steel construction with adjust-able beam clamps and tie rods, Grinnell Fig. 218, or side beam brackets bolted or welded to the side of the beam.
2. Where hangers are required between structural members (beams or joist) provide all auxiliary steel for the installation of the pipe hanger. Supports shall be designed in accordance with the AISC steel Handbook and shall receive a field coat of zinc chromate primer.

D. Wood Construction:

1. Support piping in wood construction with Side Beam Bracket, Grinnell Fig. 202 or Hanger Flange, Grinnell Fig 128R, using lag screws.

- 2.02 WALL SUPPORTS: Where piping is run adjacent to walls or steel columns welded steel brackets Grinnell Fig. 195 and 199 may be used. The bracket shall be bolted to the wall and a back plate of such size and thickness as to properly distribute the weight.

2.03 FLOOR SUPPORTS:

- A. Where pipe lines are located next to the floor and no provision for expansion are required support piping with Grinnell Fig. 258, pipe rest with nipple and floor flange.
- B. Where provisions for expansion are required support piping with Grinnell adjustable pipe stand Fig. 274, or pipe roll stand Fig. 271.
- C. Vertical piping shall be supported at every other floor using riser clamps Grinnell Fig. 261, for steel and cast iron pipe, and copper clad riser clamp Grinnell Fig. CT-121 for all copper piping.

2.04 SUPPORTS FOR PIPING OUTSIDE THE STRUCTURE: Support piping outside the structure on adjustable pipe supports Grinnell Fig. 264.

2.05 INTERMEDIATE ATTACHMENTS: Supports for horizontal piping shall be all-thread galvanized steel rods, ASTM A-107, Grinnell Fig. 146, of the following sizes:

Pipe Size	Hanger Rod Diameter
2" and smaller	3/8"
2-1/2" and 3"	1/2"
4" and 5"	5/8"
6"	3/4"
8" to 12"	7/8"
14" and 16"	1"

2.06 PIPE ATTACHMENTS:

- A. Hangers for insulated pipe shall be sized to bear on the outside of the insulation.
- B. Hangers for steel and cast-iron horizontal piping where provision for expansion are not required shall be Grinnell Fig. 260, clevis type with vertical adjustment.
- C. Hangers for uninsulated copper pipe 4" and smaller shall be copper plated adjustable band hangers Grinnell Fig. CT. 99C, for pipe sizes over 4" provide Grinnell copper clad clevis type hanger with a copper clad saddle at each hanger location.
- D. Hanger for PVC pipe shall be Grinnell Fig. CT. 99, adjustable band hanger.
- E. Hangers for steel and copper piping where provisions for expansion are required shall be Grinnell Fig. 171 or Fig. 181, adjustable roller hanger with Grinnell Fig. 160, pipe covering protection saddles.
- F. Pipe guide shall be Grinnell Fig. 256.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Support horizontal equipment such as in-line pumps, strainers, air separators, independently of the piping system.
- B. Hang pipe from substantial building structure. Pipe shall not be hung from other piping.

- C. Provide a hanger within one foot of each elbow.
- D. Provide a hanger within one foot of each riser in addition to the riser clamp support at every other floor.
- E. Unless specified otherwise, provide the following support spacing.

1. Pipe Size	Support Spacing
1" and smaller	5'-0"
1-1/4" and larger	10'-0"

END OF SECTION

SECTION 23 05 53

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 APPLICABILITY:

- A. All work specified in this Section shall comply with Section 23 05 10 "HVAC General Requirements".
- B. All above ground piping inside the building shall be identified with color bands at each shut-off valve, each piece of equipment, branch take-off, and 40'-0" maximum spacing on exposed straight pipe runs.

PART 2 - PRODUCTS

2.01 PIPE MARKINGS: Pipe markings shall be manufactured preprinted markings in accordance with the following:

- 1. No tape or self-adhering markers will be allowed.
- 2. Snap on pipe markers, W. H. Brady Co. or approved equal are acceptable.
- 3. Markers shall be strapped on with nylon fasteners.
- 4. Markers will be non-corrosive, non-conductive, mildew resistant and impervious to moisture.

2.03 BAND AND LETTER SIZE: Band and letter sizes shall conform to the following table:

O.D. of Pipe	Width of Color Band	Size of Letter/Numbers
1-1/4" and smaller	8"	1/2"
1-1/2" to 2"	8"	3/4"
2-1/2" to 6"	12"	1- 1/4"
6" to 10"	24"	2- 1/2"
Over 10"	32"	3- 1/2"

2.04 IDENTIFICATION:

- A. Band legend and color and letter color shall conform to the following table:

Piping Band	Legend	Letters	Band Color
Refrigerant Liquid	RL	Black	Yellow
Refrigerant Suction	RS	Black	Yellow
Refrigerant Discharge	RD	Black	Yellow
Drain	D	Black	Green

- B. All equipment, such as air units, condensing units, fans, etc., furnished by this Contractor shall be permanently labeled in an approved manner corresponding to the mark or name shown on the drawings and/or specifications.
- C. For applications where existing color schemes may already be in place, all new work requiring identification and color coding shall match the existing color schemes.

- 2.05 PIPE MARKING LOCATIONS: The following are examples of types of identification to be used for piping located above ceilings:



PART 3 - EXECUTION

3.01 EXECUTION:

- A. Locate pipe identification in the following areas:
1. Each riser and each valve,
 2. One on each side where piping pass thru walls and floors,
 3. Locate at or near each change in direction,
 4. Every 40 feet along continuous runs,
 5. Located within 4 feet of exit or entrance to a vessel or tank.
- B. Indicate pipe content flow direction with arrows of matching style and placed so the arrow points away from the legend.

END OF SECTION

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General Conditions and Division 01 Specification Sections apply to work in this section.

1.02 SUMMARY:

A. This Section specifies the requirements and procedures total mechanical systems testing, adjusting, and balancing. Requirements include measurement and establishment of the quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.

B. Test, adjust, and balance the following mechanical systems:

1. Airside systems: Supply air, return air, relief air, exhaust air, and outside air systems, all pressure ranges; Verify temperature control systems operations.

C. This Section does not include:

1. Specifications for materials for patching mechanical systems; specifications for materials and installation of adjusting and balancing devices. If devices must be added to achieve proper adjusting and balancing, refer to the respective system sections for materials and installation requirements.

1.03 SCOPE OF WORK:

A. A Test and Balance Agency that is independent of any contractor or manufacturer shall perform the testing, adjusting and balancing and prepare reports, and deliver them to the Architect. The independent Test and Balance Agency shall be a certified member of the Associated Air Balance Council (AABC). The Test and Balance Agency contract shall not be assigned to any Subcontractor; the Agency shall work directly under the General Contractor.

B. Total System Balance shall be performed in accordance with the 6th edition of the AABC National Standards for Total System Balance, and in accordance with the scope of work defined by the Contract Documents.

C. Testing and Balance Agency as part of its contract shall act as an authorized inspection agency, responsible to the Owner's Representative, and shall, during the test and balance, list systems that are installed incorrectly, require correction, or have not been installed in accordance with Contract Drawings and Specifications.

D. Upon the completion of the test and balance work, the Agency shall compile the test data and submit the specified number of copies of the complete report to the Owner's Representative for his evaluation and approval.

E. Test, adjust and balance the air systems. After testing, adjusting, and balancing is complete, the Contractor shall visit the job during the heating cycle and during the cooling cycle to make adjustments to provide uniform temperatures throughout the building. Schedule the trips during the months of December through February for the heating cycle, and June through August for the cooling cycle. Obtain signed statements from the Using Agency acknowledging these two trips and subsequent adjustments. Submit statements to the Architect.

- F. General Contractor shall furnish test and balance contracting agency for this project. The Test and balance agency shall work under the direction of the Professional.

1.04 DEFINITIONS:

- A. Systems testing, adjusting, and balancing is the process of checking and adjusting all the building environmental systems to produce the design objectives. It includes:
 - 1. The balance of air systems;
 - 2. Adjustment of total system to provide design quantities;
 - 3. Electrical measurement;
 - 4. Verification of performance of all equipment and automatic controls;
- B. Test: To determine quantitative performance of equipment.
- C. Adjust: To regulate the specified air patterns as applicable at the terminal equipment (e.g., reduce fan speed, throttling).
- D. Balance: To proportion flows within the distribution system (sub-mains, branches, and terminals) according to specified design quantities.
- E. Procedure: Standardized approach and execution of sequence of work operations to yield reproducible results.
- F. Report Forms: Test data sheets arranged for collecting test data in logical order for submission and review. These data should also form the permanent record to be used as the basis for required future testing, adjusting, and balancing.
- G. Terminal: The point where the controlled air enters or leaves the distribution system. These are supply inlets and return outlets on air terminals and exhaust or return inlets on air terminals such as fans, furnaces, registers, grilles, diffusers and louvers.
- H. Main: Duct containing the system's major or entire air flow.
- I. Sub-main: Duct or pipe containing part of the systems' capacity and serving two or more branch mains.
- J. Branch Main: Duct serving two or more terminals.
- K. Branch: Duct serving a single terminal.

1.05 SUBMITTALS:

- A. Agency Data:
 - 1. Submit proof that the proposed testing, adjusting, and balancing agency meets the qualifications specified below.
- B. Certified Representative and Technicians Data:
 - 1. Submit proof that the Test and Balance certified representative assigned to supervise the procedures, and the technicians proposed to perform the procedures meet the qualifications specified below.

- C. Certified Reports: Submit testing, adjusting, and balancing reports bearing the certified seal and signature of the Test and Balance representative. The reports shall be certified proof that the systems have been tested, adjusted, and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting, and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. Follow the procedures and format specified below:
1. Draft reports: Upon completion of testing, adjusting, and balancing procedures, prepare draft reports on the approved forms. Draft reports may be hand written, but must be complete, factual, accurate, and legible. Organize and format draft reports in the same manner specified for the final reports. Submit 3 complete sets of draft reports. Only 1 complete set of draft reports will be returned.
 2. Final Report: Upon verification and approval of draft reports, prepare final reports, type written, and organized and formatted as specified below. Submit 4 complete sets of final reports.
 3. Report Format: Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, three-ring binders. Provide binding edge labels with the project identification and a title descriptive of the contents. Divide the contents of the binder into the below listed divisions, separated by divider tabs:
 - a. General Information and Summary
 - b. Air Systems
 - c. Temperature Control Systems
 - d. Special Systems
 4. Report Contents: Provide the following minimum information, forms and data:
 - a. General Information and Summary: Inside cover sheet to identify testing, adjusting, and balancing agency, Owner, Owner's Representative, and Project. Include addresses, and contact names and telephone numbers. Also include a certification sheet containing the seal and name address, telephone number, and signature of the Certified Test and Balance registered representative. Include in this division a listing of the instrumentations used for the procedures along with the proof of calibration.
 - b. The remainder of the report shall contain the appropriate forms containing as a minimum, the information indicated on the standard report forms prepared by the AABC for each respective item and system. Prepare a schematic diagram for each item of equipment and system to accompany each respective report form.
- D. Calibration Reports: Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards, within a period of six months prior to starting the project.

1.06 QUALITY ASSURANCE:

A. Agency Qualifications:

1. Employ the services of an independent testing, adjusting, and balancing agency meeting the qualifications specified below, to be the single source of responsibility to test, adjust, and balance the building mechanical systems specified to produce the design objectives. Services shall include checking installations for conformity to design, measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.

B. The independent testing, adjusting, and balancing agency certified by Associates Air Balance Council (AABC) in those testing and balancing disciplines required for this project, and having at least one registered in the State in which the services are to be performed, certified by AABC as a Test and Balance representative.

C. Codes and Standards:

1. AABC: "National Standards For Total System Balance".

2. ASHRAE: ASHRAE Handbook, 1984 Systems Volume, Chapter 37, Testing, Adjusting, and Balancing.

1.07 FINAL INSPECTION:

A. All systems, when completed, shall be operated by the organization to test the performance as directed by and to the satisfaction of the Using Agency.

B. Systems shall be balanced within the stated tolerances at the design conditions. The Owner's Representative may request or perform a check reading on up to 10 per cent of the outlets and duct traverses. If any reading varies beyond the stated tolerances, the system will be considered out of balance and the entire system be readjusted and a new report prepared at no additional cost to the Owner.

C. Heating, ventilation and air conditioning systems shall maintain uniform temperatures without drafts through the normal change of seasons. The Owner's Representative may request new design settings on up to 20 per cent of the air outlets and coil connections for final adjustment of the system during the first year of operation at no additional cost to the Owner.

D. Air ducts shall circulate without excessive noise.

E. All defects demonstrated by inspections and tests shall be remedied immediately to the Architect's satisfaction.

1.08 PROJECT CONDITIONS: Systems Operation: Systems shall be fully operational prior to beginning procedures.

PART 2 - PRODUCTS

2.01 PATCHING MATERIALS: Except as otherwise indicated, use same products as used by original Contractor for patching holes in insulation, ductwork, and housings which have been cut or drilled for test purposes, including access for test instruments, attaching jigs, and similar purposes.

PART 3 - EXECUTION

3.01 REQUIRED DOCUMENTS:

- A. The Contractor shall provide the following, in a timely fashion, to the Test and Balance Agency:
- B. Contract drawings (complete set)
- C. Applicable specifications (Div. 23 & 26, as a minimum)
- D. Related addenda
- E. Related change orders
- F. Related reviewed shop drawings
- G. Related reviewed equipment manufacturer's submittal data
- H. Reviewed equipment control drawings

3.02 COOPERATION: The Contractor and his subcontractors shall cooperate fully with the Test and Balance Agency and provide:

- 1. Completely operable systems
- 2. The right to adjust the systems
- 3. Access to systems components

3.03 BELT DRIVES:

- A. Adjustable speed drives are to be adjusted by the Test and Balance Agency. In cases where the specified capacities cannot be obtained with the original adjustable sheave or original fixed drive sheave, the Agency is to report to the Contractor the sheave size required to obtain the specified capacity.
- B. Where larger or smaller sheave sizes are required, the Contractor shall provide new sheaves and, if required, new belts at no additional cost to the Owner.

3.04 CONTROL PERFORMANCE CHECK: The results produced by the operation of rooftop and fan systems controls shall be checked by the testing agency; controls requiring adjustment shall be listed and reported to the Contractor. This does not reduce the responsibility of the Contractor for the checking and adjustment required for a fully operational control system. The Test and Balance Agency is responsible only for final settings; the Contractor is responsible for completeness and correctness of all the control systems.

3.05 SETTINGS: The Test and Balance Agency shall permanently mark the settings of all dampers, valves and other adjustment devices in a manner that will allow the settings to be restored. If a balancing device is provided with a memory stop, it shall be set and locked.

3.06 MEASUREMENTS:

- A. Provide all required instrumentation to obtain proper measurements, calibrated to the tolerances specified in the referenced standards. Instruments shall be properly maintained and protected against damage.

- B. Provide instruments meeting the specifications of the referenced standards.
- C. Use only those instruments which have the maximum field measuring accuracy and are best suited to the function being measured.
- D. When averaging values, take a sufficient quantity of readings which will result in a repeatability error of less than 5 percent. When measuring a single point, repeat readings until 2 consecutive identical values are obtained.
- E. Take all reading with the eye at the level of the indicated value to prevent parallax.
- F. Take measurements in the system where best suited to the task.

3.07 PERFORMING TESTING, ADJUSTING, AND BALANCING:

- A. Cut insulation and ductwork, for installation of test probes to the minimum extent necessary to allow adequate performance of procedures.
- B. Patch insulation, ductwork, and housings, using materials identical to those removed. Seal ducts, and test for and repair leaks. Seal insulation to re-establish integrity of the vapor barrier.
- C. Mark equipment settings, including damper control positions, and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.
- D. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.

3.08 RECORD AND REPORT DATA:

- A. Record all data obtained during testing, adjusting, and balancing in accordance with, and on the forms recommended by the referenced standards, and as approved on the sample report forms.
- B. Prepare report of recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.

3.09 REPORT:

- A. The following items shall be tested, recorded, and incorporated in the test and balance report. The report shall not be limited to these items, but shall include these tests as minimum requirements.
 - 1. Record each equipment manufacturer, model numbers and serial numbers.
 - 2. Test, adjust and record required and measured total CFM for each air system and component. Test and record quantity of exhaust or relief air in CFM.
 - 3. Test, adjust and record all required and measured outside air quantities and return air CFM.
 - 4. Test and record required and measured system static pressures; filter differential, and fan total static pressure. Test and record pressure drop through the air system units.
 - 5. Record all installed fan drive assemblies; fan sheaves, motor sheaves, and belts.
 - 6. Record each installed motor manufacturer.
 - 7. Record each installed motor horsepower.

8. Test and record each motor name plate and measured voltage and full load amperage.
 9. Test, adjust, and record each blower RPM.
 10. Test and adjust the CFM delivery of each diffuser, grille, and register.
 11. Identify the location of each diffuser, grille, and register.
 12. Record the size, type, and manufacturer of each grille, register and diffuser.
 13. Data obtained for each diffuser, grille and register shall include required FPM velocity and test resultant velocity, required CFM and test resultant CFM after adjustments.
 14. All diffusers, grilles, and registers shall be adjusted to minimize drafts.
 15. All tests shall be made with supply, return, relief and exhaust systems operating, and all doors, windows, etc. closed or in their normal operating condition.
 16. All damper positions shall be permanently marked after air balancing is complete.
 17. The final balanced condition of each area shall include the testing and adjusting of pressure conditions. Front doors, exits, etc., should be checked for air flow so that exterior conditions do not cause excessive abnormal pressure conditions.
 18. Indicate on floor plans the locations and results of the sound measurements taken.
- 3.10 SYSTEM BALANCING REQUIREMENTS: Testing, adjusting and balancing shall be provided for all airside systems and equipment specified and indicated in the Contract Documents.

END OF SECTION

SECTION 23 07 00

HVAC INSULATION

PART 1 - GENERAL

- 1.01 RELATED DOCUMENTS: Drawing and general provisions of Contract, including General and Supplementary Conditions and Specification section 23 05 10 "HVAC General Requirements", apply to work of this section.
- 1.02 DESCRIPTION:
- A. All insulation products used outside of mechanical rooms 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.** All insulation shall be installed in accordance with the insulation manufacturer's recommendations. Insulation 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 Foamglass Insulation, Calcium Silicate or Perlite and shall be 2" longer than the pipe shields. Pipe shoes welded to the pipe shall be used for roll type hangers.
 - D. All required tests of the relevant section of pipe, ductwork, or equipment 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°F.
 - G. Items not to be insulated:
 - 1. Exhaust Ducts
 - 2. Vents from pressure relief valves.
 - 3. Ducts with internal lining or factory insulated ducts.
 - H. Clean and dry all surfaces to be insulated from loose scale, dirt, oil, moisture and other foreign matter.
 - I. Insulate completely all metal surfaces of piping, ductwork and equipment other than hangers.
 - J. Surface finishes shall present a tight smooth appearance.
 - K. Permit expansion and contraction without causing damage to insulation or surface finish.
 - L. Surface finish shall be extended to protect all surfaces, ends, and raw edges of insulation.
 - M. Vapor barriers must be continuous and uninterrupted throughout the system where specified except where insulation is interrupted for fire dampers. See details for special conditions.

- 1.03 PIPING:
- A. Insulate all valves, strainers and fittings. For the purposes of this Specification, fittings include unions and flanges. Use premolded material where available. Insulate valves up to and including bonnets.
 - B. Pipe Hangers that are installed in direct contact with the surface of the pipe, such as a pipe clamp shall have the insulation applied over the hanger as well as the pipe. Provide a rain shield on piping supported on hangers outdoors to prevent bulk water from entry.
- 1.04 DUCTWORK: Insulation shall cover all standing seams and metal surfaces. Materials shall be applied subject to their temperature limits.
- 1.05 QUALITY ASSURANCE:
- A. 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.
 - B. 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. Material shall be furnished to the job bearing the manufacturer's label.
 - C. Insulation products shall be as manufactured by Pittsburgh Corning Corporation, Knauf, Resolco, Owens-Corning, Certainteed or Armstrong.
- 1.06 FITTING COVERS AND JACKETS: Where applicable, provide and install PVC covers and jacketing on fittings with fiberglass insulation as manufactured by Johns Manville Zeston 300 Series.

PART 2 - PRODUCTS

- 2.01 EXTERIOR WRAP FOR ROUND DUCTWORK:
- A. **Insulation equal to Knauf Duct Wrap.** Insulate externally, all round ductwork with 2" thick blanket fiberglass duct insulation. All seams to be taped with pressure sensitive tape and banded with nylon ties on 3'-0" centers.
 - B. The board type shall have a minimum 3# density, 1 ½" thick with ASJ jacket. Insulation board shall have an average conductivity not to exceed 0.27 BTU/inch/ square foot/degree F / hour at a mean temperature of 75°F.
- 2.02 ACOUSTICAL DUCT LINER:
- A. Duct liner shall be equal to Knauf Textile Duct Liner. Acoustical duct liner shall be a flexible type with a minimum 1" thickness using long fiberglass with a smooth firmly bonded fire-resistant surface to prevent erosion of the insulation. Surface not to exceed 25 flame spread and 50 smoke development. Thermal conductivity shall not exceed 0.26 at 75° F. mean temperature.

- B. Noise reduction coefficient (NRC) shall not be less than .60 based on acoustical materials test, Mounting No. 6. Completely coat all duct surfaces with Benjamin Foster 85-15 adhesive. Neoprene coated side on liner shall face air stream. Sections shall be jointed by coating the edges with Foster 30-36. Secure liner to duct system with self-adhering pins adhered to clean surface and secure with self locking washers, space pins not more than 4" from the edges and not more than 16" on centers. Lining shall meet National Board of Fire Underwriters' Standards for Internal Duct Application and shall have a minimum density of 3 lbs. per cu. ft. All duct liner shall be marked with the density located so as to be visible on the exposed surface of the liner. Air friction correction factor shall not exceed 1.40 at 2000 FPM and 1.5 at 4000 FPM.
 - C. Insulate all rectangular supply, return, and outside air ductwork internally as described in Paragraphs A and B.
- 2.03 FOAMED PLASTIC SHEET, AND TUBING:
- A. Sheet Insulation shall be equal to Armstrong Armaflex. Minimum of 4.5 lbs. per cu. ft. Thermal conductivity shall not exceed 0.28 at 75° F mean temperature.
 - B. Insulate following piping with 3/4" Armstrong Armaflex foam plastic insulation:
 - 1. Refrigerant Piping
 - 2. Condensate drain Piping
- 2.04 ADHESIVES, MASTIC, COATINGS:
- A. Benjamin Foster, Childers, Insul-Coustic, EPOLUX, Minnesota Mining and Manufacturing Co.
 - B. Treatment of pipe jackets and duct facings to impart flame and smoke safety shall be permanent. The use of water-soluble treatments is prohibited.
 - C. Vapor barriers shall have a perm rating of not more than .05 perms. Adhesives, coatings and mastics shall have a perm rating of not more than .25 perms.
- 2.10 TAPE: Wherever tape is used for sealing purposes, it shall be of the type and shall be applied as recommended by the non-conductive covering manufacturer. Where recommendation is lacking, the tape used shall be sealed with Minnesota Mining Adhesive EC-1329.
- 2.11 INSULATING CEMENT: Insulating cement shall be O-C 110 mineral wool Benjamin Foster or Minnesota Mining, all purpose cement. Where insulating cement is applied to pipe fittings in concealed locations, it shall be "one-coat" cement.

PART 3 - EXECUTION

3.01 GENERAL:

- A. Surfaces to be insulated shall be clean, dry, and free of foreign material, such as rust, scale and dirt when insulation is applied. Perform pressure tests required by other Sections before applying insulation.
- B. Where existing insulation is damaged due to the new work, repair damage to match existing work or replace damaged portion with insulation specified for new work.

3.02 INSULATION FOR ALL PIPING SYSTEM:

- A. Insulate pipe, fittings, flanges, unions and valves.
- B. Install insulation materials with smooth and even surfaces, jackets drawn tight and cemented down smoothly at longitudinal seams and end laps. Do not use scrap pieces of insulation where a full length section will fit.
- C. Install insulation, jackets and coatings continuous through wall and floor openings and sleeves.
- D. Application of all materials shall be in accordance with the manufacturer's instructions.
- E. Butt all joints of pipe insulation together and secure all jacket laps with lap adhesive. Seal all butt joints with joint straps furnished with insulation.
- F. Care shall be taken so as not to place insulation over vent and drain inlets and outlets.
- G. Staples are not permitted on pipe insulation.
- H. Insulate all refrigerant piping appurtenances subject to sweating, such as thermometer wells, gauge cocks, and valve stems with preformed and mitered fiberglass pipe insulation. Finish with white vapor barrier mastic.

3.03 INSULATION FOR DUCT SYSTEM:

- A. Secure insulation to duct with Benjamin Foster 85-15 adhesive applied in 4 inch strips around the duct on 8 inch centers. Nylon cord shall be used to secure the insulation. Where ductwork is 36" wide or more secure insulation to the bottom of the duct using self adhering pins and self locking washers placed not more than 18 inches on center. Insulation shall overlap lining and factory applied insulation a minimum of 2 inches. Vapor barrier at all butted joints or breaks shall be sealed with 4" inch wide foil reinforced tape adhered with Benjamin Foster 82-07.
- B. Insulate ductwork exposed to the weather that is not lined with glass fiber semi-rigid board insulation 1½" thick, 3 lbs. per cubic feet density. Secure to metal with self-adhering pins with self locking washers. Finish with standard weight glass cloth set in 1/16" weatherproof mastic similar to Seal-Kote. After drying, apply a 1/16" finish coat of waterproof mastic. Butt insulation joints and seal with mastic.

- 3.04 INSULATION FOR EQUIPMENT: Secure insulation with insulation hangers and self locking washers, copper weldwire or galvanized bands. Miter to insure a tight fit. Seal joints with mineral wool insulating cement. Finish with standard weight glass cloth set between two 1/16" coats of white mastic. Insulate flanged ends of strainers, pumps, removable head sections, access plates and coupling with a removable 18 gauge aluminum casing, lined with foamed plastic sheeting adhered to the inside of all surfaces subject to sweating. Casing shall be fabricated in two sections and joined with galvanized steel bolts. Casing shall be removed and reinstalled without damage to surrounding insulation. Attention is called to the fact that external duct insulation is required at Fire/Smoke dampers sleeves where dampers occur in lined ductwork.

END OF SECTION

SECTION 23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 - GENERAL

1.01 DESCRIPTION

- A. All work specified in this Section is subject to the provisions of Division 26.
- B. Each system shall be controlled by individual 7-day programmable thermostats with separate heating and cooling setpoints, fan "on-off-auto" switch, and system "heat-off-cool" switches. Thermostat locations shall be as shown on drawings.
- C. Remote position indicators for the electric controllers shall be located adjacent to the controllers and controlled devices.
- D. High limit thermostats shall be provided in intake of all exhaust fans and in discharge air of all supply fans except where smoke detectors are provided.
- E. Smoke detectors shall be provided under Division 23 and installed by Division 23 in the return air path (s) at each furnace or air handling unit prior to mixing with outside air. Detectors shall be ionization duct-mounted type. All necessary interlocks, relays, contactors, etc., with the smoke detection system and mechanical equipment, shall be provided under Division 23. Wiring for unit shut-down shall be provided under Division 23. Provide normally open contacts at each smoke detector for interlock with building fire alarm system.

PART 2 - PRODUCTS

- 2.01 MATERIALS AND COMPONENTS: All electrical components of the control systems shall conform to the requirements of Division 26.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The automatic temperature controls shall be installed in complete conformance with the manufacturer's recommendations and the Contract Documents.
- B. The ATC systems shall be installed to provide a completely functional and fully coordinated system of control.

3.02 SEQUENCE OF OPERATION: Gas-Fired Furnaces and Heat Pump Indoor Units:

- 1. Units shall be started and stopped, subject to safety thermostats and smoke detectors, and by a thermostat mounted in space.
- 2. Install ionization type smoke detectors in the return air stream of all units. Upon signal from smoke detector or high limit thermostat, the fan shall stop. The fan shall stop via a signal obtained from the relay provided by Division 23. Control Wiring from the relay to the furnace shall be by Division 23.
- 3. The control system shall only operate when the unit is running. All valves and dampers shall assume their normal position when unit is off.

END OF SECTION

SECTION 23 11 26

FACILITY LIQUEFIED PETROLEUM GAS PIPING

PART 1 - GENERAL

1.01 DESCRIPTION:

A. This Section of the Specifications and related drawings describe requirements pertaining to the liquefied petroleum gas piping and equipment.

B. Refer to the following sections for related work:

22 05 11	Plumbing Submittals Data
22 05 29	Hangers and Supports for Plumbing Piping and Equipment
22 05 53	Identification for Plumbing Piping and Equipment

1.02 RECORD DOCUMENTS: Provide corrected Record Documents in accordance with the Project Record Documents Sections and the Mechanical General Section.

1.03 GENERAL PROVISIONS AND BASIC MATERIALS: The requirements of Plumbing General Requirements Section 22 05 10 apply to this work.

1.04 CODE:

A. The work shall comply with the International Plumbing Code, International Fuel Gas Code, and NFPA 54; acceptability under the codes shall not authorize any substitution, smaller size, lighter weight or less durable materials for the items specified.

B. The Contractor shall obtain and pay for all required permits and inspections and shall deliver one copy of each inspection certificate to the Architect before the date of Substantial Completion.

C. Install gas system in accordance with local gas utility company requirements.

1.05 DESCRIPTION OF WORK:

A. Provide a complete system of propane gas piping including connection to vehicle wash system furnished by owner.

B. Extent of gas system work is indicated on the drawings and by requirements of this section.

PART 2 - PRODUCTS

2.01 GENERAL:

A. Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide materials and products complying with NFPA 54 where applicable; base pressure rating on gas piping system maximum design pressures. Provide sizing and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in liquefied petroleum gas systems. Where more than one type of materials or products are indicated, selection is Installer's option.

2.02 GAS PIPING:

- A. Aboveground Piping inside building, Pipe Sizes Up To and Including 2": Black steel pipe, Schedule 40, ASTM-A53 with threaded joints and Class 150 malleable iron threaded fittings, except piping located within return air plenums or above non-accessible ceilings which shall be all welded same as for pipe sizes 2-1/2" and larger.
- B. Aboveground Piping inside building, Pipe Sizes 2-1/2" and Larger: Black steel pipe Schedule 40, ASTM-A53 with butt welded joints and standard weight wrought steel butt welded fittings.
- C. Exposed Exterior Piping, All Pipe Sizes: Black steel pipe, Schedule 40, ASTM-A53 with butt welded joints and standard weight wrought steel butt welded fitting. Pipe shall have a factory applied extruded high density polyethylene coating of a minimum thickness of 24 mils with a hot applied adhesive undercoating. Coating shall be equal to Republic X-Tru-Coat. All joints, fittings and mags in pipe coating shall be wrapped with a cold applied coal tar tape of 35 mil thickness minimum. Tape coating shall be equal to X-Tru-Tape Tapecoat CT or Scotchwrap No. 51.
- D. Underground Piping, Pipe Sizes Up to 3": PE 2406 – Type II polyethylene pipe and fittings, ASTM D-1248 with socket fusion joints.
- E. Polyethylene pipe and fittings shall be as manufactured by Phillips Driscopipe, Inc., Plexco or Uponor Aldyl Co.

2.03 PRESSURE REGULATING VALVES:

- A. Single stage, steel jacketed, corrosion-resistant gas pressure regulators; with atmospheric vent, elevation compensator; with threaded ends for 2" and smaller, flanged ends for 2-1/2" and larger; for inlet and outlet gas pressures, specific gravity, and volume flow indicated by equipment manufacturer.
- B. Pressure regulators shall be manufactured by Rockwell International or Fisher.

2.04 BASIC PIPING SPECIALTIES:

- A. Unions:
 - 1. Unions shall be the same material and working pressure as the fittings specified for the piping system. Unions on piping 2-1/2" in size and larger shall be bolted flanged joint and on smaller than 2-1/2" shall be screwed connection.
 - 2. Unions and flanges provided between copper and ferrous pipe connections shall be insulating (dielectric) type to electrically separate dissimilar metal connections in piping system.
- B. Dielectric Adapters:
 - 1. Dielectric adapters shall be the union type for pipes 2" in size and larger. Adapters shall have working pressure of 250 psi for union type and 165 psi for flanged type. The insulating gaskets shall have an operating range of 40 degrees F to 240 degrees F and shall limit the galvanic corrosion to a maximum of 1% of the short circuit current. Dielectric adapters shall be Ebco, Crane or Capitol.
 - 2. Provide a dielectric adapter between any ferrous and copper connection including piping and equipment.

2.05 VALVES:

- A. Gas valves and cocks shall be Class 200 plug cocks, conforming to ASTM A-126 Class B, with semi-steel body Teflon coated tapered plug, threaded of flanged ends, wrench operated; Walworth 1559 or approved equal.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Install piping and make all joints in accordance with the pipe manufacturer's recommendations.
- B. Use sealants on metal gas piping threads which are chemically resistant to propane gas. Use sealants sparingly, and apply to only male threads of metal joints.
- C. Remove cutting and threading burrs before assembling piping.
- D. Do not install defective piping or fittings. Do not use pipe with threads which are chipped, stripped or damaged.
- E. Plug each gas outlet, including valves, with threaded plug or cap immediately after installation and retain until continuing piping, or equipment connections are completed.
- F. Install drip legs in gas piping where indicated and at base of risers, at connections to equipment and where required by code or regulation. Pitch piping where possible to drain to drip legs.
- G. Changes in direction shall be made with fittings. Changes in pipe size shall be made with reducing fittings. Bushings will not be permitted.
- H. Use dielectric unions where dissimilar metals are joined together.
- I. Install piping parallel to other piping, but maintain minimum of 12" clearance between gas piping and steam or hydronic piping above 200°F (93°C).

3.02 REGULATORS: Install gas regulators in gas piping system where indicated on drawings. Provide gas cock and union on both sides of regulator. Install regulator in accordance with manufacturer's recommendations.

3.03 EXCAVATION, TRENCHING AND BACKFILLING:

- A. Perform all excavation, trenching and backfilling for work under Division 22. During excavation, material for backfilling shall be piled back from the banks of the trench to avoid overloading and to prevent slides and cave-ins. All excavated materials not to be used for backfilling shall be removed and disposed of. Grading shall be done to prevent surface water from flowing into trenches and other excavation and any water accumulating therein shall be removed by pumping. All excavations shall be made by open cut. No tunneling shall be done.
- B. Bottom of trench shall be uniformly graded to provide firm support and even bearing surface for pipe.
- C. Pipe shall be laid on firm soil, laid in straight lines and on uniform grades. Provide bell holes so that barrels of pipe rest evenly on bottom of trench along entire length of pipe.

- D. Pipe shall be inspected and tested prior to backfilling. No roots, rocks or foreign materials of any description shall be used in backfilling the trenches. Trench shall be hand filled to a minimum of 12" above the top of the pipe with clean earth and tamped to 95 percent compaction after first layer using the modified Proctor test method of compaction.

3.04 GAS SERVICE:

- A. Arrange with LP Gas Company to provide gas service to indicated location with shutoff at termination. Make all arrangements with Gas Co. as to extent of its work, and pay all costs, fees and secure permits involved to obtain service for building.

3.05 TESTS OF PIPING:

- A. Inspect, test, and purge propane gas systems in accordance with NFPA 54, the local utility requirements and the local code officials.
- B. All gas piping shall be tested with air at a minimum of 50 psi for two (2) hours with no drop in pressure.
- C. Repair or replace piping as required to eliminate leaks and retest to the satisfaction of the Engineer of Record.

3.06 ADJUSTING AND CLEANING:

- A. Clean and inspect propane gas system components, including regulators, relief valves, etc.
- B. Thoroughly air blow all piping and drain and clean all dirt and drain legs.

3.07 SPARE PARTS:

- A. Furnish to Owner, with receipt, two (2) valve wrenches for each type of gas valve installed, requiring same.

END OF SECTION

SECTION 23 23 00 REFRIGERANT PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. The requirements of the General Conditions and Supplementary Conditions.
- B. Refer to Specification Section 23 05 29 "Hangers and Supports for HVAC Piping and Equipment" for specification and installation requirements of the pipe support system.
- C. Refer to Specification Section 23 07 00 "HVAC Insulation" for specification and installation of thermal insulation for the various types of pipe, fittings, and accessories specified in this section.

1.02 DESCRIPTION OF WORK:

- A. Extent of the piping systems work is indicated on the Drawings and schedules, and by the requirements of this section.
- B. The construction requirements herein shall include appurtenant structures and buildings to which the piping system is to be connected.

1.03 QUALITY ASSURANCE:

- A. 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.
- B. Firms regularly engaged in manufacture of piping products of types, materials and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years are approved.
- C. Certify brazing procedures, brazes and operators in accordance with Section IX ASME Boiler and Pressure Vessel Code (ANSI B31.5). Two copies of the qualification test report and certification shall be submitted to the Architect.

1.04 DEFINITIONS: Pipe sizes listed are for outside diameter of the pipe (O.D.).

PART 2 - PRODUCTS

2.01 REFRIGERANT PIPE:

- A. All Pipe Sizes:
 - 1. Type: Copper tubing of the pipe sizes listed.
 - 2. Class: ACR Type L hard drawn tubing, ASTM B-88
 - 3. Fitting: Sweat type wrought copper.
 - 4. Joints: Socket brazed with 95-5 tin-antimony

- B. Accessories: The refrigeration system shall include all accessories for complete and operable system. Accessories shall include, but not limited to: oil traps, filter dryers, expansion valves, sight glasses, solenoid valves, liquid charging, valves and strainers.

PART 3 - EXECUTION

3.01 GENERAL PIPE SYSTEM:

- A. Nonferrous Metallic Pipe: Where nonferrous metallic pipe, e.g., copper tubing, crosses ferrous piping material, a separation must be maintained between pipes.
- B. Cut pipe accurately to measurements, and ream free of burrs and cutting splatter. Carefully align and grade pipe, and work accurately into place. Fittings shall be used for any change in direction. Provide for expansion at every building expansion joint. Protect open pipe ends to prevent trash being placed in the lines during installation. Clean all dirt and cutting debris from pipes before making the next joint.
- C. Install piping so as to preserve access to all valves, air vents, and other equipment and to provide the maximum headroom possible.
- D. Joints shall be made with nitrogen gas in the pipes to prevent oxidation. All piping shall be installed parallel to or at right angles with building walls, columns, and partitions.
- E. Clean inside of refrigerant lines with methyl alcohol before assembly and take care thereafter to prevent foreign matter from entering and being sealed in. Cut pipe ends square and de-burr. Clean pipe and fitting with #00 steel wool before joining.

3.02 TESTS:

- A. Test refrigerant piping, equipment, valves and fittings at a pressure of 245 psi on the low side and 300 psi on the high side by introducing refrigerant and dry carbon dioxide (CO₂) or nitrogen throughout the refrigerant circuit. Bubble test joints with soap lather, clean joints of soap and leak-test with a halide torch. The system shall be pumped out and the entire circuit placed under 27 inches of vacuum and allowed to stand sealed off for a period of 8 hours, without any loss of vacuum.
- B. Submit an affidavit signed by the Architect's representative and the Contractor's representative stating they have witnessed and approved the dehydration test.

- 3.03 SUBMITTALS: Submittals shall include but shall not be limited to a diagram approved by the compressor manufacturer, to include the size and length of the refrigerant piping, all offsets and elbows required for the installation location of all valves, filter dryers, moisture and liquid indicators and flexible connectors where required.

END OF SECTION

SECTION 23 30 00

HVAC AIR DISTRIBUTION

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. All work specified in this Section is subject to Section 23 05 10 "HVAC General Requirements".
- B. Ductwork shall be provided to meet the minimum capacities indicated, shall meet all constraints of construction, and shall comply with all Specification Sections.
- C. See Section 23 07 00 "HVAC Insulation" for ductwork insulation (duct wrap and liner).
- D. No ductwork shall be fabricated until fabrication shop drawings have been prepared, submitted and reviewed. Ductwork installed before shop drawings are reviewed is entirely at the risk and expense of the contractor.

PART 2 - PRODUCTS

2.01 DUCTWORK - GENERAL:

- A. SMACNA Standards indicated shall mean standard published by the Sheet Metal and Air Conditioning Contractor's National Association, Inc. Ductwork shall be constructed in complete conformance with the latest edition of the SMACNA Manual. Duct classification shall be:
 - 1. Low pressure - 2" static pressure, Class A Seals
 - 2. Exhaust ductwork - 1" S.P., Class B Seals
- B. Ductwork shall be constructed of G90 galvanized sheet steel unless otherwise specified herein. All rectangular ductwork shall be lined. Ductwork shall be round, oval or rectangular as indicated. Sizes given shall be considered to be the clear inside dimension.
- C. Turning vanes shall be installed in all 90 degree square and rectangular elbows and at other locations shown. The turning vanes shall be double thickness type, with vanes secured to the runners and runners secured to the duct. Elbows in round ductwork and other radius elbows shall have an inside radius equal to the diameter of the duct.
- D. Low pressure round ducts up to including 12" in diameter shall be longitudinal lock seam construction. Round ducts larger than 12" shall be spiral lock seam construction.
 - 1. Girth joints in ducts up to and including 12" shall be beaded crimp type and each joint shall be fastened with sheet metal screws, equally spaced, not more than 8" on centers and with a minimum of 3 screws in each joint. The beaded-crimp joint shall provide at least a 1" lap to accommodate the sheet metal screws.
 - 2. Girth joints in ducts larger than 12" shall be the beaded sleeve type. The beaded sleeve joints shall be fabricated of the same gauge galvanized sheet steel and the duct shall be a minimum of 4" in length. Each section of duct shall be fastened to the sleeve with sheet metal screws equally spaced, not more than 8" on centers and with a minimum of 3 screws in each section.

E. Duct hangers and supports shall be in accordance with Section V (pages 5-1 thru 5-13) HANGERS AND SUPPORTS of the referenced SMACNA Standard, except:

1. Hangers shall be spaced not over 8'-0" on centers.
2. For rectangular ducts with longest dimensions up through 60", hangers shall be the galvanized steel strap type; with the longest dimension 61" and larger, hangers shall be trapeze type constructed of galvanized steel angles with round hanger rods. Sizes for strap hangers and trapeze angles and rods shall be based on duct size as scheduled in the SMACNA Standard, Table 5-1 (page 5-8) for strap hangers and Table 5-3 (page 5-10) for trapeze hangers.
3. For round ducts, hangers shall be galvanized steel strap hangers. Sizes and number of strap hangers shall be based on duct size as scheduled in the SMACNA Standard, Table 4-2 (page 4-9). For duct sizes requiring 2 hangers, the hanger supports shall be minimum 3/8" round steel hanger rods.

2.02 MANUAL DAMPERS AND DAMPER HARDWARE:

A. Splitter dampers shall be constructed of not less than 20 gauge galvanized steel sheet. The length of the damper blade shall be the same as the width of the widest duct section at the split, but in no case shall blade length be less than 12".

B. Volume Control Dampers:

1. Dampers shall be single blade butterfly type in ducts up to and including 12" x 12" size; for ducts larger than 12" x 12", in either or both dimensions, the dampers shall be the multi-blade type. All dampers in O.A. ductwork shall shut tightly and have vinyl edge seals and stainless steel jamb seals.
2. Single blade butterfly dampers shall be constructed of not less than 16 gauge galvanized steel blades mounted in a galvanized steel frame. For rectangular dampers, the top and bottom edges of the blade shall be crimped to stiffen the blade. Damper shall be provided with an extended rod to permit installation of a damper regulator.
3. Dampers larger than 12" in either direction shall be multi-blade dampers and shall be the opposed blade type, constructed of not less than 16 gauge galvanized steel blade mounted in galvanized steel channel frame. Blade spacing shall not exceed 6" and the top and bottom edges of the blade shall be crimped to stiffen the blades. Damper blades shall be interconnected by rods and linkages to provide simultaneous operation of all blades. Damper shall be provided with an extended rod to permit installation of a damper regulator.

C. Hardware for Manual Dampers:

1. Splitter damper hardware - When neither dimension of a damper exceeds 18", the damper shall be provided with a ball joint bracket attached to the outside of the duct. The bracket shall have a set screw for securing damper rod in position. The damper operating rod shall be not less than 1/4" diameter steel rod and shall be secured to the damper blade with a clip. When either dimension of a damper exceeds 18", the damper shall be provided with 2 ball joint brackets and rods. The rods shall be located at quarter points on the damper.

2. Duct mounted regulators with operating handle and locking quadrant shall be provided on manual volume control dampers.
 3. Damper hardware shall be Ventfabrics, Young Regulator or Duro-Dyne, provided the equipment meets or exceeds the requirements of the Contract Documents.
- D. Acceptable manufacturers of dampers are Ruskin, Air Balance, or Louvers and Dampers Inc., provided the equipment meets or exceeds the requirements of the Contract Documents.
- 2.03 FLEXIBLE DUCTWORK:
- A. Flexible ductwork shall be Class 1, UL 181-air duct with an aluminized mylar or polyester inner liner laminated to a corrosion resistant steel wire helix. Aluminum helix is not acceptable. Flexible ductwork shall comply with NFPA 90A and 90B.
 - B. A 1" thick, one (1) pound density fiberglass insulation and vinyl outer jacket shall cover the wire helix.
 - C. The maximum allowable length of low pressure flexible ductwork shall be 4'-0" and shall be limited to short run-outs and end runs connected to round neck ceiling supply diffusers. Provide a spin-in fitting with integral volume damper at all flexible run-out connections in low-pressure ductwork.
 - D. The maximum allowable length of medium pressure flexible ductwork shall be 1'-0" and shall be limited to short run-outs connecting FPB and VAV units to medium pressure sheet metal ductwork.
 - E. Flexible ductwork shall be designed for pressures up to 4" W.G. for low-pressure ductwork and 10" W.G. for medium pressure ductwork.
 - F. Flexible ductwork insulation shall be fiberglass and have a minimum insulation R-value of 6.0.
 - G. Low pressure and medium pressure flexible ductwork shall be equal to FlexMaster Model 5B or Thermaflex Model M-KE.
- 2.04 FLEXIBLE DUCT CONNECTIONS: Flexible duct connections shall be non-combustible, installed at all belt-driven equipment and where shown. Material shall be glass fabric double coated with neoprene (30 Oz. per square yard minimum) and shall be Vent Fabrics, Duro-Dyne or Young Regulator, provided the equipment meets or exceeds the Contract Documents. Provide duct supports on each side of flexible connections.
- 2.05 STAND-OFF MOUNTING BRACKETS: Locking-type quadrant operators for dampers, when installed on ducts to be externally insulated, shall be provided with stand-off mounting brackets bases or adapters to provide clearance between the duct surface and the operator not less than the thickness of the insulation. Stand-off mounting items shall be integral with the operator or standard accessory of the damper manufacturer.
- 2.06 DUCT INSTRUMENT TEST HOLES: Provide for each system four (4) test holes; two (2) in supply duct and two (2) in return air plenum at opposite ends near air handling units with screwed caps.

2.07 REGISTER AND GRILLE CONNECTION:

- A. Where take-offs are on side of a duct, clinch lock short tee sections onto trunk. Install collars with slip joints and 3/4" flange at outlet end. At plastered surfaces set collars exactly flush with plaster surface (mechanic must be on job to make adjustments during plaster application). Set flange face so as to receive register gasket, and be concealed by register flange. Collars may be deleted where mounting frames are furnished with registers.
- B. Install boots above lay-in ceilings simultaneously with ceiling work; mechanic must be on job during this phase of construction work.
- C. At return relief and exhaust grilles 48" or more in either dimension, collars shall be 1 x 2 x 1/8 inch steel angle frames with corners mitered, welded and ground smooth. Frames in ceilings shall be independently suspended from the ceiling structure, or the duct shall have special reinforcing to prevent sagging of the boot.
- D. Interior of ductwork visible through grilles and diffusers shall be painted flat black.

2.08 ACCESS DOORS: Provide in duct wall at each splitter, fire, fire/smoke and motorized damper, at each end of coils, in plenums and elsewhere indicated. Size and position shall provide access to bearings, fire links, etc. Typical doors shall be double metal faced, internally insulated same as duct provided with gasket seal, and held in place with four or more sash locks. Minimum size shall be 16" x 12", maximum duct size for smaller ducts.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Install all ductwork and accessories as shown and in accordance with applicable SMACNA standards.
- B. Duct liner shall be cut to provide overlapped and compressed longitudinal corner joints. Liner shall be installed with coated surface facing the air stream. Duct liner shall be adhered to the ductwork with 100% coverage of the sheet metal surfaces using a fire retardant adhesive applied by spraying. Coat all exposed leading edges and all transverse joints with airfoils.
- C. Splitter Dampers:
 - 1. Fabricate blades of same thickness galvanized steel as the duct where used (min. 20 ga.), securely attached to a rod at the air leading edge to present a round nose to air flow. Length shall be sufficient to close either branch duct.
 - 2. Anchor splitters at the air entering edge by 3/16 inch adjustable galvanized steel rods that pass through set screw clamps on the outside of duct. Use one (1) rod and clamp on splitters with leading edge up to 15 inches, (2) rods up to 30 inches, and on 15 inch centers above 30 inches. See typical details on plans.
 - 3. When splitter dampers occur above other than lay-in ceilings, provide Young Model No. 890-A damper assembly complete with supports, bearings and Young No. 1 regulators with an additional end bearing and chromium plated ceiling.

- D. Joints in all low pressure ductwork shall be sealed with a water based gray vinyl acrylic sealant. Sealant shall be U.L. listed Class 1 classified adhesive with flame spread and smoke developed ratings of O. Sealant shall be applied to surfaces relatively free of dirt, oil and grease after ductwork has been installed. Sealant shall be Hardcast, Inc. "Iron Grip" IB-601 or approved equal.

END OF SECTION

SECTION 23 34 00

HVAC FANS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. All work specified in this Section is subject to the provisions of Section 23 05 10 "HVAC General Requirements".
- B. Fans shall be provided to meet the minimum capacities scheduled at the indicated conditions and shall meet all constraints of construction and shall comply with all specification Sections.
- C. Fans shall be tested and rated in accordance with the Air Moving and Conditioning Association, Inc., Standard No. 210, Test Code for Air Moving Devices and bear the AMCA Seal.
- D. Fan motor enclosure shall be the drip-proof type unless specifically indicated otherwise.
- E. Roof-mounted fans shall be waterproof design so that water cannot enter the building through the fan housing, whether or not the fan is operating.
- F. Centrifugal fan wheels shall be statically and dynamically balanced.

1.02 COORDINATION: Fans of specific manufacturers have been used as the basis of design. Any modifications to controls, electrical connections, structural supports, etc., that result from the use of equipment by any other manufacturer, shall be coordinated with all other trades; this coordination shall occur before delivery of the equipment from the manufacturer. Any modifications shall be performed without incurring additions to the Contract.

PART 2 - PRODUCTS

2.01 DESCRIPTION:

A. CABINET FANS:

- 1. Ceiling cabinet fans as indicated on drawings shall have acoustically insulated housings and shall not exceed sound level ratings shown. Fans shall bear the AMCA Certified Ratings Seal and U.L. Label. Integral backdraft damper shall be chatterproof. Fans shall have true centrifugal wheels. Face grille shall be of aerodynamic white eggcrate design and provide 85% free area. Manufacturers shall submit vibration amplitudes and magnetic motor hum in decibels. Fans shall be provided with cord, plug, and receptacle inside the housing. Entire fan, motor and wheel assembly shall be removable without disturbing the housing. Fan motors shall be suitably grounded and mounted on vibration isolators. Fans shall be Greenheck or approved equal by Cook, Acme or Penn.

B. SIDEWALL PROPELLER FANS:

- 1. The propeller fan blade shall have die formed gusseted blades welded to a spherically shaped steel hub. Provide keyway slots and set screws to secure fan wheel to the shaft. The entire propeller assembly shall be statically and dynamically balanced to ensure vibration free operation.
- 2. The steel fan panel shall be of one (1) piece construction with spun venturi, formed flanges and welded corners. The fan panel shall have a drive support frame providing a rigid platform for the motor and shaft.

3. V-belt drives shall be designed for not less than 150% of connected driving capacity and motor sheaves shall be adjustable to provide not less than 20% speed variation. Sheaves shall be selected to drive the fan at a speed to produce the scheduled capacity indicated on the drawings when set at the approximate midpoint of the sheave adjustment. Motors with V-belt drives shall be provided with adjustable bases.
4. Fan shaft shall be ground and polished steel with slotted keyways.
5. Bearings shall be the ball bearing pillow block type. Bearing shall be rated for an average life of 100,000 hours.
6. Provide matching factory fabricated motor side guards, outlet screens and mounting collars.
7. Fans shall be Greenheck or approved equal by Cook, Acme or Penn.

PART 3 - INSTALLATION

- 3.01 **INSTALLATION:** Fans shall be installed in complete conformance with the manufacturer's recommendations and the Contract Documents. Coordinate the actual units to be provided with all trades.
- 3.02 **ADJUSTMENT:** The fans shall be tested and adjusted to provide the scheduled capacities.

END OF SECTION

SECTION 23 34 50

CEILING MOUNTED CIRCULATION FANS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. All work specified in this Section is subject to the provisions of Section 23 05 10 "HVAC General Requirements".
- B. Fans shall be provided to meet the minimum capacities scheduled at the indicated conditions and shall meet all constraints of construction and shall comply with all specification Sections.

1.02 COORDINATION: Fans of specific a manufacturer have been used as the basis of design. Any modifications to controls, electrical connections, structural supports, etc., that result from the use of equipment by any other manufacturer, shall be coordinated with all other trades; this coordination shall occur before delivery of the equipment from the manufacturer. Any modifications shall be performed without incurring additions to the Contract.

PART 2 - PRODUCTS

2.01 DESCRIPTION:

A. HIGH VOLUME, LOW SPEED FANS

1. Complete Unit: The fan shall be ETL certified and built pursuant to construction guidelines set forth by UL standard 507 and CSA standard 22.2. The fan shall be designed to move an effective amount of air for cooling and destratification in large industrial applications with dense floor obstructions, over an extended life. The fan and components shall be designed specifically for high volume, low speed fans to ensure lower noise operation. The sound levels from the fan operating at maximum speed shall not exceed 55 dBA (measured 20' below the blades and 20' horizontally from the center of the fan).
2. Airfoils: The fan shall be equipped with ten (10) high volume, low speed airfoils of precision extruded aluminum alloy. Each airfoil shall be of the high performance Powerfoil design. The airfoils shall be connected by means of two (2) locking bolts per airfoil. The airfoils shall be connected to the hub and interlocked with zinc plated steel retainers. As an option, airfoils may be powder coated as specified by the architect or owner.
3. Winglets: The fan shall be equipped with ten (10) Powerfoil Plus winglets designed to move air away from the fan at an angle, thereby increasing the amount of area affected by the fan. The winglets shall be molded of high density polyethylene. A winglet shall be attached at the tip of each airfoil by means of a barrel screw. The standard color of the winglets shall be "Safety Yellow," but may be colored as specified by the architect or owner.
4. Motor: The fan motor shall be an AC induction type inverter rated at 1725 RPM, 230/460 VAC, 3 phase and 60 Hz. The motor shall be totally enclosed, fan cooled (TEFC) with an IP55 NEMA classification. NEMA standard frames 56C/143TC/145TC shall be provided for ease of service. The motor shall be manufactured with a double baked Class F insulation and be capable of continuous operation in -30F to 122F ambient conditions.

5. **Gearbox:** The fan gearbox shall be a NitroSeal™ Drive designed specifically for the Powerfoil X. The gearbox shall include a high efficiency, hermetically sealed, nitrogen filled, offset helical gear reducer with two stage gearing, a 2 1/2" (6.4 cm) hollow output shaft, cast iron housing, double lip seals, high quality SKF Explorer Series bearings with crowned cages for optimal lubrication flow, and precision machined gearing to maintain backlash less than 11 arc minutes over the life of the unit. Lubrication shall be a high grade, low foaming synthetic oil with extreme pressure additives and a wide temperature range. The fan gearbox shall be equipped with a passageway in which wiring, piping, etc can be routed below the fan. A non-rotating, standard junction box shall be provided at the base of the fan for installing optional features such as lights, cameras, and VESDA. An aluminum cover plate shall be provided for attachment to the junction box when these features are not installed.
6. **Mounting Post:** The fan shall be equipped with a mounting post that provides a structural connection between the fan assembly and upper mounting system. The mounting post shall be 3" x 3" (7.6 cm x 7.6 cm) square tubing and powder coated for corrosion resistance and appearance. As an option, mounting post may be colored as specified by the architect or owner.
7. **Hub:** The fan hub shall be precision cast aluminum alloy for high strength and light weight. The hub shall be secured to the output shaft of the gearbox by means of a steel flange interface. Both hub and flange shall be precision machined to achieve a well balanced and solid rotating assembly. The hub shall incorporate five (5) safety retaining clips made of 1/4" (0.6 cm) thick steel that shall restrain the hub/airfoil assembly in case of gearbox output shaft failure.
8. **Mounting System:** The fan mounting system shall be designed for quick and secure installation from a structural support beam. All components in the mounting system shall be of welded construction using low carbon steel no less than 3/16" (0.5 cm) thick and be powder coated for appearance and resistance to corrosion. All mounting bolts shall be SAE Grade 8 or equivalent and rated with a minimum tensile strength of 150,000 psi (1,034 MPa). As an option, mounting components may be colored as specified by the architect or owner.
9. **Safety Cable:** The fan shall be equipped with a safety cable that provides an additional means of securing the fan assembly to the building structure. The safety cable shall be 3/8" (1 cm) diameter and fabricated out of 7 x 19 stranded galvanized steel. The loops shall be secured with swaged Nicopress fittings, pre-loaded and tested to 3,000 lb·f. Field construction of safety cables is not permitted.
10. **Controller:** The fan controller shall be constructed using a Variable Speed Drive (VSD) that is pre-wired to the motor and factory programmed to minimize the starting and braking torques, for smooth and efficient operation. The controller shall be prewired to the motor using a short run of flexible conduit THHM with a dedicated ground conductor to minimize electromagnetic interference (EMI) and radio frequency interference (RFI). An incoming power cord shall also be pre-wired to the controller for ease of installation. The controller shall be contained within a completely sealed aluminum enclosure and secured to the mounting post 'onboard' the fan assembly.
11. **Wall Control:** The fan shall be equipped with a remote wall control. The wall control shall be a digital keypad device mounted inside an aluminum bezel. The bezel shall be capable of mounting to a standard wall box. The wall control shall be equipped with touchpad controls and an LED display for controlling the fan's direction, operation and speed. Communication with the fan drive and controller shall be by a standard commercially available CAT 5 (or higher) Ethernet cable that is field installed and provided by the installer. A 5' (1.5 m) 'patch cable' shall be provided to test and verify communication signals locally prior to connecting the remote connection cable. The wall control shall be equipped with a simple diagnostic program to identify faults in the system. Provisions must be made for retrieving fan operation and diagnostic data (fault messages) through the remote wall device.

12. Warranty: The manufacturer shall replace any products or components defective in material or workmanship, free of charge to the customer (including transportation charges), pursuant to the complete terms and conditions of the Manufacturer's Non-Prorated Warranty in accordance to the following schedule:

- a. Airfoils Lifetime (Parts)
- b. Hub Lifetime (Parts)
- c. Motor 10 years (Parts) †
- d. Gearbox 10 years (Parts) †
- e. Controller 10 years (Parts) †
- f. Labor 1 year††

† 10 year parts warranty only valid with factory installation, 5 year parts without factory installation.

†† All reasonable costs of repair or replacement will be paid or reimbursed provided customer obtains pre-approval; see full warranty for details.

Further information on the terms and conditions of the warranties can be found in the Installation Guide.

2.02 ACCEPTABLE MANUFACTURERS: Drawings and Specifications are based on products manufactured by Delta T Corporation, dba Big Ass Fans, PO Box 11307, Lexington, Kentucky 40575. Phone (877) 244-3267. Fax (859) 233-0139.

PART 3 - INSTALLATION

3.01 INSTALLATION:

- A. The fan shall be mounted to an angle iron or I-beam structure. Consult the Installation Guide for proper sizing and placement of angle iron for a span mount. A structural engineer must be consulted for installation methods outside the manufacturer's recommendation and a certification submitted prior to installation.
- B. To reduce the risk of injury to persons, the fan shall be installed so that the airfoils are at least 10' above the floor. The fan installation area must be free of obstructions such as lights, cables, sprinklers or other building structures; with the airfoils at least 2' clear of all obstructions. The fan should not be installed where it will be continuously subjected to wind gusts or in close proximity to the outputs of HVAC systems.
- C. If the fan is hung from an extension tube that measures 4' or longer, it may be necessary to provide guy cables or struts to limit potential lateral movement of the fan. A stiffening strut braced against an additional beam may be required if there is a close clearance situation. The design criteria for the fan mounting system shall be capable of handling 300 ft-lbs of torque.

3.02 WORKMANSHIP: Good workmanship shall be evident in all aspects of construction. Field balancing of the airfoils shall not be necessary.

3.03 DOCUMENTATION: The manufacturer shall furnish a copy of all operating and maintenance instructions for the fan.

END OF SECTION

SECTION 23 37 00 AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.01 SECTION INCLUDES:

- A. Extruded aluminum stationary wall louvers.
- B. Extruded aluminum stationary brick wall vents.
- C. Extruded aluminum combination wall louvers.

1.02 RELATED SECTIONS:

- A. Section 09 05 15 – Color Design.
- B. Section 23 05 10 – HVAC General Requirements.

1.03 REFERENCES:

- A. AAMA 605.2 - High Performance Organic Coatings on Architectural Extrusions and Panels.
- B. AMCA 500 - Test Methods for Louvers, Dampers and Shutters.
- C. AMCA 511 - Certified Ratings Program for Air Control Devices.

1.04 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.

1.05 QUALITY ASSURANCE:

- A. Manufacturer Qualifications:
 - 1. The manufacturer shall have implemented the management of quality objectives, continual improvement, and monitoring of customer satisfaction to assure that customer needs and expectations are met.
 - 2. Manufacturer shall be International Organization for Standardization (ISO) 9000 accredited.

B. Installer Qualifications:

1. Verify size, location and placement of louver units prior to fabrication, wherever possible.
2. 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.

C. Product Qualifications:

1. Louvers licensed to bear AMCA Certified Ratings Seal. Ratings based on tests and procedures performed in accordance with AMCA 511 and comply with AMCA Certified Ratings Program. AMCA Certified Ratings Seal applies to air performance and water penetration ratings.

D. SMACNA Recommendations:

1. Comply with SMACNA "Architectural Sheet Metal Manual" recommendations for fabrication, construction details and installation procedures, except as otherwise indicated.

1.06 DELIVERY, STORAGE, AND HANDLING:

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store materials in a dry area indoors, protected from damage and in accordance with manufacturer's instructions.
- C. Handling: Protect materials and finishes during handling and installation to prevent damage.
- D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A. Drawings and Specifications are based on products manufactured by Ruskin Manufacturing, Kansas City, MO. Tel. (816) 761-7476.
- B. Equivalent products by the following manufacturers are acceptable:
 1. Construction Specialties, Inc., 49 Meeker Ave., Cranford, NJ 07016. Tel. (908) 272-5200
 2. All-Lite Louvers, Mineral Wells, WV. Tel. (304) 489-8113.
- C. Substitutions shall fully comply with specified requirements and Section 01 25 13-Product Substitution Procedures.

2.02 EXTRUDED ALUMINUM STATIONARY WALL LOUVERS:

A. Fabrication:

1. Model: ELF6375DX as manufactured by Ruskin Company.
2. Performance Ratings: AMCA licensed.
3. Frame:
 - a. Material: Extruded aluminum, Alloy 6063-T5.
 - b. Wall Thickness: 0.081 inch (2.1 mm), nominal.
 - c. Depth: 6 inches (152 mm).
 - d. Downspouts and caulking surfaces.
4. Blades:
 - a. Style: Drainable.
 - b. Material: Extruded aluminum, Alloy 6063-T5.
 - c. Wall Thickness: 0.081 inch (2.1 mm), nominal.
 - d. Angle: 37.5 degrees.
 - e. Centers: 5-29/32 inches (150 mm), nominal.
5. Bird Screen:
 - a. Material: Aluminum, [3/4 inch x 0.051 inch (19 mm x 1.3 mm), expanded, flattened] [1/2 inch mesh x 0.063 inch (13 mm mesh x 1.6 mm), intercrimp].
 - b. Frame: Removable, rewireable.
6. Gutters: Drain gutter in head frame and each blade.
7. Downspouts: Downspouts in jambs to drain water from louver for minimum water cascade from blade to blade.
8. Vertical Supports: Hidden vertical supports to allow continuous line appearance up to 120 inches (3,048 mm).
9. Sill: Steeply angled integral sill eliminating areas of standing or trapped moisture where mold or mildew may thrive and effect indoor air quality.
10. Assembly: Factory assemble louver components. All welded construction.

B. Performance Data:

1. Based on testing 48 inch x 48 inch (1,219 mm x 1,219 mm) size unit in accordance with AMCA 500.
2. Free Area: 57 percent, nominal.
3. Free Area Size: 9.08 square feet (0.84 m²).
4. Maximum Recommended Air Flow Thru Free Area: 1,023 feet per minute (312 m/min).
5. Air Flow: 9,289 cubic feet per minute (263 m³/min).
6. Maximum Pressure Drop: 0.15 inches w.g. (3.8 mm w.g.).

7. Water Penetration: Maximum of 0.01 ounces per square foot (3.1 g/m²) of free area at an air flow of 1,023 feet per minute (312 m/min) free area velocity when tested for 15 minutes.

2.03 EXTRUDED ALUMINUM STATIONARY BRICK WALL VENTS:

A. Fabrication:

1. Model: BV100 as manufactured by Ruskin Company.
2. Frame:
 - a. Material: Extruded aluminum, Alloy 6063-T5.
 - b. Wall Thickness: 0.100 inch (2.5 mm), nominal.
 - c. Frame Construction: 4 inches (102 mm) frame depth with three 1/8 inch (3 mm) mortar ribs at perimeter.
3. Frame Size:
 - a. 15-5/8 inches by 7-3/4 inches (397 mm by 197 mm).
4. Blades:
 - a. Style: Straight.
 - b. Material: Formed aluminum, Alloy 6063-T5.
 - c. Thickness: 0.100 inch (2.5 mm), nominal.
 - d. Angle: 48 degrees.
 - e. Centers: Blades overlap.
5. Assembly:
 - a. Factory assembled vent components. Mechanically fastened construction.

B. Performance Data:

1. Performance Ratings:
 - a. Based on testing 48 inch by 48 inch (1219 mm by 1219 mm) size unit in accordance with AMCA 500.
2. Free Area: 39 percent, nominal.
3. Maximum Recommended Air Flow through Free Area: Not rated.

2.04 EXTRUDED ALUMINUM COMBINATION WALL LOUVERS:

A. Fabrication: Mullion style.

1. Model: ELC6375DAX as manufactured by Ruskin Company.
2. Frame:
 - a. Frame Depth: 6 inches (152 mm).
 - b. Material: Extruded aluminum, Alloy 6063-T5.
 - c. Wall Thickness: 0.125 inch (3.2 mm), nominal.
3. Front Blades:
 - a. Style: Drainable "AF".
 - b. Material: Extruded aluminum, Alloy 6063-T5.
 - c. Wall Thickness: 0.081 inch (2.1 mm), nominal.

- d. Angle: 37.5 degrees.
 - e. Centers: 6-1/8 inches (156 mm), nominal.
4. Rear Blades:
- a. Style: Airfoil shape, adjustable.
 - b. Material: Extruded aluminum, Alloy 6063-T5.
 - c. Wall Thickness: 0.140 inch (3.6 mm) double wall, nominal, for single section widths through 60 inches (1524 mm).
 - d. Linkage: Concealed in frame.
 - e. Bearings: Stainless steel sleeve pressed into frame.
 - f. Axles: 1/2 inch (13 mm) plated steel hex.
5. Actuator:
- a. Electric, 120 V, 60 Hz, two-position, spring-return.
6. Gutters: Drain gutter in head frame and each blade.
7. Downspouts: Downspouts in jambs to drain water from louver for minimum water cascade from blade to blade.
8. Sill: Steeply angled integral sill eliminating areas of standing or trapped moisture where mold or mildew may thrive and effect indoor air quality.
9. Fabrication:
- a. Mullion Style – Design incorporates visible mullions or frames at the perimeter of the louver and also at certain intervals within the louver perimeter to support the louver blades. Louver blade sightlines are interrupted at the mullion locations. No rear-mounted blade supports are utilized.
10. Assembly:
- a. Factory assembled louver components. Mechanically fastened construction.
- B. Performance Data:
- 1. Performance Ratings: AMCA licensed.
 - a. Based on testing 48 inch by 48 inch (1219 mm by 1219 mm) size unit in accordance with AMCA 500.
 - 2. Free Area: 47 percent, nominal.
 - 3. Maximum Recommended Air Flow through Free Area: 1169 feet per minute (356 m/min).
 - 4. Air Flow: 8744 cubic feet per minute (249 cu. m/min).
 - 5. Maximum Pressure Drop: 0.15 inches w.g. (37.35 Pa).
 - 6. Water Penetration: Maximum of 0.01 ounces per square foot (3.1 g/sm) of free area at an air flow of 1169 feet per minute (356 m/min) free area velocity when tested for 15 minutes.
 - 7. Air Leakage: Maximum of 1.3 cubic feet per minute (0.037 cu. m/min) air leakage per square foot of louver face area at 0.50 inches w.g. (0.125 kPa) pressure drop.

2.05 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.

2.06 LOUVER SCREENS:

- A. Provide removable screens for exterior louvers. Fabricate screen frames of same metal and finish as louver units to which secured, unless otherwise indicated. Provide frames consisting of U-shaped metal for permanently securing screen mesh.
- B. Use insect screens of 18X14 aluminum mesh and additional 1/2-inch sq. mesh, 0.050-inch aluminum wire bird screen. Locate screens on inside face of louvers, unless otherwise indicated. Secure screens to louver frames with machine screws, spaced at each corner and at 12 inches on center between.
- C. Use bird screen only for louvers that are connected to duct work 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 23 37 13

DIFFUSERS, REGISTERS AND GRILLES

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. All work specified in this Section is subject to the provisions of Section 23 05 10 "HVAC General Requirements".
- B. Grilles, registers and diffusers shall be provided to meet the minimum capacities indicated on the drawings and shall meet all constraints of construction.

1.02 COORDINATION: The grilles, registers and diffusers of one manufacturer have been used as the basis of design. Any modifications to ductwork, controls, building structure, etc., that result from the use of any other units shall be coordinated with all trades. This coordination shall occur before delivery of equipment from the manufacturer. Any modifications shall be performed without incurring any additional costs to the Contract.

1.03 ACCEPTABLE MANUFACTURERS:

- A. Manufacturers listed below are acceptable. Approved equal products which are ADC tested, rated and certified may be Price, Metalaire or Titus.
- B. All devices selected must meet or exceed all the requirements of these contract documents.

PART 2 - PRODUCTS

2.01 DESCRIPTION:

- A. Color of all grilles, registers and diffusers are to be selected by Architect. Also, ceiling mounted items shall be selected to fit the ceiling in which they are applied.
- B. Air distribution devices shall be as follows:
 - 1. Exhaust air register shall have a fixed core of 1/2" x 1/2" x 1/2" aluminum squares. Register shall have opposed blade dampers. Registers shall be as scheduled on plans or equal.
 - 2. Return air grilles (ceiling mounted) shall have a fixed core of 1/2" x 1/2" x 1/2" aluminum squares. Grilles shall be as scheduled on plans or equal. Finish shall be white baked enamel.
 - 3. Supply air diffusers (square) shall be extruded aluminum rectangular to round neck diffusers with T-Bar flange frames. Diffusers shall be as per scheduled on plans or approved equal.
 - 4. Sidewall air registers shall have 1" framed border and aluminum face bars on 1/2" centers. Unit shall be extruded aluminum with natural anodized finish. Sidewall registers shall be as scheduled on plans or approved equal.
 - 5. Linear slot diffusers shall be extruded aluminum with adjustable pattern controller. Linear diffusers shall be as per scheduled on plans or approved equal.

- C. The Contractor shall verify that all air distribution devices are suitable for the ceiling and wall types in which they are installed.
- D. All air distribution devices shall be shown in grille, register and diffuser schedule.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Grilles, registers and diffusers shall be installed as indicated in conformance with the manufacturer's recommendations. Coordinate the actual units to be provided with all trades.
- B. All grilles, registers and diffusers shall be selected and submitted at a NC level of 35 or less.
- C. The grilles, registers and diffusers shall be tested and adjusted to provide the scheduled capacities.

END OF SECTION

SECTION 23 41 00 PARTICULATE AIR FILTRATION

PART 1 - GENERAL

- 1.01 GENERAL: All work specified in this Section is subject to the provisions of Section 23 05 10 "HVAC General Requirements".
- 1.02 COORDINATION: The filters of one manufacturer (Farr) have been used as the basis of design. Any modifications to ductwork, building structure, etc., that result from the use of any other units shall be coordinated with all trades; this coordination shall occur before delivery of equipment from the manufacturer. Any modifications shall be performed without incurring any additional cost to the Owner.
- 1.03 ACCEPTABLE MANUFACTURERS:
 - A. Manufacturers listed below are acceptable: Farr.
 - B. All devices selected must meet or exceed all the requirements of the Contract Documents.

PART 2 - PRODUCTS

- 2.01 FILTER: Filter media shall have an average efficiency of 35-35% on ASHRAE Test Standard 52-76. It shall have an average arrestance of not less than 97% on that standard. Filters shall be listed by Underwriter's Laboratories as Class 2.

PART 3 - EXECUTION

- 3.01 SPARES: Provide one (1) complete set of replacement filters as recommended by the manufacturer.

END OF SECTION

SECTION 23 51 23 GAS VENTS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. All work specified in this Section is subject to the provisions of Section 23 05 10 "HVAC General Requirements".
- B. Gas flues shall be U.L. listed and provided as indicated, shall meet all constraints of construction and shall comply with all Specifications Sections.

1.02 COORDINATION: The gas flues as manufactured by Metalbestos have been used as the basis of design. Any modifications to roof openings, structural supports, etc. that result from the use of equipment by any other manufacturer, shall be coordinated with all other trades; this coordination shall occur before delivery of the equipment from the manufacturer. Any modifications shall be performed without incurring any additional cost to the Owner.

1.03 ACCEPTABLE MANUFACTURERS: Factory fabricated gas flues shall be Metalbestos or an approved equal. Any flues selected must meet or exceed all the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.01 GENERAL:

- A. The flue supports shall be tested, approved and listed by Underwriter's Laboratories. These supports shall be capable of supporting four times the combined weight of the flue installation.
- B. All clearances to combustible material shall be maintained so as to comply with all codes and regulations.
- C. Provide weatherproof roof caps with bird-proof screens on all gas vents.
- D. Flues extending above roof surfaces shall terminate in a U.L. listed top or housing assembly, according to Appendix D of NFPA No. 211 or according to local code.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Gas flues shall be installed in complete conformance with the manufacturer's recommendations and these Contract Documents.
- B. Provide all necessary expansion joints, supports, thimbles, etc., for a complete installation.

END OF SECTION

SECTION 23 55 23

GAS-FIRED RADIANT HEATERS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. All work specified in this Section is subject to the provisions of Section 23 05 10 "HVAC General Requirements".
- B. Unit heaters (UH) shall be provided to meet the minimum capacities scheduled at the indicated conditions, shall meet all constraints of construction and shall comply with all Specifications Sections.

1.02 COORDINATION: Unit heaters of one manufacturer (Modine) have been used as the basis of design. Any modifications to controls, electrical connections, structural supports, etc., that result from the use of equipment by any other manufacturer shall be coordinated with all other trades; this coordination shall occur before delivery of equipment from the manufacturer. Any modifications required shall be performed without incurring additions to the Contract.

1.03 ACCEPTABLE MANUFACTURERS: Unit heaters shall be Modine or equal units by Reznor or Sterling.

PART 2 - PRODUCTS

2.01 DESCRIPTION:

- A. Unit heaters shall be A.G.A. certified gas-fired high intensity infrared type.
- B. The main frame shall be 16 gauge corrosion-free aluminized steel and of no weld construction. The main frame shall have a double turned upper edge. The side frames shall have four (4) 3/8" holes for easy mounting of an "S" hook and chain.
- C. The burner(s) shall include the ceramic combustion surface, a plenum chamber, and a venture mixer and shall be removable with a single screw for cleaning or replacement without disconnecting any gas, electrical or hanging device.
- D. Gas valve shall be 24 volt, 1 phase, 60 cycle, arranged for 100% safety shut-off at both main and pilot burner gas supply. High limit control shall be wired to shut off gas valve and cause fan to operate until limit resets. 115/24 volt transformer shall be supplied on each unit and factory wired on the low voltage side to the gas valve.
- E. Controls shall be exterior mounted for easy accessibility.
- F. Units shall have single-stage, direct spark ignition control with 100% safety shut-off with flame monitoring. Controls shall operate on 115V/60Hz/1ph with 6VA maximum power consumption.
- G. Unit shall include a chain mounting kit.
- H. Unit shall included and be controlled by a single-stage thermostat, 40-80 degree temperature range.
- I. All line voltage wiring shall be completely enclosed in flexible conduit.

- J. All units and component assemblies shall be warranted for one year. Heat exchanger, flue collector and burners shall have ten year non-prorated limited warranty on materials and workmanship.

PART 3 - EXECUTION

- 3.01 **INSTALLATION:** Radiant heaters shall be installed in complete conformance with the manufacturer's recommendations and the Contract Documents.

END OF SECTION

SECTION 23 55 33

FUEL-FIRED UNIT HEATERS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. All work specified in this Section is subject to the provisions of Section 23 05 10 "HVAC General Requirements".
- B. Unit heaters (UH) shall be provided to meet the minimum capacities scheduled at the indicated conditions, shall meet all constraints of construction and shall comply with all Specifications Sections.

1.02 COORDINATION: Unit heaters of one manufacturer (Modine) have been used as the basis of design. Any modifications to controls, electrical connections, structural supports, etc., that result from the use of equipment by any other manufacturer shall be coordinated with all other trades; this coordination shall occur before delivery of equipment from the manufacturer. Any modifications required shall be performed without incurring additions to the Contract.

1.03 ACCEPTABLE MANUFACTURERS: Unit heaters shall be Modine or equal units by Reznor, Sterling, or Trane.

PART 2 - PRODUCTS

2.01 DESCRIPTION:

- A. Unit heaters shall be A.G.A. certified gas-fired propeller type.
- B. Cabinet shall be cold rolled steel, with factory-applied finish.
- C. Heat exchanger shall be aluminized steel with minimum 20 gauge tube sections and header plates. Burners shall be aluminized or stainless steel.
- D. Gas valve shall be 24 volt, 1 phase, 60 cycle, arranged for 100% safety shut-off at both main and pilot burner gas supply. High limit control shall be wired to shut off gas valve and cause fan to operate until limit resets. 115/24 volt transformer shall be supplied on each unit and factory wired on the low voltage side to the gas valve.
- E. Fan time delay switch shall be provided and shall be controlled by low voltage thermostat.
- F. Units shall have intermittent spark ignition with electronic flame supervision.
- G. Motor shall be 120 volt, 1 phase, 60 cycle, totally enclosed fan cooled type with internal automatic reset thermal overload protection.
- H. Fan shall be direct driven, with fan guard. Fan shall be statically balanced.
- I. All line voltage wiring shall be completely enclosed in flexible conduit.
- J. All units and component assemblies shall be warranted for one year. Heat exchanger, flue collector and burners shall have ten year non-prorated limited warranty on materials and workmanship.

PART 3 - EXECUTION

- 3.01 INSTALLATION: Unit heaters shall be installed in complete conformance with the manufacturer's recommendations and the Contract Documents.

END OF SECTION

SECTION 23 81 26

SPLIT-SYSTEM AIR-CONDITIONERS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. All work specified in this Section is subject to the provisions of Section 23 05 10 "HVAC General Requirements".
- B. Split system air handler shall be provided with minimum capacities schedules, shall meet all constraints of construction, and shall comply with all sections of this specification.

1.02 COORDINATION: The units of one manufacturer (Trane) have been used as a basis of design. Any modifications to ductwork, piping, wiring, building structure, etc., that result from the use of any other units shall be coordinated with all trades prior to delivery of approved equipment from the manufacturer to the job site. Any costs incurred because of these modifications shall be the responsibility of the Contractor.

1.03 ACCEPTABLE MANUFACTURERS: The following manufacturers are acceptable on this project: Trane, Lennox, and Carrier. The manufacturer shall have a local distributor with repair parts in stock or have access to repair parts within a 24 hour period.

PART 2 - PRODUCTS

2.01 FURNACE:

- A. Casing shall be heavy-gauge steel finish with a baked on acrylic finish. Unit shall be lined with one-half (1/2") inch thick insulation. Multiple knock-outs shall be provided for utility and control connections.
- B. Evaporator fan shall be multi-speed, direct driven, centrifugal, forward curved type sized to meet the air quantity and static pressure scheduled at the middle speed selection.
 - 1. Provide a permanently lubricated, open drip-proof motor with thermal overload protection. Motor shall have Class B insulation.
 - 2. Fan bearings shall be permanently lubricated with an average life of 100,000 hours.
 - 3. The entire fan/motor assembly shall be isolated from the unit with rubber-in-shear vibration isolators.
- C. Gas furnace section shall be up flow as indicated on the drawings. Furnace shall be natural draft type, AGA certified and fueled by LP gas. Unit shall meet or exceed the capacities scheduled.
 - 1. Heat exchanger shall be constructed of aluminized steel with twenty (20) year warranty.
 - 2. Provide electronic ignition with intermittent pilot and redundant gas valve.
 - 3. Burners shall be multi-port type constructed out of aluminized steel.

2.02 EVAPORATOR COIL:

- A. Evaporator coil shall have aluminum fins bonded to seamless copper tubes. Coil shall be factory tested under 300 psig pressure to assure leak-proof construction. Units shall ship with thermal expansion valve, metering devices, quick-connect couplings and an operating charge of refrigerant.
- B. Coil casing shall be heavy-gauge steel lined with one half (1/2") inch thick insulation. Unit shall have horizontal insulated drain pan.
- C. Coil shall be provided with a secondary drain pan, either factory installed or field fabricated.

2.03 COMPRESSOR UNIT:

- A. Air cooled outdoor unit shall be factory assembled into a weatherproof cabinet. Unit shall be UL listed and comply with ARI Standard No. 240.
- B. Cabinet shall be heavy-gauge, zinc coated steel, phosphatized, painted with an epoxy resin primer (exterior) and finished with an acrylic topcoat. Electrical and refrigeration connections shall be located at accessible points. Removable panel shall allow access to all components and connections. Drainage hole shall be provided in base pan for removal of moisture.
- C. Each refrigerant circuit shall be complete with hermetic or semi-hermetic compressor with high and low pressure cutouts, crankcase heater, moisture indicating sight glass, filter drier, and access and service valves. Compressor shall be mounted on rubber grommets to minimize noise and vibration transmission.
- D. Condenser coil shall have heavy aluminum fins bonded to copper tubes. Unit shall be factory tested under pressure at 425 psig to assure leak-proof construction.
- E. Condenser fans shall be propeller type, direct driven by permanently lubricated motors, designed for outdoor installation. Entire fan/motor assembly shall be isolated from unit with rubber-in-shear vibration isolators. Provide fan guard on outside of fan.

2.04 FILTRATION:

- A. Each furnace unit shall be furnished with two (2") inch thick throwaway filters.
- B. Furnace units shall either be provided with side filter racks or bottom return plenums and filter racks as shown on the drawings.

2.05 CONTROL SYSTEM: Units shall be complete with unit manufacturer's solid state temperature controls package, with 7-day programmable thermostat.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. The entire split system air handler and associated items shall be installed in complete conformance with the manufacturer's recommendations and these Contract Documents.
- B. Units shall be provided with duct connections as indicated on the drawings, and all connections shall be made with flexible connectors as specified herein.

- C. All low voltage wiring shall be installed in conduit by a licensed electrician. Low voltage control wiring shall be installed under this division. All line voltage wiring (115V and higher) shall be installed under Division 26.

END OF SECTION

SECTION 23 81 48

SPLIT-SYSTEM HEAT PUMPS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. All work specified in this Section is subject to the provisions of Section 23 05 10, "HVAC General Requirements".
- B. Split system heat pump shall be provided with minimum capacities scheduled, shall meet all constraints of construction, and shall comply with all sections of this specification.

1.02 COORDINATION:

- A. The units of one manufacturer have been used as a basis of design. Any modifications to ductwork, piping, wiring, building structure, etc., that result from the use of any other units shall be coordinated with all trades prior to delivery of approved equipment from the manufacturer to the job site. Any costs incurred because of these modifications shall be the responsibility of the Contractor.

1.03 ACCEPTABLE MANUFACTURERS:

- A. The following manufacturers are acceptable on this project: Mitsubishi, LG, and Sanyo. The manufacturer shall have a local distributor with repair parts in stock or have access to repair parts within a 24-hour period.

PART 2 - PRODUCTS

2.01 WARRANTY:

- A. The units shall have a manufacturer's parts and defects warranty for a period one (1) year from date of installation. The compressor shall have a warranty of 6 years from date of installation. If, during this period, any part shall fail to function properly due to defects in workmanship or material, it shall be replaced or repaired at the discretion of the manufacturer. This warranty does not include labor.
- B. Manufacturer shall have over 25 years of continuous experience in the U.S. market.

2.02 INDOOR UNIT:

- A. The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, an emergency operation function and a test run switch. Indoor unit shall be charged with dry air before shipment from factory.
- B. Unit Cabinet:
 - 1. The casing shall have a white finish.
 - 2. Multi directional drain and refrigerant piping, offering three (3) direction pipe alignments for all refrigerant piping and two (2) direction pipe alignments for condensate draining shall be standard.
 - 3. There shall be a separate back plate that secures the indoor unit firmly to the wall.

C. Fan:

1. The evaporator fan shall be an assembly with a line-flow fan direct driven by a single motor.
2. The fan shall be statically and dynamically balanced and run on a motor with permanently lubricated bearing.
3. A manual adjustable guide vane shall be provided with the ability to change the airflow from side to side (left to right).
4. An integral, motorized air sweep flow louver shall provide for uniform air distribution.
5. The indoor fan shall consist of three (3) speeds: High, Medium and Low.

D. Filter:

1. Return air shall be filtered by means of easily removed, washable, Catechin, Antioxidant Pre-filter and an Anti-allergy enzyme filter – blue bellows type.

E. Coil:

1. The evaporator coil shall be of nonferrous construction with smooth plate fins on copper tubing.
2. The tubing shall have inner grooves for high efficiency heat exchange.
3. All tube joints shall be brazed with phos-copper or silver alloy.
4. The coils shall be pressure tested at the factory.
5. A condensate pan and drain shall be provided under the coil, complete with coil condensate pump.

F. Condensate Pump: Unit to be furnished with factory mounted condensate pump. See Mechanical drawings for routing of coil condensate.

G. Electrical:

1. The unit electrical power shall be 208-230 volts, 1-phase, 60 hertz.
2. The system shall be equipped with A-Control – a system allowing the indoor unit to be powered directly from the outdoor unit using a 3-wire connection plus ground.
3. The indoor unit shall not have any supplemental electrical heat elements.
4. The outdoor unit shall be equipped with Pulse Amplitude Modulation (PAM) control for efficiency.

H. Control:

1. The unit shall have a wireless controller to perform input functions necessary to operate the system.
2. The indoor unit shall have the option of a field installed hard-wired remote controller.
3. The controller shall consist of a Power On/Off switch, Mode Selector, Temperature Setting, Timer Control, Fan Speed Select and Auto Vane selector.
4. The indoor unit shall perform Self-diagnostic Function, Test Run switching and Check Mode switching.
5. Temperature changes shall be by 1° F increments with a range of 65-87° F.
6. The microprocessor located in the indoor unit shall have the capability of sensing return air temperature and indoor coil temperature, receiving and processing commands from the wireless or wired controller, providing emergency operation and controlling the outdoor unit.
7. The system shall be capable of automatically restarting when the power is restored after power interruption.

8. Control system shall control the continued operation of the air sweep louvers, as well as provide On/Off, System/Mode function.

2.03 OUTDOOR UNITS:

- A. The outdoor units are specifically designed to work with the MSY indoor units. The units must have a powder coated finish. The outdoor unit shall be completely factory assembled, piped and wired. Each unit shall be run tested at the factory.
- B. Unit Cabinet:
 1. The casing shall be fabricated of galvanized steel, bonderized, finished with an electro statically applied, thermally fused acrylic or polyester powder coating for corrosion protection.
- C. Fan:
 1. The unit shall be furnished with a direct drive propeller type fan.
 2. The condenser fan motor shall be a direct current (DC) motor and have permanently lubricated bearings.
 3. The fan motor shall be mounted for quiet operation.
 4. The fan shall be provided with a raised guard to prevent contact with moving parts.
 5. The outdoor unit shall have horizontal discharge airflow.
- D. Coil:
 1. The condenser coil shall be of nonferrous construction with laced or corrugated plate fins on copper tubing.
 2. The coil shall be protected with an integral metal guard.
 3. Refrigerant flow from the condenser shall be controlled by means of a metering orifice.
- E. Compressor:
 1. The compressor motor shall be direct current (DC).
 2. The compressor shall be of high performance hermetic; inverter driven, variable speed, rotary type.
 3. The outdoor unit shall have an accumulator.
 4. The compressor will be equipped with an internal thermal overload.
 5. The outdoor unit must have the ability to operate with a maximum height difference of 35 feet and have refrigerant tubing length of 65 feet between indoor and outdoor units without the need for line size changes, traps or additional oil.
 6. The compressor will be mounted to avoid the transmission of vibration.
- F. Electrical:
 1. The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.
 2. The unit shall be capable of satisfactory operation within voltage limits of 198 volts to 253 volts.
 3. The outdoor unit shall be controlled by the microprocessor located in the indoor unit and outdoor unit.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. The entire split system heat pump and associated items shall be installed in complete conformance with the manufacturer's recommendations and these Contract Documents.
- B. Units shall be provided with connections as indicated on the drawings, and all connections shall be made with flexible connectors as specified herein.
- C. All low voltage wiring shall be installed in conduit by a licensed electrician. Low voltage control wiring shall be installed under this division. All line voltage wiring (115V and higher) shall be installed under Electrical Division 26.

END OF SECTION

SECTION 26 05 10

ELECTRICAL GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE

- A. This Division and the accompanying electrical drawings cover furnishing all labor, equipment and materials and performing all operations in connection with the installation of a complete and operational electrical system.
- B. There are many interfaces between the work involved with this Division and the work in other Divisions, particularly with Divisions 22 & 23. Be aware of the responsibilities at the interfaces. The exact locations of apparatus, fixtures, equipment and raceways shall be ascertained from all concerned and the work shall be installed accordingly. In addition, coordinate with all equipment suppliers and other trades to verify the actual installation requirements prior to rough-ins.
- C. The plans and specifications are considered cooperative and complimentary. Where one contradicts the other the specifications shall govern the Architect for clarification prior to any installation.
- D. All applicable portions of the General and Specific Conditions are included herein by reference.

1.02 DEFINITIONS

- A. Install: Receive, store, place, fix in position, secure, anchor, etc., including necessary appurtenances and labor so the equipment or installation will function as specified and intended.
- B. Furnish: Purchase and supply equipment and components, including shipping and receiving.
- C. Provide: Furnish, install, connect, test, demonstrate and leave operational.
- D. Wiring: Wire or cable installed in raceway with all required boxes, fittings, connectors, etc.
- E. Work: Materials completely installed, including the labor involved.
- F. Or approved equal: Equal in type, design, quality and appearance, as determined by the Architect.
- G. Raceway: Galvanized rigid steel conduit (GRC), electrical metallic tubing (EMT), intermediate metal conduit (IMC), schedule 40 Polyvinyl Chloride (PVC), flexible steel (FLX), sheathed flexible steel (SLT), code gauge wireway (WW).

1.03 CODES AND REGULATIONS

- A. All work shall comply with all local laws, ordinances and regulations applicable to the electrical and fire alarm/life safety system installation, NFPA, OSHA, ANSI, SBC, municipal ordinances governing electrical work, and with the requirements of the latest edition of the National Electrical Code.

- B. Where different sections of any of the aforementioned codes and regulations, the specifications or the plans require different materials, methods of construction, or other requirements, the most restrictive or stringent shall govern. In any conflict between a general provision and a special provision, the special provision shall govern.
- C. Obtain all permits and licenses, and pay all fees as required for execution of the Contract. Arrange for necessary inspections required by the Architect, city, county, state and other local authorities having jurisdiction (LAHJ) and present certificates of approval to the Architect or his designated representative.
- D. Under no circumstances will asbestos, or asbestos related materials, be allowed on this project.
- E. Communicate with all required utility offices to meet utility schedules and regulations. Coordinate the local utility requirements with the requirements of these contract documents. Should conflicts arise, notify the Architect immediately. Acquire services to avoid project delays. Conform to regulations of the local utility company with respect to metering, service entrance and service access.

1.04 SITE VISIT

- A. **All parties shall visit the site and thoroughly familiarize themselves with the local conditions and existing conditions which may affect the cost of the Work prior to any project activity or submission of bids. No allowances will be made for lack of knowledge of existing job conditions which could reasonably be identified during site visit.**
- B. Where work under this Division requires extension, relocation, reconnection or modifications to the existing equipment or systems, the existing equipment or systems shall be restored to their original condition prior to completion of this Project.
- C. Verify the service entrance voltage and short circuit contribution with the serving power utility and provide written confirmation of same to the Architect prior to submitting shop drawings or ordering any materials for use in the building served. Provide service entrance equipment fully rated to interrupt the available fault current from the serving utility.

1.05 DRAWINGS AND SPECIFICATIONS

- A. The Electrical Drawings are diagrammatic, and are not intended to show the exact location of raceways, outlets, boxes, bends, sleeves, fire sealant, couplings or other such elements except where dimensions are noted. Provide all required offsets, extensions or pull boxes required for a fully coordinated and operational system.
- B. The Drawings and Specifications shall both be considered as part of the Contract. Any work or material shown in one and omitted in the other, or which may fairly be implied by both or either, shall be provided in order to give a complete job.
- C. Should conflicts exist between the Drawings and Specifications, notify the Architect/Engineer for clarification prior to installation.
- D. Refer to the Architectural {Interiors}, Structural, Mechanical, Civil, and Kitchen plans in conjunction with other project construction and shop drawings for dimensions, and properly fit the work to conform to the details of building construction.
- E. The right is reserved to shift any switch, receptacle, ceiling outlet or other outlet which has been roughed-in a maximum of 10'-0" from its location as shown before it is permanently installed, without incurring additions to the Contract in time or cost. In addition, refer to the Architectural Drawings for exact location of devices and equipment.
- F. All conduit and wiring shown on the Electrical Drawings shall be provided under this Division regardless of its function.

- G. Review the drawings and specifications provided for other systems such as Elevator Equipment, Sound System, Computer, Landscape, etc., for additional work which may be required under this Division. Provide service to and make connections to all such equipment requiring electrical service.
 - H. Equipment configuration is based upon one manufacturer's product. Where the equipment selected by the Contractor for use on this Project differs from the configuration shown, the Contractor shall be responsible for coordinating space requirements, connection arrangements, interfaces with mechanical and plumbing equipment and all other affected trades and providing access for future maintenance and repair. Submit proposed revisions for approval by the Architect.
- 1.06 DEVIATIONS
- A. No deviations from the drawings and specifications shall be made without the full knowledge and consent of the Architect.
 - B. If it is found that existing conditions make desirable a modification in requirements covering any particular item, report such item to the Architect for their review and instructions.
- 1.07 EQUIPMENT CONNECTIONS
- A. Coordinate with other trades and review the drawings of other divisions and provide suitable control equipment and feeders/branch circuits so that the above requirements shall be met without incurring additions to the Contract in time or cost. Conform with UL Listing and nameplate requirements for equipment furnished. Such adjustments shall be subject to the approval of the Architect.
 - B. Provide suitable overcurrent protection and disconnecting means in conformance with the requirements of the NEC, for all items or equipment utilized on the project no matter how, or by whom, furnished. However, duplication, or redundancy, is not required. Coordinate said requirements with equipment furnished and with applicable trades.
 - C. Branch circuits supplying control panels and other equipment master and local unit locations and quantities shall be coordinated at the submittal stage and provided under Division 26. Provide emergency power where required to accomplish emergency equipment operations in accordance with Divisions 22 & 23 requirements. All control wiring for plumbing and heating, ventilation and air conditioning systems shall be installed under Divisions 22 & 23. Review Division 22 & 23 specifications and shop drawings for control systems to assure system compatibility between equipment furnished under Division 26 and system wiring and controls furnished under Divisions 22 & 23.
 - D. Motor controllers shall be furnished and installed by Division 26 where automatic control of equipment is required, unless specified to be furnished as an integral part of packaged equipment. Provide the number and type of auxiliary contacts and relays necessary to interlock the equipment and provide the specified control sequence, reserving spare NO and NC contacts for future use. Power wiring to all motors and motor controllers and between motors and controllers shall be furnished under Division 26.
 - E. Where drawings indicate or specifications require equipment to be controlled by line voltage interlock, safety device or control, provide line voltage control wiring in Division 26.
 - F. For each electrical connection required, provide pressure connectors, terminals (lugs), electrical insulating tape, heat-shrinkable insulating tubing, cable ties, solderless wire connectors, and other items required to complete splices and terminations of the necessary types. Cover splices or terminations with electrical insulation equivalent to insulation of conductors terminated.

PART 2 PRODUCTS

2.01 STANDARDS FOR MATERIALS AND WORKMANSHIP

- A. All material shall be new and shall bear the inspection label of Underwriter's Laboratories, Inc. (UL).
- B. The published standards and requirements of the National Electrical Manufacturer's Association (NEMA), Underwriters' Laboratories (UL), Electrical Testing Laboratories (ETL), American National Standards Institute (ANSI), Institute of Electrical and Electronic Engineers (IEEE), Insulated Cable Engineers Association (ICEA), National Fire Protection Association (NFPA), Occupational Safety and Health Administration (OSHA) and the American Society for Testing and Materials (ASTM) shall govern and apply where such have been established for the particular material in question.
- C. Specified catalog numbers and trade or manufacturers names are intended to describe the material, devices, or apparatus desired for type, construction features, electrical characteristics, ratings, operating functions, style and quality. Similar materials of other manufacturers, not less than specified quality, capacity or character may be substituted in conformity with the provisions of the General and Supplementary Conditions. Materials of the same type shall be the product of one manufacturer. Refer to Shop Drawing requirements.
- D. Furnish all materials specified herein or indicated on the drawings.
- E. All work shall be installed in a practical and workmanlike manner by competent workmen, licensed and skilled in their trade.

2.02 SHOP DRAWINGS

- A. Provide complete electrical characteristics for all equipment. Submit for approval data of the materials and equipment to be incorporated into the Work. Submittals shall include descriptive materials, catalog cuts, diagrams, performance characteristics, and charts published by the manufacturer indicating conformance to the specification and drawing requirements; model numbers alone will not be acceptable. Submittals shall be made by Specification section number, tabbed, within three ring binders, grouped and submitted in packages as indicated below. Submittals for lighting fixtures shall include full photometric data. Shop drawings shall be submitted for the following equipment and items suitably bound, and marked:

Package I:

Section 26 05 19 Low-Voltage Electrical Power Conductors and Cables
Section 26 05 33 Raceway and Boxes for Electrical Systems
Section 26 27 26 Wiring Devices

Package II:

Section 26 24 16 Panelboards

Package III:

Section 26 51 13 Interior Lighting Fixtures, Lamps, and Ballasts

Package IV:

Section 28 31 00 Fire Detection and Alarm System

- B. Shop drawings and/or catalog data submittals on all items of equipment and materials shall be submitted in conformity with requirements of the General and Supplementary Conditions. Do not submit more than the required number of sets as indicated by Architect. Do not submit equipment or materials not requested in the Specifications.
- C. All material lists and shop drawing submittals shall include a stamped indication by the Contractor signifying that the submittals have been previously reviewed for complete compliance with the Contract Documents, that all coordination required between trades prior to field installation has occurred and that the material being submitted is approved for installation. The stamped indication shall include the name of the contracting firm, the date of the review and the signature of the contractor. The Engineer will not review the shop drawing submittals without the contractor's stamped approval already on the shop drawings. The responsibility of complying with the Contract Documents will not be relieved by the Architect's review, which requires 10 working days from the date the shop drawings are received by the Architect.
- D. All pricing is to be based upon the products, manufacturers, and processes described in the Contract Documents. Requests for approval of substitutions shall be written and delivered to the Architect's/Engineer's office in conformity with the provisions of the General and Supplemental Conditions. Do not submit any shop drawing or product data that does not conform with the contract documents.
- E. Resubmittals, if necessary, shall be made as specified above. Resubmittals will highlight and indicate any and all revisions made there to and will include the following text " Resubmittal #___", typed in a prominent location on the cover sheet.
- F. The Contractor shall provide with the shop drawing submittal dimensioned layouts of all electrical rooms and spaces using the equipment he intends to furnish. Switchboard, panelboards, distribution panels, etc., will be rejected without dimensioned room layouts.
- G. Samples of all materials proposed for use shall be presented to the Architect/Engineer for his approval when requested.
- H. Submittals shall be noted with any deviations, alterations or limitations of product from the specified materials. The product will be rejected upon failure to indicate this information. Any conflict or failure to perform comparably to the originally specified materials will result in product rejection. It will be the Contractor's responsibility to replace the alternate material or equipment with the originally specified one and to demolish, replace, repair and retest the equipment, including repair or replacement of any component of the building, finishes or other systems affected by said replacement, at no additional costs to the Owner.

2.03 SUPPORT FASTENER DEVICES

- A. Anchors for post tensioned concrete applications shall be cast in place continuous or spot insert channel providing a safety factor of 3 in 3000 lb hard rock concrete.
- B. Anchors for cast in place concrete shall be insert type expansion shields and bolts, lead shields and bolts or self drilling expansion shields and bolts. Powder actuated pins of 1500 pound pull out strength may be utilized in concrete.
- C. Anchors for wood construction shall be lag bolts or power driven wood screws.
- D. Anchors in hollow masonry shall be toggle bolts.
- E. Anchors for steel attachment shall be machine screws, bolts, or beam clamps.
- F. Equipment mounted to drywall construction shall be secured to power channel (13/16" x 1 5/8" minimum). Secure channel to a minimum of two (2) dry wall studs with drywall screws and washers.

2.04 SUPPORTS: Furnish and install under this contract all angle iron, channel iron, rods, threaded rod, supports or hangers required to install or mount all electrical equipment, material or related devices. Conduit shall not be supported from steel decking, roof decking, bridging, ceiling or ceiling support wires.

2.05 IDENTIFICATION

A. All equipment or devices specified in Division 16 shall be identified with an engraved plastic nameplate. Identification of flush equipment shall be on the inside of the cover. Surface equipment shall be identified on the outside. Plastic nameplates shall be multicolored laminated plastic with engraved lettering. Nameplates shall be provided as scheduled:

1. 240/120 volt normal power equipment shall be white faceplate/black core (1 ½"x 6" with 3/8" high letters).
2. 240/120 volt emergency power equipment shall be white faceplate/red core (1 ½" x 8" with ½" high letters). Face plate shall read "Emergency - 120 Volts".
3. Computer power equipment (i.e. UPS, isolated ground, etc.) shall be orange faceplate/white core (1 ½: x 8" with 3/8" Faceplate shall read "Computer - _____ Volts".
4. Provide 3" high x (length as required) for electrical switchboards.
5. Junction boxes for emergency power, lighting, fire alarm systems, etc. shall have circuit numbers indicated and labeled as required.
6. Junction boxes for general power, lighting and misc., systems etc. shall have circuit numbers indicated and voltage (system) labeled as required.

2.06 AS-BUILT (RECORD) DRAWINGS

- A. Maintain on the job site at all times during construction a set of "As-Built" mylar sepias with all changes during construction marked thereon. This set shall be utilized for no other purpose. Include any addenda, change orders, field orders, project sketches or "marked-up" drawing prints as may be generated on the job site to assist in recording the changes.
- B. The "As-Built" sepias shall show all changes and deviations from the Contract Drawings including relocation of outlets, conduit and equipment. Record final dimensioned locations of switchboards, panelboards, transformers, disconnect switches, etc. Make sufficient measurements to locate all underground conduit. Show exact locations of underground cable and conduits, both interior and exterior, fully dimensioned from building column lines or permanent exterior structures. These drawings shall be available for reference at the time of final inspection.
- C. At the completion of construction, the Contractor shall purchase a set of reproducible from the Architect/Engineer at cost of printing and shipping. All changes noted above shall be incorporated thereon by the Contractor. The reproducible drawings, with one set of blue-line prints thereof and the original sketches and marked-up "As-Built" prints shall be presented to the Owner.

2.07 MAINTENANCE AND INSTRUCTION MANUALS

- A. Submit to the Architect/Engineer/Owners Representative upon completion of the work and prior to final inspection, copies of maintenance and instruction manuals for equipment provided as outlined below:
1. Three sets of the following data are required:
 - a. Operating and maintenance instructions.
 - b. Spare parts list.
 - c. Copies of approved submittal data.
 - d. Copies of panelboard circuit directories reflecting all field changes.
 - e. Test reports of all tests performed.

- f. Contact names and phone numbers for parts suppliers of submitted equipment.
 - B. Arrange each set of data in a orderly way and bind each set in a separate 3-ring hard-cover binder with appropriate label identifying the Project, Architect, Engineer, Contractor, Subcontractor and Date.
- 2.08 SUBMISSION OF DRAWINGS: Submission of Architect's drawings for shop drawings and unaltered Architect's drawings for "As-Built" will not be acceptable.

PART 3 EXECUTION

3.01 COORDINATION

- A. Before any piping, conduit, outlets, equipment or lighting fixtures are located in any area, coordinate the space requirements with all trades. Such shall be arranged so that space conditions will allow all trades to install their work, and will also permit access for future maintenance and repair. Coordinate the installation of recessed electrical equipment with concealed ductwork, piping, insulation, structural appurtenances and wall thickness.
- B. Piping, ductwork, conduit and equipment installed at variance with the above requirements shall be relocated and/or revised to conform with the above requirements without incurring additions to the Contract.
- C. Coordination of space requirements with all trades shall be performed so that:
 - 1. No piping or ductwork, other than electrical, shall be run within 42" of panelboards, switchboards or transformers.
 - 2. No pipes or ducts that operate at a temperature in excess of 120 degrees F. shall be installed nearer than 3" to any electrical conductor.
- D. Do not scale drawings. Obtain dimensions for layout of equipment from the Architectural drawings unless noted on the Electrical drawings.
- E. Contractor for work under this division shall be fully responsible for determining in advance of purchase that proposed equipment and materials for installation shall fit into the confines indicated and allow sufficient clearance for maintenance and service of all equipment including other trades.
- F. Clearances in front of electrical switchboards, panelboards, motor starters, bus plugs etc. (equipment requiring maintenance while energized) shall be installed in accordance with N.E.C. 110-162 condition number 2.

3.02 PROTECTION OF MATERIALS

- A. Refer to the general requirements section of the Specifications for storage, protection and handling requirements.
- B. Provide dry, weathertight staging and storage for materials and equipment requiring protection from weather and moisture per manufacturer's recommendations. Install temporary lighting or heat sources to prevent moisture accumulation. Provide protection against direct sunlight, precipitation, wind, ice, fire or excessive heat. Store materials in original undamaged packaging with manufacturer's labels and seals intact. Containers which are broken, damaged or watermarked are not acceptable and are subject to rejection.

- C. Materials and equipment will not be installed until the environmental conditions of the project are suitable to protect same per manufacturer's recommendations. Equipment or materials damaged or subjected to moisture, precipitation, direct sunlight, cold or heat are not acceptable and shall be removed from the project and replaced at no additional costs to the Owner.
 - D. All conduit and other openings shall be kept protected to prevent entry of foreign matter or construction debris. Fixtures, equipment, and apparatus shall be kept covered for protection against dirt, water, chemical or mechanical damage before and during construction.
 - E. The original finish, including shop coat of paint of fixtures, apparatus or equipment that has been damaged shall be restored without incurring additions to the Contract in time or price.
- 3.03 HOUSEKEEPING PADS: Provide 4" minimum height concrete pad, integral with floor, under all floor mounted electrical equipment or apparatus.
- 3.04 CUTTING AND PATCHING: The Contractor is responsible for all cutting and patching, including escutcheon plates where necessary, whether or not such cutting and patching is shown or indicated.
- 3.05 CLEANING AND PAINTING
- A. Remove foreign materials, drywall compound, overspray, oil, dirt and grease from all raceway, fittings, supports, boxes, cabinets, pull boxes, panelboard trims and equipment to provide clean surfaces for painting. Remove surface oxidation and restore galvanized surfaces with cold process galvanizing compounds. Touchup marred or scratched surfaces of fixtures, panelboard and cabinet trims, motor control centers, switchboards, cabinets, and equipment enclosures with paint furnished by the equipment manufacturer specifically for that purpose. When touchup is required, provide one base coat over imperfection and subsequent coat over entire side or surface of equipment.
 - B. Do not paint trim hinges, latches, clamps, locks, device covers or trim covers. Mask or remove such items prior to finishing.
 - C. Unless otherwise noted herein, all painting shall conform to the "Painting" section of the specifications.
 - D. Where plywood backboards are utilized to mount electrical or electronic equipment provided under Division 26, finish same with two (2) coats of light gray semi-gloss paint.
- 3.06 ACCESS TO ELECTRICAL ITEMS: Install all concealed electrical equipment, junction and pull boxes, apparatus, or devices so as to maintain access for maintenance, operations and replacement. Access doors or covers shall be provided where required by NEC or LAHJ and shall be installed in accordance with manufacturer's instructions. Refer to the Architect for approved types, means, methods and appearance. Locate each access unit accurately in relation to electrical work requiring access.
- 3.07 EQUIPMENT CONNECTIONS
- A. Review all divisions of specifications, where equipment requiring electrical service is specified, to determine the complete scope of work under this division of the specifications. Provide electrical connections and service to all equipment specified elsewhere requiring such connections or service.
 - B. Connect all equipment requiring electrical connections, in accordance with the equipment manufacturer's requirements. Where equipment connections require specific locations, determine and coordinate same with submittals. Provide concealed service to central plant equipment locations and pads.

3.08 NAMEPLATES AND IDENTIFICATION

- A. Provide and install nameplates for transformers, switchboards, switchgear, power and lighting panels, disconnect switches, time switches, pull boxes, junction boxes, fire alarm equipment, contactors, relays and other unit equipment. Nameplates shall be affixed with epoxy cement. Refer to 26 05 10-2.5 for additional requirements.
- B. Install nameplates plumb and level.
- C. Provide and install sleeve type wire markers on all conductors at all termination points and access points. Branch circuit identification (as LP-21") shall be installed on hot and neutral conductors. Dedicated circuits and isolated ground technical power circuits shall have wire markers installed on ground conductor. Label junction and pull box covers with all circuit numbers contained therein.

3.10 EXCAVATION AND BACKFILLING

- A. Provide and perform all excavation required to install conduit, ductbanks and manholes indicated on the drawings and/or specified. Trenches shall be of uniform width required with minimum 8" clearance on both sides. Remove and dispose of all materials not to be used for backfill. Maintain dry excavations for electrical work, by removing water. Grade areas to prevent surface water from entering excavation. Remove any accumulated water by pumping. Perform all excavation by open cut. Excavate with vertical-sided excavations where possible. Where necessary, provide sheeting and cross-bracing to sustain sides of excavations. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition. Establish requirements for trench shoring and bracing to comply with local codes and LAHJ. No tunneling shall be permitted.
- B. The bottom of all trenches and excavation shall be graded to provide uniform bearing surface for conduits or ductbanks on undisturbed soil at every point along entire length. Tamp over-excavation with specified backfill materials. Remove unstable materials unsuitable for supporting equipment or installation and replace with specified materials for a minimum of twelve (12) inches below invert of equipment or installation.
- C. Specified materials shall be utilized for backfilling, in not more than six (6) inch layers and tamped until the installation has cover of not less than the adjacent grade and not more than two (2) inches above same. Remove sheeting and cross-bracing during backfilling wherever such removal would not endanger the work or other property. Equalize backfilling operation to avoid shifting of materials and equipment installed. Compaction of backfill materials shall be at least equal to surrounding undisturbed material. Backfill trenches with concrete where excavations pass within 18" of footings or other utility lines. Do not settle backfill with water. Conform to compaction requirements and methods specified elsewhere.
- D. Electrical duct shall be installed a minimum of 24" below finished grade with bottom of duct below geographic frost line. Duct cark shall not be in direct contact with building structure (slab) except for vertical riser supports.

3.11 TESTS AND CERTIFICATIONS

- A. Upon completion of the electrical work and prior to final inspection, conduct an operating test in the presence of the Architect or his designated representative.

- B. The installation shall be demonstrated to operate in accordance with the Contract Documents. Any material or workmanship which does not meet with the approval of the Architect shall be removed, repaired or replaced as directed without incurring additions to the Contract in time or cost. All electrical systems shall be tested for compliance with the specifications.
 - C. Furnish all instructions, tools, test equipment and personnel required for the test. Have sufficient tools and personnel available to remove equipment covers, coverplates, etc., as required for review of internal wiring and proper inspection. Provide hand tools, flashlights, ladders, outlet testers, VOM, meters and keys required to access and observe system operation and characteristics. Turn circuits on and off as directed and demonstrate operation of equipment as directed.
 - D. Contractor shall test all wiring and connections for continuity and grounds by megger testing. Upon indication of defective insulation, Contractor shall remove and replace the defective conductor and demonstrate by testing that the new conductor is acceptable. Record feeder load currents and line voltages measured at each transformer, switchboard and panelboard after installation of all equipment and lighting. Adjust transformer taps as required to provide optimum voltage levels. Adjust single phase load connections to balance feeder load and document on as-built drawings. Provide the Owner with full documentation of all testing for future reference.
 - E. Refer to the individual specification sections and the electrical systems testing section of the specifications for specific testing requirements.
- 3.12 TEMPORARY WIRING: Provide a temporary electrical lighting and power distribution system of adequate size to properly serve the construction requirements, including adequate feeder sizes to prevent excessive voltage drop. Temporary work to be installed in accordance with the National Electrical Code, Article 305, and as required by OSHA or applicable local safety codes, rules and regulations.
- 3.13 WARRANTY
- A. All systems and components shall be provided with a one-year warranty from the time of final acceptance. The warranty shall cover all defects in materials, design and workmanship. During this warranty period, all defects in materials and workmanship shall be corrected without incurring additions to the Contract. The correction shall include removing the defective part(s), replacing and installing the new parts (including shipping and handling), all required cutting, patching, repainting, or other work involved, including repair or restoration of any damaged sections or parts of the premises resulting from any fault included in the warranty, entirely at the expense of the Contractor.
 - B. In addition to this general warranty, present to the Architect any other guarantees or warranties from equipment or system manufacturers. These supplemental guarantees or warranties shall not invalidate the general warranty.

END OF SECTION

SECTION 26 05 11

ELECTRICAL SUBMITTAL DATA

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. The requirements of the General Conditions, Supplementary Conditions, and Section 26 05 10 Electrical General Requirements, apply to all work herein.

1.02 QUALITY ASSURANCE:

- A. 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. The Contractor shall submit to the Architect a sufficient number of copies of all such Shop Drawings or catalog data to provide him with as many reviewed copies as he may need, plus two (2) copies for retention; one by the Architect and one by the Engineer.
- 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 of the official review by the Architect. Any 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 Specification unless he has, in writing, specifically called attention to such deviations at the time of submission and has obtained the permission of the Architect. Also, it shall not 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 this is not mentioned, 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.

PART 2 - PRODUCTS

2.01 GENERAL:

- A. All products shall be new and bear all labels which are identified by the applicable specification section and Contract Documents.

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. 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 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 the 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.
3. Electrical submittal data shall be bound into separate 3-ring binders, each volume shall contain one copy of all specified equipment/shop drawing submittals. Each binder shall be provided with an index of materials and 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. **FAILURE to provide BOUND AND IDENTIFIED SUBMITTALS will result in the AUTOMATIC REJECTION of the submittal data with NO EXCEPTION.**

B. The bound submittals are to be submitted for review within 30 days after the Contract is awarded. No submittal will be checked until ALL required submittals have been received by the Engineer.

C. The Contractor shall submit with the bound and 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 has been fully coordinated with the mechanical contractor. No submittal data 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 performed without any additions to the Contract Sum. Shop Drawings shall be submitted for each of the following:

Disconnect Switches
Starters

3.02 OPERATING AND MAINTENANCE INSTRUCTIONS:

A. Description

1. A system wiring and control diagram shall be included in the operating and maintenance instruction.
2. Prior to final acceptance or beneficial occupancy, provide the services of a competent representative to instruct the Owner in the operation of all systems for a period of not less than three (3) days. This instruction shall include a complete walk-through of all equipment and systems. The Architect reserves the right to attend any such meeting and shall be duly notified.

3.03 OTHER SUBMITTALS – CLOSEOUT FORMS:

A. Submit two copies of the following prior to occupancy of the project by the Owner. See Contract Closeout Forms – Section 00 65 00.

1. As built drawings for the electrical systems.
2. Request for final payment.
3. Letter or “Release of Liens”.
4. Letter of “Guarantee”.
5. Consent of Surety Company to final payment.

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND
CABLES

PART 1 GENERAL

1.01 DESCRIPTION

- A. All work specified in this Section shall comply with the provisions of Section 26 05 10 "Electrical General Requirements".
- B. This Section covers the furnishing, installation and connections of the building wiring system. Interior wiring, power distribution, lighting, appliance and equipment, motor and exterior wiring systems extending beyond the building are included. The wiring system shall be complete from electrical service entrance to every electrical device requiring an electrical connection.

PART 2 PRODUCTS

2.01 CONDUCTORS

- A. Conductors shall be copper of 98% conductivity, soft temper, 600 volt insulation. Sizes specified are American Wire Gage (AWG) for No. 4/0 and smaller and thousand circular mils (kcmil) for all sizes larger than No. 4/0. Service entrance conductors shall be 600 volt, type XHHW.
 - B. Conductors No. 10 and smaller shall be solid and type "THHN" / THWN" insulation. No. 8 and larger shall be stranded and type "THHN" / "THWN" or "XHHW" insulation.
 - C. All wire and cable shall be U. L. Listed and shall bear the U. L. Label.
 - D. All conductors shall have size, grade of insulation, voltage and manufacturer's name permanently marked on the exterior at maximum 24 inch intervals.
 - E. Conductor size shall be a minimum of No. 12 AWG. Conductor size shall be not less than indicated on the drawings. The minimum size of all emergency circuits shall be No. 10 AWG.
 - F. Fixture wire shall be No. 14 AWG silicone rubber insulated, stranded fixture wire, Type THAN (90 degrees C.).
 - G. Control conductors for use on 120 volt control wiring shall be No. 14 AWG stranded Type THHN/THWN, unless indicated otherwise on the drawings or as required for compliance with voltage drop requirements.
 - H. Where cables are used for switch leg, the white conductor shall be permitted to supply the switch, but not as a return to the fixture.
- 2.02 PREFABRICATED CABLE ASSEMBLIES: Metal clad cable type MC may be utilized for concealed branch circuit wiring only as permitted by local authority having jurisdiction. Insulated ground conductor shall be provided.

2.03 CONNECTORS

- A. Terminations and connections shall be made with U. L. Listed connectors applied per manufacturer's recommendations.
- B. Connections of #10 AWG and smaller size power and lighting branch circuit conductors shall be made with insulated spring steel wire nut connectors. Size #8 AWG and larger connections shall be made with hydraulically applied compression type connectors with insulated covers.
- C. Connections of special system conductors shall be made via dedicated terminal strips labeled to indicate wire number and system type. Wire nut connections in system junction box are not acceptable.

2.04 ACCEPTABLE MANUFACTURERS:

- A. Wire and Cable products:
 - 1. Southwire Co.
 - 2. Rome Cable
 - 3. Alcan Cable
 - 4. Carol Cable
 - 5. AFC Cable Systems
 - 6. American Insulated Wire
 - 7. Cerro Wire & Cable
 - 8. General Cable
 - 9. Triangle PWC
 - 10. Cabelec
 - 11. Okonite
- B. Signal Cable products:
 - 1. Belden
 - 2. Continental
 - 3. Dekoron
 - 4. West Penn
- C. Connector products:
 - 1. AMP
 - 2. Burndy
 - 3. Eagle
 - 4. Gould
 - 5. Ideal
 - 6. Joslyn
 - 7. O-Z Gedney
 - 8. Thomas & Betts
 - 9. IlSCO
 - 10. Buchanan
 - 11. King
- D. Wire management products:
 - 1. AMP
 - 2. Thomas & Betts
 - 3. Panduit
 - 4. Wieland

- E. Wire & Cable identification products:
 - 1. Thomas & Betts SM series
 - 2. Wieland C type
 - 3. Brady type XC

- F. Wire Pulling lubrication products:
 - 1. Ideal Yellow 77
 - 2. Electro Y ER EAS
 - 3. Burndy Silkon

PART 3 EXECUTION

3.01 WIRING

- A. All conductors shall be installed in conduit, unless noted otherwise. All conductors shall be pulled in at the same time. No conductors shall be pulled into the conduit until the conduit system is complete and plaster/drywall construction has dried. Clean, swab and evacuate conduit system before pulling in conductors. Do not exceed the manufacturer's maximum pulling tension.

- B. Conductors shall be continuous from outlet to outlet and from outlet to junction box or pull box. All splices and joints shall be carefully and securely made to be mechanically and electrically solid with proper U. L. Listed connectors. Where connection is made to any terminals of more than 30 amperes capacity and where conductors larger than No. 10 are connected to any terminal, copper terminal lugs shall be secured to the conductors. Where multiple connections are made to the same terminal, individual lugs for each conductor shall be used.

- C. Each conduit shall have a minimum of three (3) conductors pulled in unless that particular conduit is noted as being for systems other than electrical circuitry and/or future use or unless noted otherwise. Grounding conductors are not shown in wire count, but are required from circuit origin to last device.

- D. Conductors for lighting and receptacle circuits shall have color coded jackets. The wiring shall be color coded with the same color used with its respective phase through the entire job as follows:

240/120 Volt Systems

Black	Phase A
Red	Phase B
White	Neutral
Green	Ground
White/Green Stripe	IG Neutral
Green/White Stripe	IG Ground

- E. The feeder and service entrance conductors shall be color coded by the use of one (1) inch wide colored plastic tape applied within 6" of each conductor end.

- F. Branch circuit conductors shall not be smaller than No. 12 and where the home run from panel to first device exceeds 60'-0", the conductors from home run outlet to panel shall be No. 10 minimum.

- G. Branch circuit wiring which supplies more than one fluorescent fixture through wireway of other fixtures shall be rated for use at 105 degrees C.
- H. For branch circuits terminating in outlet without device, leave minimum of 12" of slack wire coiled for connection of equipment.
- I. All conductors shall be identified with proper circuit numbers at all access points, terminals, and junction boxes and at panelboards within 6" of conductor ends.
- J. Special systems conductors shall be color coded in accordance with system manufacturer's recommendations or in a manner approved by the Engineer.
- K. Furniture system branch circuits shall have minimum #10 neutral home run conductors pulled to system junction box.
- L. Maintain phase rotation established at service entrance point throughout entire project.
- M. Taps and splices, where permitted by these specifications, shall be performed with an encapsulating watertight connection kit which insulates and moisture seals the connection.
- N. Grounding conductors are not indicate in the wire count shown on the drawings, but are required in all branch circuit and feeder installations. Provide insulated ground conductor (sized per NEC requirements) in all raceways.

3.02 CONTROL WIRING

- A. Control wiring is defined as the wiring which provides connections between control circuit elements and does not provide the power circuit.
- B. Generally, control wiring is specified in Divisions 22 & 23; however, where a control device such as a push-button, thermostat, firestat, etc. is to be installed in the power circuit, these devices shall be received, stored and installed as part of the work of this Division. Control wiring, conduit etc. shall be coordinated with Divisions 22 & 23 and provided as required.

3.03 CONNECTIONS

- A. All connectors shall be U.L. Listed and shall be utilized in full accordance with manufacturer's requirements.
- B. Splices shall be made only where specifically approved by the Engineer. Conductors shall be continuous from origin to first outlet box or manhole. Splices made exterior to the structure, or below grade, shall be compression type connections with insulated, waterproof covers. Submit splicing requests for review and approval prior to installation.
- C. Termination lugs shall be applied to all single cables #8 and larger, and shall be compression type fittings. The use of mechanical type lugs, kerneys or other pressure type connections will not be permitted.
- D. All compression connections shall be long barrel type installed using hydraulic tools designed for the purpose.

- E. Insulated spring steel wire nut connectors shall be used for branch circuit connections of #10 and smaller conductors. Connections of #8 and larger sizes shall be made with compression type connections with insulated covers. Where exposed to moisture or corrosion spring steel wire nut connectors shall be silicone filled.
- F. Control and special system riser and junction boxes shall be fitted with terminal strips and all conductors shall be labeled per system requirements. The installation of wirenuts in special system riser and junction boxes is not acceptable.
- G. Phase rotation at service equipment shall be maintained throughout entire project, color coding of conductors shall be consistent for feeders and branch circuits through out entire project.

3.04 IDENTIFICATION

- A. All conductors shall be identified with full circuit number at all access points, boxes, and at panelboards within 6 inches of conductor end. Identification shall be permanently marked PVC split sleeve or tubing type
- B. Tape or laminated type wire markers are not acceptable
- C. Permanently mark the junction box cover with the circuit numbers for all conductors contained within. Utilize black marker for normal power and red marker for emergency power and fire alarm.

3.05 WIRE MANAGEMENT

- A. Power and control wiring within all special system cabinets and enclosures, and within switchboards and electrical equipment shall be bundled or routed within slotted wiring duct in a workmanlike manner.
- B. Any knockout, cutout or slot containing wiring shall be fitted with bushing or continuous grommet strip to avoid fraying or abrasion.
- C. Train and lace all conductors within panelboard or control enclosures with cable ties or spiral wrapping.
- D. Spare conductors installed shall be identified and capped.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 DESCRIPTION

- A. All work specified in this Section shall comply with the provisions of Section 26 05 10 "Electrical General Requirements".
- B. This section covers the installation of the building grounding system. The grounding system shall be established with equipment grounding conductors; the use of metallic raceways as the only method of equipment grounding is not acceptable.
- C. In addition, this section covers ground fault protection for the main service entrance equipment.

PART 2 PRODUCTS

2.01 GROUNDING CONDUCTORS

- A. Grounding electrode conductors shall be bare or green insulated copper conductor sized as indicated on the drawings.
- B. Equipment grounding conductors shall be green insulated type THHN/THWN, or XHHW conductors sized as indicated on the drawings. Where size is not indicated on the drawings, conductor size shall be determined from the National Electrical Code table on sizes of equipment grounding conductors.
- C. Bonding jumpers shall be flexible copper bonding jumpers sized in accordance with the National Electrical Code tables for grounding electrode conductors.

2.02 PANELBOARDS, MOTOR CONTROLLERS, AND DISCONNECT SWITCHES

- A. Provide each low voltage distribution and branch circuit panelboard with a copper equipment grounding bar brazed or riveted to the associated enclosures or cabinet and an insulated neutral bar.
- B. Provide a conductor termination grounding lug bonded to the enclosure of each equipment item.

2.03 DEVICES: Each receptacle and switch device shall be furnished with a grounding screw connected to the metallic device frame.

2.04 GROUND RODS

- A. Ground rods shall be 3/4" x 10'-0 copper clad steel.
- B. Sectional ground rods shall be hot dip galvanized 5/8" x 10' sections with an internal stainless steel splined coupling pin.

2.05 HYDRAULIC AND MECHANICAL TERMINATIONS

- A. Acceptable manufacturers for hydraulically applied terminations are Square D, Burndy and Thomas and Betts (T & B).
- B. Acceptable manufacturers for mechanically applied terminations are Ideal, Burndy and Thomas and Betts (T & B).

PART 3 EXECUTION

3.01 INSTALLATION

- A. Ground all non-current carrying parts of the electrical system, i.e. raceways, equipment enclosures and frames, junction and outlet boxes, machine frames and other conductive items in close proximity with electrical circuits, to provide a low impedance path for potential grounded faults.
- B. Service entrance and separately derived electrical systems, grounding electrode system:
 - 1. The neutral conductor of the electrical service serving the premises wiring system shall be grounded to the ground bus bar in the service equipment which shall be grounded to the cold water system, the ground rod system, and other grounding electrodes specified herein or indicated on the drawings. Grounding electrode conductors shall be installed in rigid, nonmetallic conduit to point of ground connection, unless subject to physical damage in which case it shall be installed in galvanized rigid steel. Where metallic conduit is permitted, bond conduit at both ends to grounding electrode conductor with a U.L. bonding busing.
 - 2. Make connection to main water line entering the building. Make connections ahead of any valve or fittings whose removal may interrupt ground continuity. Install a bonding jumper of the same size as the grounding conductor around the water meter.
 - 3. Bond together the following systems to form the grounding electrode system. All system connections shall be made to the electrodes as close as possible to the service entrance equipment and each connected at the service entrance equipment ground bus. Do not connect electrode systems together except at ground bus.
 - a. Ground rod system
 - b. Main rebar in foundation footing
 - c. Building structural steel components.
 - 4. Grounding Electrode connections to structural steel, reinforcing bars, ground rods, or where indicated on the drawings shall be with chemical exothermic weld connection devices recommended for the particular connection type. Connections to piping shall be with U.L. listed mechanical ground clamps.
 - 5. Bonding shall be in accordance with the National Electrical Code.
 - 6. Install ground rods where indicated on the drawings with the top of the ground rods 12 inches below finished grade.

C. Equipment Grounding Conductor:

1. Grounding conductors for branch circuits are not shown on the drawings; however, grounding conductors shall be provided in all branch circuit raceways and cables. Grounding conductors shall be the same AWG size as branch circuit conductors.
2. Grounding conductors for feeders are typically indicated on the drawings and the raceway is sized to accommodate grounding conductor shown. Where grounding conductor size is not indicated on the drawings, conductor shall be in accordance with the equipment grounding conductor table of the National Electrical Code.
3. A grounding conductor shall be installed in all flexible conduit installations. For branch circuits, grounding conductor shall be sized to match branch circuit conductors.
4. A feeder serving several panelboards shall have a continuous grounding conductor which shall be connected to each related cabinet grounding bar.
5. The equipment grounding conductor shall be attached to equipment with bolt or sheet metal screw used for no other purpose. Where grounding conductor is stranded, attachment shall be made with lug attached to grounding conductor with crimping tool.
6. Ground all motors by drilling and tapping the bottom of the motor junction box and attaching the equipment grounding conductor to the box with a round head bolt used for no other purpose. Conductor attachment shall be through the use of lug attached to conductor with crimping tool.
7. Equipment grounding conductors shall terminate on panelboard, switchboard, or motor control center grounding bus only. Do not terminate on neutral bus. Provide a single terminal lug for each conductor. Conductor shall terminate in the same section as the phase conductors originate. Do not terminate neutral conductors on the ground bus or equipment grounding conductors on the neutral bus.

D. Other Grounding Requirements:

1. Each telephone backboard shall be provided with a No. 6 grounding conductor. When backboard is located in vicinity of electrical service equipment, the "point of grounding" of this conductor shall be the main cold water service with connections made ahead of any valves or joints. Remote backboards shall use building steel as "point of ground". Terminate conductor by stapling to backboard.
2. At each building expansion joint flexible copper bonding jumpers shall be attached to building structure by chemical weld process. Install bonding jumpers in concealed locations that will not subject connections or jumpers to physical abuse. Install 100' on centers across expansion joints.
3. Bond all metal at pools or fountains to grounding electrode system per NEC requirements.

3.02 TESTING:

- A. Upon completion of the ground rod installation, the Contractor shall test the grounding resistance. Grounding resistance reading shall be taken before connection is made to the building cold water piping system. Ground resistance readings shall not be taken within forty-eight hours of rainfall. Results of ground resistance readings shall be forwarded, in writing, immediately to the Project Engineer.
- B. If the resistance to ground exceeds 5 ohms, additional rods shall be driven and bonded together, until a reading of 5 ohms or less to ground is obtained. After completion of the grounding system, measure the system ground resistance with a "Megger Earth Tester". Submit directly to the Project Engineer two (2) copies of each test report certified by the testing technician and the electrical contractor.

- C. All grounding electrode conductors and ground bus shall be measured by the Contractor for objectionable levels of current, and to detect any inadvertent connection of neutral to ground.
- D. If the ground current exceeds 10% of the rating of the conductor ampacity, all devices on that feeder or circuit shall be rechecked for proper connection.
- E. All grounding system connections shall be rechecked at final checkout for correct wiring termination methods and mechanical strength.

END OF SECTION

SECTION 26 05 33

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. All work specified in this Section shall comply with the provisions of Section 26 05 10 "Electrical General Requirements".
- B. This Section covers the installation of all interior and exterior conduit and raceway systems, outlet boxes, pull boxes, junction boxes and wiring troughs or other boxes throughout the wiring system, including supports.
- C. Outlets are located diagrammatically on the drawings. Outlets shall be located so as to be symmetrical with Architectural details.

PART 2 - PRODUCTS

2.01 GENERAL MATERIAL REQUIREMENTS

- A. All boxes shall be U. L. Listed and labeled.
- B. Boxes shall be of one-piece construction, fabricated from NEC gauge galvanized steel, unless rustproof cast metal boxes are specified or required by NEC, or unless otherwise shown on the drawings.

2.02 CONDUIT:

- A. Galvanized rigid steel conduit (GRC) shall be low carbon, hot-dipped zinc galvanized steel to meet U.L. 6 Standards, ANSI C80.1 and shall have NPT (ANSI B1.20.1) full cut threaded joints, galvanized after forming. IMC shall carry U. L. Label. Conduit with integral couplings may be utilized for 2.5 inch sizes and above provided it conforms to U. L. Safety Standard #514-B.
- B. Intermediate metal conduit (IMC) shall be premium hardened steel conforming to ASTM-A568, hot galvanized with zinc chromate exterior with polymer sealcoat to meet U.L. 1242 and ANSI C80.6 standards. Interior to be finished with corrosion inhibiting organic coating. Both coatings shall conform to ANSI C80.6 requirements. IMC shall have NPT (ANSI B1.20.1) full cut threaded joints, galvanized after forming. Conduit with integral couplings may be utilized for 2.5 inch sizes and above provided it conforms to U. L. Safety Standard #514-B. IMC shall carry U. L. Label.
- C. Electrical metallic tubing (EMT) shall be high grade mild ductile steel, hot galvanized exterior with a clear organic polymer topcoat to meet U.L. 797 Standards and ANSI C80.3. Interior to be finished with corrosion inhibiting clear organic coating. Conduit with integral set screw couplings may be utilized for 2.5 inch sizes and above provided it conforms to U. L. Safety Standard #514-B.
- D. Plastic conduit (PVC) shall be schedule 40 PVC heavy wall type for 4" and smaller, Schedule 20 for 5" and larger. PVC shall be U.L. Listed, NEMA TC 2, sunlight resistant and suitable for use with 90 degree C conductors.

- E. Flexible metal conduit (FLX) shall be extra flexible, extra strength galvanized steel conduit tubing and shall meet U. L. Standard for Flexible Steel Conduit and U.L. Standard for Safety #1. The use of aluminum flexible conduit is not permitted.
- F. Liquid-tight flexible metal conduit (WFX) shall be UL Listed with galvanized steel core of square locked or interlocked design, integral ground conductor and thermoplastic PVC (polyvinyl chloride) cover. The use of aluminum core or non-metallic types is not permitted.
- G. Electrical non-metallic tubing (ENT) shall be UL Listed and manufactured to the requirements of NEMA TC-13. This raceway is permitted to be utilized with concrete encasement or unexposed installations only. Do not install exposed in plenums or other open areas. Utilize steel outlet boxes in all partition construction. Utilize plastic boxes only in concrete encasement.
- H. Steel conduit approved manufacturers are Allied, Triangle, Republic, Wheatland and Pittsburg.
- I. Flexible conduit approved manufacturers are Anamet (Anaconda) and Republic.
- J. PVC conduit approved manufacturers are Carlon, Triangle, and Johns-Manville.
- K. PVC coated metallic conduit approved manufacturers are Robroy, Permacote and Occidental.

2.02 CONDUIT FITTINGS

- A. GRC and IMC conduit fittings shall be zinc-coated, ferrous metal and taper threaded type, U. L. Labeled.
- B. EMT fittings shall be zinc-coated steel and shall be Type 1 or 2 (raintight compression or concrete tight set-screw type). EMT connectors shall have insulated throats. Die cast, malleable iron or pressure cast material will not be accepted. Fittings shall bear U. L. Label. Two (2) inch and larger fittings shall be compression type or shall utilize dual set screws for each side of fitting.
- C. PVC fittings, elbows and cement shall be NEMA TC3, produced by the same manufacturer. All joints shall be solvent welded in accordance with the manufacturer's recommendations.
- D. Conduit connections to switchboards, motor control centers, transformers, panels, cabinets, and pull boxes shall have locknuts designed to bite into the metal.
- E. Each conduit end shall be provided with either an insulated throat connector or separate locknut and insulated bushing. Bushing shall be installed before any wire is pulled.
- F. Expansion fittings shall be provided in all conduits which crosses an expansion joint either in, across, or through same. Fittings shall be U.L. 467 and 514 Listed. Fittings shall contain an internal flexible metal braid to maintain system ground continuity.
- G. Flexible conduit fittings shall be cast malleable iron or stamped steel type with integral fastener. Fittings shall be U.L. Listed for the application. The use of "squeeze" type cast or stamped steel connectors is not permitted.
- H. Liquidtight flexible metal conduit fittings shall be liquidtight with neoprene bushing, nylon gland, tapered hub threads and outlet bushing. Fittings shall be U.L. Listed for the application. The use of non-metallic or thermo-plastic insert connectors is not permitted.

1. EMT conduit fittings approved manufacturers are Raco, Steel City, Crouse-Hinds, O.Z Gedney, Thomas & Betts, Efcor and Appleton.
 2. GRC and IMC fittings approved manufacturers are Appleton, Crouse-Hinds, O.Z. Gedney or Thomas & Betts.
- 2.03 SMOKE AND FIRE STOP FITTINGS: If and where required, smoke and fire stop fittings shall be U.L. listed for that purpose. The fittings used to seal conduit either on the outside of the conduit or cable or internally shall have heat activated intumescent material which expands to fill all voids and shall be O.Z./Gedney "FIRE-SEAL" or Dow Corning silicone RTV foam with an hourly fire-rating equal to or higher than the rating of the floor, ceiling or wall through which the cable or conduit passes. The seals for conduit shall be of the flanged type. Penetration of any fire rated wall, floor, or ceiling shall use Through-Penetration Firestop Systems described in the current Underwriters Laboratories Building Materials Directory.
- 2.04 RACEWAY SUPPORTS
- A. Raceways and systems shall be supported independent of any other equipment or appurtenances except the building structure. Suspended ceiling systems will not be considered as structure for support purposes, even if so rated by the manufacturer.
 - B. All support components shall be zinc-coated or have equivalent corrosion protection. Unprotected components shall be removed and replaced at no additional costs to the Owner.
 - C. Conduit support straps shall be single-hole cast malleable iron or dual hole stamped steel type with zinc coating sized for type of raceway used. Conduit clamps for single conduit support shall be stamped steel with bolt & nut fastener and threaded rod support. Multiple conduit support channel straps shall be galvanized stamped steel two piece clamps with bolt & nut fasteners.
 - D. Conduit support channel shall be minimum 1 5/8" x 1 5/8" x 12 gauge roll-formed pre-galvanized steel or painted steel conforming to ASTM A-570 Grade 33 or ASTM A-446 Grade A requirements. Channel cross section shall be increased to provide higher load bearing capability, if required by this installation. Channel shall have elongated holes at two (2) inch centers.
 - E. Drop wire type hangers will not be permitted. Any hanger which may distort the ceiling support structure will not be permitted. Lathers channel and chain are not acceptable for conduit hangers.
 - F. Furnish and install under this contract all angle iron, channel iron, rods, threaded rod, supports or hangers required to install or mount all electrical equipment, material or related devices. Conduit shall **not** be supported from steel decking, roof decking, bridging, ceiling or ceiling support wires.
 - G. Before any piping, conduit, outlets, equipment or lighting fixtures are located in any area, coordinate the space requirements with all trades. Such shall be arranged so that space conditions will allow all trades to install their work, and will also permit access for future maintenance and repair. Coordinate the installation of recessed electrical equipment with concealed ductwork, piping, insulation, structural appurtenances and wall thickness.
 - H. Support branch circuit conduits and raceways at intervals not exceeding ten (10) feet and within three (3) feet of each termination. Support feeder conduit and raceway at intervals not exceeding twelve (12) feet and within three (3) feet of each termination.

- I. Piping, ductwork, conduit and equipment installed at variance with the above requirements shall be relocated and/or revised to conform with the above requirements without incurring additions to the Contract.
- J. Raceway installed within reinforcing steel of elevated or slab on grade concrete construction shall be tied to the re-steel at intervals not exceeding three (3) feet.

2.05 SUPPORT FASTENER DEVICES

- A. Anchors for post tensioned concrete applications shall be cast in place continuous or spot insert channel providing a safety factor of 3 in 3000 lb hard rock concrete.
- B. Anchors for cast in place concrete shall be insert type expansion shields and bolts, lead shields and bolts or self drilling expansion shields and bolts. Powder actuated pins of 1500 pound pull out strength may be utilized in concrete.
- C. Anchors for wood construction shall be lag bolts or power driven wood screws.
- D. Anchors in hollow masonry shall be toggle bolts.
- E. Anchors for steel attachment shall be machine screws, bolts, or beam clamps.
- F. Equipment mounted to drywall construction shall be secured to power channel (13/16" x 1 5/8" minimum). Secure channel to a minimum of two (2) dry wall studs with drywall screws and washers.
- G. Under no circumstance will nylon or composition type tie wraps or straps be permitted for use in supporting electrical raceway. Utilize galvanized tie wire or prefabricated steel clips for such support.

2.06 OUTLETS

- A. Outlet boxes and covers shall be of such form and dimensions as to be adapted to their specified usage, locations, size and quantity of conduit, and size and quantity of conductors entering the boxes.
- B. Outlet boxes for flush mounted light fixtures shall be four inch square boxes 1 1/2" deep, with blank cover, installed adjacent to fixture served. Connection to fixture shall be with flexible steel conduit and fixture wire.
- C. Flush ceiling outlets for surface or pendant mounted lighting fixtures shall be one-piece 4" square or octagonal pressed steel boxes, minimum two (2) inch depth.
- D. Boxes for devices in unfinished masonry walls or stud walls shall be 4" square boxes with a square cornered tile wall cover (plaster ring), set flush with masonry or drywall construction. Where only one conduit enters box or one wiring device is provided, 2 3/4" deep box may be used. Outlet boxes for dimmers, GFI outlets, and all other conditions shall be full depth. Use multigang boxes where more than one device is mounted together under common coverplate. Do not use sectional switch boxes.
- E. Boxes in concrete ceiling slab shall be octagonal, concrete-tight two (2) inch deep concrete boxes. Welded boxes are not acceptable.

- F. All outlet boxes in plaster, drywall, stucco or masonry walls or ceiling shall be provided with plaster rings.
- G. Junction boxes and all outlets not indicated as containing wiring devices or lighting fixtures shall have covers. Covers for outlets in walls shall be as specified for wall switches and receptacles.
- H. Outlet boxes exposed to the weather, under raised floor, used in exterior wiring system and outlet boxes for vaportight lighting fixtures and devices shall be of cast corrosion resistant type.
- I. In special "Fire Rated" partitions, outlets shall comply with ASTM No. E119 and maintain fire barrier ratings.
- J. Utility (handy) boxes with matching covers may be used in mechanical and electrical spaces for switches and 15A/120V receptacles.
- K. Where special purpose devices are utilized and require larger outlet box than specified herein, provide outlet box suitable for specific device. These outlet boxes shall be of the same type as specified herein for the installation required. Coordinate requirements prior to rough-in installation.

2.07 JUNCTION AND PULL BOXES

- A. Dimensions of pull boxes and junction boxes shall not be less than those dimensions required by the National Electrical Code (NEC) article 370-18 for the number, size and position of conductors and raceway entering the box. Only a single extension ring shall be permitted on a box to increase the volume.
- B. Pull boxes required in finished spaces shall be installed out of sight lines and located per Architect's direction. Box shall be flush mounted cabinets provided with trim, hinged door and flush latch and lock to match panel trim for flush mounted electrical panelboard.
- C. Pull boxes for installation of vertical riser conductors shall be provided with red seal type VVC or approved supports for all conductors as required by the NEC.
- D. Pull boxes for horizontal feeders containing more than one feeder (not including parallel conductors) shall be provided with reinforced flange shall be compartmented by barriers (or feeder conductors shall be fire-taped) and provided with minimum 1 5/8" x 1 5/8" fiberglass channel strut (removable) for support of conductors. Wood supports within pull boxes are not acceptable.
- E. Provide box covers for all junction and pull boxes of same materials and construction as box. Identify feeder or branch circuit conductors contained within on outside of cover for surface mounted boxes and within cover on flush mounted boxes.

2.08 EXTERIOR PULL BOXES & HANDHOLES

- A. Exterior pull boxes shall be Quazite "PC" style Gasketed boxes, resistant to sunlight exposure, weathering and chemicals, with solid base, penta-head security bolts, heavy duty rated cover with logo to suit purpose, with compressive strength of 11,000 psi, or approved equal. Size shall be minimum 12"w x 18"d x 12"h unless noted otherwise. Set assembly at final finished grade elevation.

- B. Exterior handholes shall be Quazite "PG" style stackable service box assemblies resistant to sunlight exposure, weathering and chemicals, with solid base, penta-head security bolts, heavy duty rated cover with logo to suit purpose, with compressive strength of 11,000 psi, or approved equal. Size shall be minimum 24"w x 36"d x 18"h unless noted otherwise. Provide extensions as required to bring assembly to final finished grade elevation.
- 2.09 CONDUIT BODIES & FITTINGS: Conduit bodies and fittings shall be NEMA FB-1 zinc coated steel or malleable iron, taper threaded type, of material matching conduit type with gasketed cover containing captive screws.
- 2.10 WIRING TROUGH: Wiring trough shall be NEMA 1, unless noted otherwise, hinged cover with captive screws, grey enamel finished inside and outside, 16 or 14 gauge steel as per NEC requirements. Size of trough based on NEC requirements.
- 2.11 PULL BOXES & ENCLOSURES
- A. Pull boxes for feeder and power conductors shall be NEMA 1 with 14 or 12 gauge galvanized steel bodies and 12 or 10 gauge galvanized steel screw covers. Seams shall be continuously welded and ground smooth. Cover screws shall be captive, stainless steel type. Provide oil-resistant gasket and adhesive. Size pullboxes as specified.
 - B. Enclosures for termination of special systems wiring shall be NEMA 1 panel enclosures with 14 gauge steel bodies and removable hinged doors. Provide back panel of 14 gauge steel construction and wiring terminal blocks. Enclosures shall be painted ANSI 61 and panels shall be white enamel. Size enclosures for quantity of terminations required plus 25% spare capacity.
- 2.12 ACCEPTABLE MANUFACTURERS
- A. Outlet boxes:
 - 1. Steel City
 - 2. Hubble/RACO
 - 3. Crouse-Hinds
 - 4. Appleton
 - B. Floor boxes:
 - 1. Steel City
 - 2. Walker
 - 3. Hubbell
 - 4. American Electric
 - C. Poke-through devices:
 - 1. Hubbell
 - 2. Walker
 - 3. Raceway Components
 - 4. Thomas & Betts
 - D. Exterior junction boxes & handholes:
 - 1. Quazite
 - 2. Nelson
 - 3. Killark
 - 4. Associated Plastics

- E. Conduit bodies & fittings:
 - 1. Adalet-PLM
 - 2. Myers
 - 3. O-Z Gedney
 - 4. Appleton
 - 5. Efcor
 - 6. Crouse-Hinds

- F. Wiring troughs:
 - 1. Electromate
 - 2. Square D
 - 3. Universal
 - 4. Hoffman
 - 5. Wiegmann
 - 6. General Metals
 - 7. Keystone

- G. Pull boxes & enclosures:
 - 1. Hoffman
 - 2. Electromate
 - 3. Wiegmann
 - 4. Universal
 - 5. American Electric
 - 6. Crouse-Hinds
 - 7. Square D

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Provide galvanized steel or cast type boxes for all outlets, and for junction or pull boxes. All boxes shall be accessible and sized per NEC requirements. Provide access panels in any non-accessible spaces to allow access to boxes installed.

- B. Provide an UL listed outlet box for each ceiling mounted fan assembly shown.

- C. Where outlet boxes are used to support lighting fixtures, as junction boxes, or device outlet boxes, the box shall be anchored to the structural members of the building per NEC 370-13.

- D. Outlet boxes shall be flush mounted unless they are specifically shown as being used with exposed conduit or are located above a ceiling.

- E. Where outlets are supplied from conduit run in or below floor slabs, the conduit shall be stubbed up at the location shown and the wall built up around the conduit.

- F. Cuts for outlet boxes in masonry walls shall be made so that the coverplate will completely cover the cut. The mounting height of switch, receptacle and other outlets may be varied slightly, with the Architect's approval, so that the outlet box, top or bottom, will occur at a masonry joint.

- G. The edge of all outlet boxes shall be flush with the surface in which they are recessed. The devices that fit into the outlet boxes shall be screwed tight before the cover plate is installed and the coverplate shall not be used as a means of tightening the devices in

place. Provide box extensions as required to permit the above. Coordinate fabric panels, finishes and woodwork provisions in order to determine exact requirements.

- H. Where outlets are shown as being adjacent and different mounting heights are specified for each, they shall be mounted one directly over the other, on the centerline of the group.
- I. Electrical outlet boxes may be installed in vertical fire resistive assemblies classified as fire/smoke and smoke partitions without affecting the fire classification, provided such openings occur on one side only in each framing space and that openings do not exceed sixteen square inches. All clearances between such outlet boxes and the gypsum board shall be completely filled with joint compound or approved fire-resistive compound. The wall shall be built around outlet boxes larger than sixteen square inches so as not to interfere with the wall rating.
- J. Where low voltage device is to be installed in common boxes with line voltage device (or devices of different operating voltage), provide insulated barrier within boxes to establish separate compartments.
- K. Remove only knockouts required and plug all unused openings per NEC 370-18/373-4 requirements.
- L. Extend branch circuit grounding conductor to each box. Provide grounding pigtail via dedicated fastener.
- M. Outlet boxes in the same wall shall not be mounted back-to-back but shall be offset a minimum of six (6) inches, except in acoustical rated walls where 24" is required.
- N. Install pull boxes only in unfinished spaces or concealed above accessible ceilings. Provide pull boxes when any of the following conditions apply:
 - 1. Where indicated on the drawings.
 - 2. Where conduit run exceeds 150 feet from access point to access point.
 - 3. Where conduit run contains in excess of 360 degrees bend or offset.
 - 4. To facilitate conductor installation or to insure that manufacturer's maximum pulling tension is not exceeded.
 - 5. Where requirements of the special system or telephone installer/vendor dictate raceway access or provisions.
- O. Do not splice conductors in pull boxes. Splices are not permitted in pull boxes except where specifically approved in writing by the Engineer. Where splices are permitted, make splices as specified in Wire & Cable Specifications.
- P. Where pull boxes are required, multiple circuits within pull box shall:
 - 1. Circuit conductors and feeders shall be individually laced with nylon straps and nylon identification tabs. Conduits shall enter pull box in such manner that conduits enter and exit in the same plane (both horizontal and vertical).
 - 2. Feeder circuits shall be separated by full height and length sheet metal (NEC gage) or polyester resin barrier secured with angle brackets.
- Q. Where exterior junction or pull boxes are required, install in the following manner:
 - 1. Exterior junction or pull boxes shall be mounted flush with finished grade, unless noted otherwise. Coordinate with the final grade elevation.

2. Heavy traffic rated covers shall be provided in sidewalks, paved areas or within six (6) feet of same.
3. Seal conduit entries into boxes with duct seal to prevent entrance of water, after conductors are installed.
4. Taps and splices, where permitted by these specifications, shall be performed with an encapsulating watertight connection kit which insulates and moisture seals the connection.

R. After completion, clean all work of dirt, construction debris, paint and refuse.

3.02 COVERS:

- A. All junction boxes, outlet boxes, multi-gang switch boxes, utility boxes, etc., shall be covered with a coverplate. The coverplate shall be a finished plate as specified elsewhere unless designated otherwise.
- B. Coverplates shall be mounted vertically unless designated otherwise.
- C. Permanently mark each junction box and pull box cover with the circuit numbers for all conductors contained within. Utilize indelible ink black marker for normal power and red marker for emergency power and fire alarm.
- D. All junction boxes and pull boxes for wiring systems above 600 volts shall be painted red and identified with high voltage warning labels in accordance with OSHA standards. Raceway shall be identified with the same labels installed every twenty (20) linear feet.

3.03 EQUIPMENT ANCHORING

- A. Support all boxes from structure:
 1. Secure to wood with wood or sheet metal screws.
 2. Secure to hollow masonry with toggle bolts.
 3. Secure to light gage metal with sheet metal screws.
 4. Secure to heavy gage metal with bolts or clamps.
 5. Anchors for solid masonry and concrete shall be self-drilling or insert expansion shields with bolts or powder actuated drive pin studs (except in post-tension construction).
 6. Secure outlet boxes to dry wall studs with steel mounting bracket screwed into stud having support leg to restrain box.
 7. Where box is suspended below structure, support from structure with threaded steel rod secured with double nuts. Pull boxes larger than 18" x 18" x 8" shall be supported from power strut and threaded steel rod suspension. Provide seismic bracing where required by local authority.
- B. All items of electrical equipment, such as enclosures, panels, troughs, pull boxes, etc., shall be securely anchored to the building structure. The anchoring shall be accomplished by utilizing a minimum size of 3/8" steel anchor bolts in the structure and to the item of equipment. A minimum of two (2) anchor bolts shall be provided on each side of each item of equipment with the following exceptions:

Exception No. 1: If the equipment manufacturer includes more than two (2) anchor holes per side in the base or base frame of the equipment item, then there shall be one anchor for each anchor hole.

Exception No. 2: If the equipment manufacturer recommends a particular quantity greater than two (2) per side, then that quantity of anchors shall be provided.

3.04 CONDUIT

- A. Rigid galvanized conduit or intermediate metal conduit shall be used for service entrance and all feeders and branch circuits where exposed to damage or moist conditions.
- B. EMT shall be used for feeders, branch circuits, fire alarm and telephone when not underground or in concrete in contact with the earth. Raceway underground or in concrete in contact with the earth shall be rigid galvanized conduit, intermediate metal conduit or Schedule 40 PVC. Conduit exiting elevated slabs or slab on grade shall be IMC. PVC conduit exiting slab is not permitted.
- C. Conduit shall be continuous from outlet to outlet, from outlet to cabinet, junction box and pull box. Conduit shall enter and be secured to all boxes, etc., in such a manner that each system will be electrically continuous from service to all outlets. All conduit from cabinets and junction boxes shall terminate in approved outlet box or conduit fittings. Conduit connections to any box which has no threaded hub shall be double-lock-nutted and bushing installed.
- D. Provide junction boxes or pull boxes where shown and where necessary to avoid excessively long runs or too many bends between outlets. The conduit sizes shown may be increased if desired to facilitate the pulling of cables.
- E. All conduit shall be concealed unless indicated otherwise. Install exposed conduit parallel with or at right angles to the building walls and support from walls or ceilings at intervals required by Code with approved galvanized malleable iron or stamped steel clamps or hangers. Concealed conduit above the ceiling shall be supported independent of ceiling construction. Where ceilings of lay-in type are used, conduit must be installed minimum six (6) inches above ceiling structure to permit removal of ceiling panels and lighting fixtures.
- F. Use threaded rods and hangers consisting of double-nutted threaded rods and channel or angles of 12 gauge minimum steel for supporting multiple conduit. Refer to drawing details.
- G. Minimum size conduit for exposed branch circuits shall not be smaller than 1/2". Raceway installed in concrete slabs shall be minimum 3/4". Home runs shall extend from outlets shown to panel designated. Home runs shown shall not be combined. Home run conduit shall not be smaller than 3/4".
- H. Type GRC and IMC conduit shall be cut and threaded with similar die heads. Deburr outside of all cuts prior to cutting threads. Cut threads one thread short so that they meet in the coupling and all threads are covered when wrench tight. Deburr inside of end after cutting threads. Right and left hand couplings shall not be used; conduit couplings of the Erikson Type shall be used at locations requiring such joints. Utilize only rigid type hand benders, "Chicago" type benders or power benders with required IMC shoes. DO NOT attempt to bend IMC with "hickey" type hand benders. Any such bends will be replaced at no additional costs to the Owner. Utilize only U.L. Listed conduit fittings, elbows and junction boxes (IMC or GRC types).
- I. All conduit for future use and for special systems such as telephone, data or TV wire shall be left with No. 16 gauge wire or approved pull cord pulled in them.
- J. Expansion fittings shall be installed in all conduit penetrations through, around or in expansion joints, and all straight runs in excess of 150 feet. Watertight flexible metallic conduit, connectors and couplings may be utilized for exposed transitions. U.L. 467 & 514 Listed fittings are required in slab.

- K. Provide non-hardening elastic type duct seal compound, Neer No. DC, 3M Co. "Scotchfil," or Gardner Bender duct seal, for each conduit entering the building from outside, for each conduit entering refrigerated spaces, for each conduit entering exterior equipment and for each conduit passing from one space into another which is normally at a lower temperature. Conduits entering refrigerated spaces shall be IMC.
- L. Provide intermediate metal conduit and watertight conduit hubs on conduit terminating in a box or cabinet exposed to the weather or damp locations.
- M. Space in sleeves or around conduit that pass through fire resistive or fire rated walls, partitions, floors or ceilings shall be closed by packing with an U.L. labeled fire resistive material, or provide mechanical fire stop fittings that will maintain the rating of the barrier penetrated. Conform with local authority requirements and UL Building Materials Directory.
- N. Coordinate the conduit routing and installation location with the actual electrical equipment furnished. Review submittals for termination locations. Coordinate with all Specification Divisions and submittals to determine termination and access locations. Coordinate installation sequence with all other trades to avoid conflicts and provide the fastest overall installation schedule.
- O. Dented, malformed or flattened conduits are not permitted and shall be removed and replaced.
- P. Protect conduits against dirt, plaster, and construction debris with the use of conduit plugs. Tape is not acceptable. Plugs shall remain in place until all masonry or/and drywall construction is complete. Protect conduit stubups during construction from damage, and replace any bent conduits.
- Q. Conduits serving roof mounted equipment shall pass through roof curb where such is provided. Roof penetrations outside this equipment will not be permitted.
- R. Separate raceway systems shall be provided for power systems and for control, signal and communications systems. Do not install above systems cables in the same raceway as branch circuit or feeder cables.
- S. Service entrance and fire pump feeders shall be installed "Outside" of the building as defined by NFPA and the N.E.C. Provide concrete encasement where required to conform with Code requirements.
- T. All conduits installed exposed shall be IMC to a minimum elevation of ten (10) feet AFF. Exposed boxes shall be type FS cast metal.
- U. Where hazardous locations, as classified by the National Electrical Code, exist, all raceway and fittings and the installation of these materials shall comply with Article 500 requirements.
- V. All conduits for interior wiring systems operating above 600 volts shall be galvanized rigid conduit, painted red at access points and labeled per OSHA requirements.
- W. Maintain minimum three (3) inch clearance when raceway crosses piping and/or systems operating above 75°F and provide twelve (12) inches separation when installed parallel to hot piping, flues or appliances operating above 75°F.
- X. Nonmetallic fittings shall be applied with compatible solvent welding cement and shall be fitted while solvent is liquid. Overwrap all fittings used in concrete encasement with suitable tape. Provide o-rings at terminal points to provide watertight seal.

3.05 FLEXIBLE CONDUIT

- A. Watertight flexible metallic conduit shall be used in making short flexible connections to all motors, transformers, bus duct switches, kitchen equipment and rotating or vibrating machinery or equipment. The flexible conduit at these locations shall be as short as possible, but shall have a minimum length of 12". Flexible metallic conduit shall be used in making connections to heaters, fixed equipment or flush mounted light fixtures.
- B. A green stranded bonding jumper shall be installed inside of all flexible conduit that extends directly from a non-flex conduit to a rotating or vibrating machine. Where a junction box is used, the green stranded bonding jumper shall be installed inside the flexible conduit and attached to the junction box and to the machine

3.06 CONDUIT PROTECTION

- A. All threaded joints in galvanized rigid conduit that is encased in concrete shall have a U.L. listed joint compound applied. All conduit installed outside the building underground shall be buried a minimum of 30" below finished grade but in no case shall be buried deeper than 48". Where conduit inside building is installed below the floor slab, the vapor barrier shall be run below the conduit concrete encasement. Conduit installed in any slab, where permitted above, shall be above the bottom steel and below the top steel. No conduit shall be spaced less than 3" apart. Submit conduit layout to structural consultant for review and approval prior to rough-in.
- B. Conduit shall be secured in place and protected where necessary to prevent damage to work during construction. The ends of all conduit shall be plugged with suitable caps (not tape) to avoid filling with any foreign matter. All conduit shall be blown out and swabbed clear of water and trash prior to pulling wire.
- C. Provide identifying marker tape the entire length of each conduit installed in the ground outside the building. The tape shall be constructed of inert polyethylene, resistant to acids, alkalis, etc., in the soil, and shall be a minimum 4 mil thickness. The tape shall be yellow, 6" wide, and shall have the words, "CAUTION - ELECTRIC LINE BURIED BELOW," imprinted with contrasting permanent ink. The imprint shall repeat itself for the entire length of the tape. The tape shall be buried at a maximum of 18" below finished grade, above a portion of the earth fill. Identify all underground and underslab conduit locations on as-built drawings for future reference.
- D. Damaged, oxidized, warped or improperly stored raceway will be removed from the jobsite and replaced with new materials. Non-metallic conduit stored on site prior to installation shall be stored on a flat surface off the ground and shall be protected from direct sunlight and debris.

3.07 CORING, CUTTING AND PATCHING

- A. Perform all coring, cutting and patching of existing walls and floors in order to install the work. Set sleeves for conduit accurately before the concrete floors are poured, or set boxes on the forms so as to leave openings in the floors in which the required sleeves can be subsequently located. Fill in the voids around the sleeves with concrete.
- B. Should the performance of this preliminary work be neglected and should cutting be required in order to install conduit, then the expense of the cutting and restoring of surfaces to their original conditions shall be accomplished without incurring additions to the Contract.

3.08 BELOW GRADE RACEWAY INSTALLATION

- A. Provide and perform all excavation required to install conduit, ductbanks and manholes indicated on the drawings and/or specified. Trenches shall be of uniform width required with minimum 8" clearance on both sides. Remove and dispose of all materials not to be used for backfill. Maintain dry excavations for electrical work, by removing water. Grade areas to prevent surface water from entering excavation. Remove any accumulated water by pumping. Perform all excavation by open cut. Excavate with vertical-sided excavations where possible. Where necessary, provide sheeting and cross-bracing to sustain sides of excavations. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition. Establish requirements for trench shoring and bracing to comply with local codes and LAHJ. No tunneling shall be permitted.
- B. The bottom of all trenches and excavation shall be graded to provide uniform bearing surface for conduits or ductbanks on undisturbed soil at every point along entire length. Tamp over-excavation with specified backfill materials. Remove unstable materials unsuitable for supporting equipment or installation and replace with specified materials for a minimum of twelve (12) inches below invert of equipment or installation.
- C. Specified materials shall be utilized for backfilling, in not more than six (6) inch layers and tamped until the installation has cover of not less than the adjacent grade and not more than two (2) inches above same. Remove sheeting and cross-bracing during backfilling wherever such removal would not endanger the work or other property. Equalize backfilling operation to avoid shifting of materials and equipment installed. Compaction of backfill materials shall be at least equal to surrounding undisturbed material. Backfill trenches with concrete where excavations pass within 18" of footings or other utility lines. Do not settle backfill with water. Conform to compaction requirements and methods specified elsewhere.
- D. Concrete encased underground ductbanks shall be installed where indicated on the drawings. Ductbank conduits shall be non-metallic type EB, thin wall PVC with concrete encasement.
 1. Stagger couplings of adjacent conduit runs by a minimum of two (2) feet. Provide pre-fabricated conduit supports installed per manufacturer's recommendation. Anchor ductbank assembly in trench to avoid "floating" during concrete pour.
 2. Changes in direction shall be made by the installation of long sweep bends of minimum twenty-five (25) foot radius. All 90 degree ells shall be long sweep type of minimum twenty-four (24) inch radius.
 3. Below all paving and traffic areas, all ductbank shall be reinforced with the installation of No. 5 rebar six (6) inches on center at each corner and on all sides, parallel to duct, and with continuous No. 3 rebar perpendicular to duct on sixteen (16) inch centers. Concrete cover for reinforced ductbanks shall be minimum six (6) inches with at least three (3) inches above rebar. Reinforcing of duct bank shall continue at least ten (10) feet to each side of required areas.
 4. All ductbanks shall be sloped to drain toward manholes and shall be laid with minimum grade of four (4) inches per hundred feet.

END OF SECTION

SECTION 26 24 16 PANELBOARDS

PART 1 GENERAL

1.01 DESCRIPTION

- A. All work specified in this Section shall comply with the provisions of Section 26 05 10 "Electrical General Requirements".
- B. This section covers lighting and appliance panelboards and load centers.

PART 2 PRODUCTS

2.01 PANELBOARDS

- A. Panelboards (panels) shall be general purpose enclosures and shall be surface or flush mounted as indicated. Panels shall be of the automatic circuit breaker type, factory assembled by the manufacturer of the circuit breakers. Panels shall be rated for the voltage indicated with the quantity of poles and ampacity of circuit breakers shown.
- B. Boxes and trim shall be made from code gauge steel. Boxes shall be of sufficient size to provide a minimum gutter space of 4" on all sides. Boxes shall be minimum 20" width and 5-3/4" depth.
- C. Hinged door covering all device handles shall be included in all panel trim. Doors shall have flush-type cylinder lock and catch, except that doors over 48" in height shall have auxiliary fasteners at top and bottom of door in addition to flush-type cylinder lock and catch. Door hinges shall be concealed. All locks shall be keyed alike. Directory frame and card having a transparent cover shall be furnished with each panel door.
- D. Trims for flush panels shall overlap the box by at least 3/4" all around. Surface trims shall have the same width and height as the box. Trims shall be mountable by a screwdriver without the need for special tools. After installation, trim mounting mechanism or hardware shall not be accessible when panel door is closed and locked.
- E. All exterior and interior steel surfaces of the trim shall be cleaned and finished with gray paint over a rust-inhibiting phosphatized coating.
- F. All interiors shall be completely factory assembled with protective devices, wire connectors, and shall be so designed that devices may be changed without machining, drilling or tapping.
- G. Interiors shall be so designed that devices can be replaced without disturbing adjacent units and without removing the main bus connectors.
- H. Bus bars for the mains shall be of copper in accordance with U.L. Standards. Full size bars shall be included. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of the branch circuit devices. Phase bussing shall be full height without reduction. Cross and center connectors shall be of the same material as the bus.
- I. The neutral bus shall have 100% rating and utilize set-screws to bond the neutral wire to the neutral bus through holes drilled in the neutral bar. A sheet copper neutral bus utilizing flathead screws to hold the neutral wires will not be acceptable. Ground bus shall be sized in accordance with U.L. standards.

- J. Spaces for future devices shall be molded case, included as indicated and shall be bussed for the maximum rated device that can be fitted into them.
- K. All circuit breakers shall be manually operated, thermal-magnetic, automatic, of the ampacity and poles as indicated. They shall be quick-make, quick-break, both in manual and automatic operation. Breakers shall be over-the-center toggle operating type, with the handle going to a position between ON and OFF to indicate automatic tripping. All multi-pole breakers shall have internal common trip. Breakers shall have a minimum of 10,000 RMS symmetrical amperes interrupting capacity unless designated otherwise.
- L. The breakers furnished shall be determined by the specifications and by the minimum U.L. labeled RMS symmetrical amperes interrupting capacity at circuit voltage. All circuit breakers shall be bolted on and rigidly braced.
- M. Panels having sub-feed lugs for feeding through shall have 8" minimum extra gutter space at the lug end and on one side.
- N. Each panel as a complete unit shall have a short-circuit current rating equal to or greater than the equipment rating indicated.
- O. Acceptable manufacturers are Square D, Siemens or Cutler Hammer.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Provide a typewritten directory under plastic for all panelboards with spares left blank.
- B. Provide all necessary hardware to secure panelboards to structure as required by the manufacturer's instructions. Make all electrical connections for supply and load circuits and leave in operating condition.
- C. Clean enclosure of all panelboards of all foreign matter, including dust.
- D. Bond separate ground bars to panelboard boxes and to the main service entrance ground bus with a code-sized grounding conductor installed in the same conduit as the phase and neutral conductors.
- E. Provide six circuit breaker handle lock-on devices for each lighting panelboard for circuits as directed by the Project Engineer to prevent unauthorized personnel from turning off circuits to controls, unit heaters, clocks, night lights, etc. Turn spare lock-on devices over to the Owner for his use.

END OF SECTION

SECTION 26 27 00

LOW-VOLTAGE DISTRIBUTION EQUIPMENT

PART 1 GENERAL

1.01 DESCRIPTION

- A. All work specified in this Section shall comply with the provisions of Section 26 05 10.
- B. This section covers describes the Electrical service entrance requirements to the building from the power company transformer.
- C. Electric service shall be obtained from the local Electrical Utility Company having jurisdiction.
- D. Primary service shall be provided and installed as directed by the Electric Utility Company rules, regulations and installation guide.
- E. Electric service shall be 208/120 Volts, 3 Phase, 4 Wire, 60 Hertz AC, Ampacity as indicated on the plans.
- F. Electrical Contractor shall make all arrangements with the Electric Utility that are necessary to obtain electrical service, both temporary and permanent.
- G. Metering and current transformers shall be provided and installed as directed by the Electric Utility Company. This contractor shall make all provisions necessary for the installation of the Electric Utility metering equipment in accordance with utility company.
- H. Electrical Contractor shall make all arrangements for temporary electrical service to the site during the construction phase, and maintain electric service to existing facilities as required.

PART 2 PRODUCTS

2.01 SERVICE ENTRANCE CABLES

- A. Install service entrance cables as shown on drawings and as specified herein.
- B. All materials and methods of construction for service provisions shall comply with the Electric Utility Company requirements.

PART 3 - DISTRIBUTION

3.01 INSTALLATION

- A. Obtain all necessary standards and detail drawings from the Electric Utility Company before building construction or excavation adjacent to service equipment is started.
- B. Coordinate service and connections with the Electric Utility Company.

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1 GENERAL

1.01 DESCRIPTION

- A. All work specified in this Section shall comply with the provisions of Section 26 05 10 "Electrical General Requirements".
- B. This Section covers wiring devices and cover plates including receptacles, switches, dimmer controls, plugs, plug connectors, floor outlets, concealed service floor outlets and poke-through device assemblies.

PART 2 PRODUCTS

2.01 MANUFACTURED WIRING DEVICES

- A. Provide manufactured wiring devices and cover plates, in types, colors, and electrical ratings for applications indicated and complying with NEMA Standard WD 1. Where types and grades are not indicated, provide specification grade selection as determined to fulfill wiring requirements, and complying with NEC and NEMA standards for wiring devices. Provide white color devices and cover plates except as noted otherwise. Color selection shall be verified with the Architect prior to purchase and installation.
- B. The devices specified herein are the products of one manufacturer. Provide heavy-duty specification grade devices selected from approved manufacturer listing.

2.02 WALL SWITCHES

- A. Wall switches shall be Institutional, heavy-duty specification grade, plastic body, nylon or lexan toggle, totally enclosed base & cover, quiet type, self-grounding, back wired, 277 volts AC and 20A rating.
 - 1. Single Pole: Hubbell No. 1221
 - 2. Double Pole: Hubbell No. 1222
 - 3. Three-way: Hubbell No. 1223
 - 4. Four-way: Hubbell No. 1224
- B. Flush motor switches shall have a red pilot light and overload protection for actual fractional horsepower motors furnished. Square D FSJ-1P or approved equal.

2.03 WALL DIMMERS

- A. Wall dimmer switches shall be totally enclosed, solid state type, self-grounding, vertical slide type, semi-flush mounted, with square law dimming characteristics. Lamp debuzzing coils shall be provided for each circuit.
- B. Dimmers shall be sized to continuously carry the indicated maximum loads shown and shall be rated to serve the load. Dimmers shall not require de-rating when gang mounted.
- C. Where wiring devices are indicated adjacent to, and mounted with wall dimmers, provide wiring devices matching dimmer in appearance and by same manufacturer under common cover plate.

- D. Dimmers indicated on the drawings to serve low voltage incandescent lamps shall be the same as specified for incandescent lamps and, in addition, shall be specifically rated for the low voltage (transformer or solid state type as required) loads. Dimmer shall be UL Listed for use with low voltage fixtures.

2.04 RECEPTACLES

- A. Duplex receptacles shall be heavy-duty specification grade, plastic base, nylon face, two-pole, three wire, self-grounding, back/side wired, 125 volts AC and NEMA 5-15R (15A) or NEMA 5-20R (20A) rating as indicated on drawings.
 - 1. Duplex NEMA 5-15R Hubbell CR5262
 - 2. Duplex NEMA 5-20R Hubbell CR5362
- B. Isolated ground duplex receptacles shall be orange heavy-duty specification grade, plastic base, nylon face, two-pole, three wire, self-grounding, back/side wired, 125 volts AC and NEMA 5-15R (15A) or NEMA 5-20R (20A) rating as indicated on drawings.
 - 1. Duplex IG NEMA 5-15R Hubbell IG5262
 - 2. Duplex IG NEMA 5-20R Hubbell IG5362
- C. Ground fault circuit interrupting (GFCI) duplex receptacles shall be heavy-duty, specification grade, plastic base, nylon face, two-pole, three wire, supplied with pre-stripped wire leads, feed-through protection, 125 volts AC and NEMA 5-15R (15A) or NEMA 5-20R (20A) rating as indicated on drawings.
 - 1. Duplex GFCI NEMA 5-15R Hubbell GFR5262
 - 2. Duplex GFCI NEMA 5-20R Hubbell GFR5362
- D. Single receptacles shall be heavy-duty specification grade, plastic base, nylon face, two-pole, three wire, self-grounding, back/side wired, 125 volts AC and NEMA 5-20R (20A) rating.
 - 1. Single NEMA 5-20R Hubbell 5361
- E. Special purpose outlets shall be heavy-duty specification grade, plastic base, nylon face, poles as noted, wires as noted, grounding type, back/side wired, with voltage and capacity rating noted. Conform to NEMA configuration requirements.
- F. Exterior flush-mounted duplex outlets shall be GFCI heavy-duty, industrial specification grade, plastic base, nylon face, two-pole, three wire, supplied with pre-stripped wire leads, feed-through protection, 125 volts AC and NEMA 5-15R (15A) recessed mounted in TayMac gasketed enclosure model Masque 72206 or approved equal. Unit assembly shall protrude no more than 1/2" and shall be rainproof in use per NEC 410-57. Provide color as specified by the Architect.

2.05 COVERPLATES

- A. Cover-plates for flush mounted devices shall be one piece standard size high impact smooth nylon surface. Color shall match wiring device finishes. Device plates for masonry walls shall be jumbo type.
- B. Telephone/data outlet cover-plates shall be the same finish as above and have two (2) modular jack openings with blank fillers as required. All Computer Lab cover-plates shall have four (4) modular jack openings.
- C. Cover-plates for flush mounted GFCI devices shall be engraved "GFCI PROTECTED".
- D. Cover-plates for flush mounted IG devices shall be engraved "ISOLATED GROUND".

- E. Cover-plates for flush mounted EMERGENCY POWER devices shall be engraved "EMERGENCY" and additionally shall have the panel name and circuit engraved on it.
 - F. Cover-plates for flush mounted UPS POWER devices shall be engraved "COMPUTER ONLY".
- 2.06 PLUGS & CONNECTORS: Plugs and connectors shall be of nylon construction, heavy duty specification grade, brass contacts and terminations, conforming to UL 94 & 498, with cord grips, 600 VAC working range, straight blade or locking type and NEMA type as noted.
- 2.07 FLOOR OUTLETS
- A. Where installation of floor mounted device box requires penetration of a fire rated floor slab, the installation shall be made with a fire rated floor fitting, U. L. Listed for use in this specific fire rated floor design. Fire barrier shall be rated to prohibit passage of smoke when heat is not present.
 - B. If and where required, floor outlets shall be single gang floor boxes or as listed on the plan sheets, equal to Steel city No. 601 Series, complete with cast iron body, vertical angular adjustment, with brass frame, brass floor-plate (#P60-CACP for duplex receptacle and #P60-3/4-2-CACP for phone/data) and gasket. Larger than standard tappings shall be furnished where required. Adjacent boxes shall be installed on minimum 7" centers.
- 2.08 ACCEPTABLE MANUFACTURERS
- A. Wiring devices & cover plates:
 - 1. Arrow-Hart
 - 2. Sierra
 - 3. Eagle
 - 4. Hubbell
 - 5. Leviton
 - 6. Pass & Seymour
 - 7. Square D
 - 8. TayMac
 - B. Wall dimmers:
 - 1. Lutron
 - 2. Prescolite
 - 3. Hunt
 - 4. Lightolier
 - C. Plugs & connectors:
 - 1. Arrow-Hart
 - 2. Eagle
 - 3. Hubbell
 - 4. Leviton
 - 5. Pass & Seymour
 - D. Floor outlets & concealed service floor outlets:
 - 1. Steel City
 - 2. Hubbell
 - 3. Walker

- E. Poke through assemblies:
 - 1. Steel City
 - 2. Hubbell
 - 3. Raceway Components
 - 4. Walker

PART 3 EXECUTION

3.01 STANDARDS COMPLIANCE: Installation and provision of all specified equipment shall be in accordance with:

- 1. National Electrical Code NFPA 70
- 2. Underwriters Laboratories (UL) UL 20, 498, 943
- 3. National Electrical Manufacturer's Association (NEMA) NEMA STDS WD 1, 2, 5

3.02 INSTALLATION

- A. Coordinate installation rough-in requirements with architectural and structural features, equipment installed under other portions of these specifications, and electrical equipment.
- B. Coordinate the installation of switches and wall dimmers with the door swings to insure that the devices are located on the strike side of the door.
- C. Review the architectural and/or interiors drawings and elevations for devices requiring specific locations.
- D. Coordinate access to poke-through assembly junction boxes such that these are readily accessible after completion of construction.
- E. The mounting height of devices is indicated in the legend on the drawings and is intended to mean the bottom of the device above the finished floor unless otherwise noted.
- F. Mount all devices within outlet boxes to allow device cover-plates to be in contact with wall on all sides. Verify all outlet boxes in grouping are at the same elevation.
- G. Install vertically mounted receptacles with the ground connection up.
- H. Install switches with "Off" position down.

3.03 WIRING DEVICES

- A. Install wiring devices as indicated, in compliance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized standard industry practices to fulfill project requirements.
- B. Where more than one wiring device is indicated at a location, the devices shall be gang-mounted in combined multi-gang boxes and covered jointly by a common cover-plate. Provide barriers as required by the devices and voltages being used.
- C. Install wiring devices only in electrical outlet boxes which are clean, free from construction debris, drywall compound and dirt. At final inspection all wiring devices shall be clean, free of paint overspray, unbroken and in new condition.
- D. Ground all wiring devices by electrically continuous, pigtail connection such that removal of device does not open grounding path to any downstream device. Connect the grounding screw of each device to the equipment grounding conductor.

- E. Prior to energizing circuits, test wiring system for electrical continuity, freedom from faults, and proper polarity of connections. After energizing circuits, test wiring devices to demonstrate compliance with these requirements.

3.04 COVER-PLATES

- A. All junction boxes, outlet boxes, multi-gang switch boxes, utility boxes, etc., shall be covered with a cover-plate. The cover-plate shall be a finished plate as specified unless designated otherwise.
- B. Cover-plates shall be mounted vertically unless designated otherwise.
- C. Do not install cover-plates until after painting and/or other finish work is complete.
- D. Where the cover-plate does not completely cover the wall opening, replace the plate with an oversized (midi or jumbo) plate or repair the wall opening. Where one oversize plate is used, replace all cover-plates in the room with the oversize plates.
- E. Remove concrete protectors and clean all floor boxes after concrete pour. Adjust boxes to be flush with finish floor elevation.
- F. At final inspection, all wiring devices and cover-plates shall be clean, without paint overspray, undamaged and unscratched or broken.

END OF SECTION

SECTION 26 28 16

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. All work specified in this Section shall comply with the provisions of Section 26 05 10.
- B. This Section covers disconnect switches for electrical equipment, 600 volts or less, and fuses mounted in the disconnect switches.
- C. Furnish and install disconnect switches for the following conditions:
 - 1. Where indicated on the drawings or schedules.
 - 2. For all motor controllers unless installation conforms to exceptions in the NEC.
 - 3. For all motors located out-of-sight of its motor controller.
 - 4. For all transformers as required by NEC.
 - 5. For all water heaters.
 - 6. For electrical duct heaters.
 - 7. Where required by the National Electrical Code.

1.02 QUALITY ASSURANCE:

- A. Industry Reference Standards:
 - 1. Underwriters Laboratories Inc. Publications:
UL 98 Enclosed Switches
UL 198.2 High Interrupting Fuses,
Current Limiting Type
UL 198.4 Class R Fuses
 - 2. National Fire Protection Association (NFPA):
NFPA 70,
 - 3. National Electrical Manufacturers Association:
KS-1 Enclosed Switches
PUB 250 Enclosures for Electrical Equipment
 - 4. American National Standards Institute:
C97.1 Low Voltage Cartridge Fuses (600 v)
- B. All equipment furnished shall be U.L. Listed and Labeled.

PART 2 - PRODUCTS

2.01 DISCONNECT SWITCHES:

- A. Disconnect switches shall be "heavy-duty" type enclosed switches of quick-make, quick-break construction. Current carrying parts shall be copper, with silver tungsten type switch contacts and positive pressure type reinforced fuse clips. Switches shall be horsepower rated type HD where motor is served and rated for either 250 volt AC or 600 volt AC as required for voltages utilized. Size in accordance with the NEC. Lugs shall be UL listed for copper and aluminum cable.
- B. Switches shall be furnished in NEMA I General Purpose enclosure unless noted otherwise. Switches located on the exterior of the building or in "wet" locations shall have NEMA 3R enclosures. When subject to splashing water, seepage of water, or falling or hose-directed water, switches shall be furnished in NEMA 4 enclosures. When located in an industrial plant subject to fibers, lint, dust, dirt, etc., switches shall be furnished in NEMA 12 enclosures.
- C. Fused disconnect switches shall have rejection type fuse clips with dual element, current limiting fuses of rating shown.
- D. Furnish a solid neutral bus or lug for each switch being installed in a circuit which contains a neutral conductor.
- E. Furnish an equipment grounding conductor lug bonded to the switch enclosure by dedicated fastener.
- F. Disconnect switches shall be non-fusible type safety switch, unless fused type is specified or indicated on the drawings, with the number of poles required to disconnect all ungrounded conductors serving equipment.
- G. Provide multi-pole disconnect switches for all dual speed motors to disconnect all ungrounded conductors serving equipment.
- H. Switches shall have the following features:
 - a. Line terminal shields on line and load lugs.
 - b. Padlocking provisions shall be provided for padlocking in the "Off" position.
 - c. Each switch shall have defeatable door interlock mechanism to prevent door from being opened when switch is in closed position.
 - d. Provide arc chute for each pole.
 - e. Provide nameplate for each switch as previously specified.
- I. Fusible switches through 600 ampere shall be provided with rejection clips to accept RK1 or RK5 fuses only. Fusible switches larger than 600 ampere shall be suitable for Class L fuses. Furnish and install a complete set of fuses in each disconnect switch sized as indicated on the drawings. Fuses serving predominantly motor or transformer loads shall be dual element, time-delay type, otherwise non-time delay type is required. Fuses shall be current limiting type.

2.02 ACCEPTABLE MANUFACTURERS:

- A. Acceptable disconnect switch manufacturers are:
 - a. General Electric
 - b. Square D
 - c. Eaton Electrical
 - d. Siemens-Allis

- e. Rockwell Automation
 - f. Appleton Electric
 - g. Cooper Crouse-Hinds
- B. Acceptable fuse manufacturers are:
- a. Chase-Shawmut
 - b. GEC Alstom
 - c. Cooper Bussmann
- C. Equipment supplied under this section shall be the same manufacturer as the Service and Distribution Equipment.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Locate disconnect switches to provide working clearance and full accessibility as required by the NEC.
- B. Unless indicated otherwise on the drawings, locate disconnect switches adjacent to equipment served.
- C. Provide power wiring to and install all disconnect switches and extend feeders to motors or other loads, unless integrally factory mounted on a piece of equipment.
- D. Provide power wiring to all roof mounted equipment via roof curb openings provided. Do not penetrate roof membrane with conduit stubups.
- E. Coordinate exact location of motor termination boxes with raceway roughin provisions to insure correct installation
- F. Connect all heating and air conditioning equipment and have this equipment complete and ready for operation. Contractor shall be responsible for checking equipment manufacturer submittal data to obtain exact location of all electrical connections for equipment before installation.
- G. A short section of watertight metallic flexible conduit shall be used at each motor connection.
- H. Restore factory finish to all equipment provided herein and touch up scratched or marred surfaces to match original finish. Clean enclosure interior and exterior of dirt, paint, and construction debris.
- I. Maintain conductor phase relationship originating at service entrance throughout motor control center. Group and strap all conductors installed in starter and wiring gutters with nylon straps. Install only one conductor under each terminal. Connect extra conductors via terminal strips. Form and train conductors neatly in enclosures parallel and at right angles to sides of box. Uninsulated conductors shall not extend more than 1/8" from terminal lug.
- J. Do not splice conductors in enclosure. Connections shall be made in suitable junction box located exterior of switch
- K. Conductors not terminating in switch shall not extend through or enter switch enclosure

3.02 MOUNTING AND SUPPORT:

- A. Locate switches to provide working clearance and fully accessible as required by the NEC. Do not mount switches directly to or on any mechanical equipment.
- B. Enclosure shall be secured to structure by a minimum of four (4) fastening devices. Disconnect switches 600 ampere and larger shall have a minimum of eight (8) fastening devices. A fender washer (minimum 1 1/4" OD) shall be used between head of screw and enclosure.
- C. Install equipment with operating handle at 5'-0" AFF, unless otherwise noted.
- D. Where enclosure is not indicated on a wall or structure, construct a metal channel (power strut) free standing frame secured to floor, pad, or building structure. In exterior applications, all support structure shall be galvanized.
- E. Where disconnect switch is mounted on drywall partitions, provide 3/4" painted plywood backboard exceeding switch size by one (1) foot in each direction, secured to drywall studs and fasten switch to backboard.
- F. Provide specified nameplates on feeder switches, fused disconnect switches and non-fused disconnect switches.

END OF SECTION

SECTION 26 29 10 MOTOR CONTROLS AND WIRING

PART 1 GENERAL

1.01 SCOPE:

- A. All work specified in this Section shall comply with the provisions of Section 26 05 10 "Electrical General Requirements".
- B. All motors shall be provided under Division 22 & 23.
- C. All motor starters shall be furnished under Division 26 for each motor except for package units, which will be furnished with integral starters. Motor starters shall be installed either in a Motor Control Center or separately mounted adjacent to the motor served, as indicated on plans.
- D. Motor power wiring is defined as those conductors between the energy source and the motor. This power wiring shall be terminated at the motor terminals.
- E. All control wiring required for automatic starting and stopping of motors shall be provided under Division 23 unless specifically shown on the electrical drawings.
- F. Power wiring shall be connected through all line voltage control devices such as firestats and thermostats provided by Division 23.

PART 2 PRODUCTS

2.01 MOTOR STARTERS:

- A. Starters for motors 1/3 horsepower or smaller shall be manual unless remote or automatic starting is required, in which case the starters shall be magnetic, full voltage, non-reversing, single-speed, unless otherwise indicated. Refer to mechanical drawings, specifications and schedules to determine which motors are not remote started. All other starters shall be magnetic.
- B. Each starter for a three-phase motor shall be furnished with three (3) overload relays sized for the full load running current of the motor actually provided. Provide an external "RESET" button or "HAND-OFF-AUTO" selector switch as scheduled with red "RUNNING" light. Provide a green pilot light to indicate motor "STOPPED." Each pilot light shall have a legend plate indicating reason for signal.
- C. Each overload relay shall have a normally open alarm contact which will close only when actuated by an overload (not to be confused with N.O. or N.C. auxiliary contacts). These contacts shall be properly wired to their respective blue pilot light provided on the starter front cover and having a "TRIPPED" legend plate.
- D. Individually mounted motor starters shall be in a NEMA Type 1 general purpose enclosure in unfinished areas and shall be flush mounted in all finished areas. Each starter shall have a laminated nameplate to indicate Division 15 unit number, function and circuit number. Starters installed outdoors shall be NEMA 3R.
- E. All motor starters, push buttons and pilot lights shall be of the same manufacture as the switchboard and shall be Westinghouse-Cutler Hammer, GE, or ITE/Siemens.

2.02 COMBINATION STARTERS:

- A. Combination starters shall consist of a circuit breaker or fused switch and a motor starter mounted in a common NEMA Type 1 general purpose enclosure.
- B. The motor starter components shall be as specified in paragraph 2.01 for motor starters.
- C. The circuit breaker component shall be a minimum 22,000 RMS interrupting capacity and shall be as required in Section 26 24 16 "Panelboards".

PART 3 EXECUTION

3.01 INSTALLATION:

- A. Provide power wiring to and install all motor starters, unless integrally factory mounted on a piece of equipment.
- B. Provide power wiring to all motors except packaged units that are prewired between the starter and motor.
- C. Where line voltage control devices are mounted at, on or inside a unit, such as aquastats, firestat for single phase devices, etc., the power wiring to the unit shall be connected through such a control device.
- D. On final inspection, it shall be demonstrated to the Architect or his representative that each overload relay control circuit is properly wired and functioning correctly by manually tripping each overload relay individually, one at a time. This inspection procedure shall not involve removing of any wiring or disconnecting any current carrying parts.

END OF SECTION

SECTION 26 32 13

DIESEL-ENGINE-DRIVEN GENERATOR SETS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. All work specified in this Section shall comply with the provisions of Section 26 05 10.
- B. This section covers the Emergency Power System which shall consist of one engine-driven generator set which contains an engine directly coupled to an electric generator, together with the necessary controls, accessories, critical silencer, skid mounted tank, engine jacket heater, battery charger, remote alarm panel, weatherproof housing, transfer devices, and fuel supply to provide electric power in the event of a failure of the normal power supply.

1.02 QUALITY ASSURANCE:

- A. The following specifications and standards are incorporated into and become a part of this specification by reference. Except where a specific date is given, the issue in effect (including amendments, addenda, revisions, supplements, and errata on the date of invitation for bids, shall apply. In text, such specifications and standards are referenced by basic designation only.

- 1. National Fire Protection Association (NFPA):
NFPA-110 - Emergency and Stand-By Power Systems.
- 2. Electrical Generating Systems Association: (ESGA) Standards:
EGS A CEP2 - Codes for Emergency Power by States and Major Cities
EGS A GTD3 - Glossary of Standard Industry Terminology and Definition.
EGS A ECB1 - Performance Standard for Engine Cranking Batteries
EGS A TSS1 - Performance Standard for Transfer Switches for use with Engine Generator Sets
EGS A BCES1 - Performance Standard for Battery Chargers
EGS A ICAE - Performance Standard for Electric Generator Set Instrument Control and Auxiliary Equipment.
- 3. Institute of Electrical and Electronics Engineers (IEEE) Standards:
IEEE 446 - IEEE Recommended practices for Emergency and Standby Power Systems
IEEE 472 - Voltage Surge Withstand Capabilities
- 4. National Electric Manufacturers Association (NEMA) Standards:
MG-1 - Motors and Generators
ICSI-109 - Test and Test Procedures for Automatic transfer Switches
ICS2-447 - A.C. Automatic Transfer Switch
- 5. Underwriters Laboratories Inc. (U.L.) Publications:
UL 1008 - Automatic Transfer Switches
- 6. American National Standards Institute (A.N.S.I.):
C37.90a - Voltage Surge Withstand Capability

1.03 SUBMITTALS:

- A. Refer to Section 26 05 10 for submittal requirements.

- B. Manufacturer's Product Data: Submit material specifications and installation data for products specified under Section 2 - Products to include:
1. Product data for the engine driven generator sets shall contain not less than the information listed as follows:
 - a. Certification that the engine driven generator set(s) furnished will serve electrical loads indicated including motor starting loads with type (s) of starting indicated.
 - b. Continuous and stand-by rating of engine driven generator set(s) including voltage and phase.
 - c. Frequency and voltage regulation with maximum instantaneous voltage dip and time of recovery to stable operation.
 - d. Output voltage adjustment range in percentage of rated plant voltage.
 - e. Alternator type and method of connection to prime mover.
 - f. Components contained in engine instrument panel.
 - g. Rating of engine at operating speed, engine cycle and number of cylinders.
 - h. Type of engine lubrication system and verification of components specified.
 - i. Type of engine governor.
 - j. Components contained in engine instrument panel.
 - k. Fuel consumption at rated load.
 - l. Starting batteries including ampere hour rating.
 - m. Verification that all accessories specified are to be provided. This includes cold weather starting aid with rating and voltage indicated, exhaust system with muffler type indicated.
 2. Product data for the transfer switch shall contain not less than the information listed as follows:
 - a. List of accessories contained in the control panel.
 - b. Withstand rating in RMS symmetrical amperes.
- C. Shop Drawings: Submit shop drawings to indicate information not fully described by the product data to indicate compliance with the contract drawings. Include layout of all equipment.
- D. Submittals shall include the nearest location of permanent parts outlet from which parts may be obtained and written assurance that trained service personnel will be available on 24 hours' notice.
- E. Operation and Maintenance Data: Include in each operation and maintenance manual, one set of operating, maintenance, and parts manuals covering all components for the EGS. Provide instructions to the owner in operation and maintenance of his equipment, both in written form and with on-site personnel including a factory technician from the paralleling switchboard manufacturer.

PART 2 - PRODUCTS

2.01 ENGINE GENERATOR SET:

- A. General: This system shall include one engine generator set and as represented in the published specifications for that model. Each set shall be rated for KW as indicated on the plans at 0.8 PF, 60 Hz, 3 phase, 4 wire, 208 or 480 volts (as indicated on plans) on a continuous standby basis. Each engine generator set shall be mounted on a heavy duty steel base to maintain proper alignment between components, and each set shall incorporate vibration isolators of the type and quantity as specified by the set manufacturer.
- B. Engine: Engine shall be stationary, liquid cooled, spark ignited for diesel operation. Engine shall be capable of driving the generator of this rating on a continuous standby basis for the duration of normal source interruptions per SAE J1349 conditions. The electrical contractor shall be responsible for field coordinating the provision and installation of gas pipe size, length, pressure requirements and point of termination.
- C. Engine components shall include the following:
1. A 12 volt DC, solenoid shift, electric starter(s) as required by manufacturer.
 2. Positive displacement, mechanical full pressures lubrication oil pump, full flow lubrication oil filter with replaceable element, pressure relief valve, dipstick oil level indicator.
 3. Dry element air cleaner with replaceable element.
 4. Engine speed isochronous governing system to control generator frequency +/- 0.25% of rated frequency under steady state load conditions, and capable of parallel operation with load sharing controls. Where electronic governing systems are factory installed as standard equipment, and without additional cost, the mechanical governing system shall not be required.
 5. Engine mounted thermostatically controlled water jacket heater to aid in quick starting. Heater shall be rated as recommended by engine manufacturer and be disconnected whenever the engine starts. Contractor shall provide proper circuit from normal utility power source.
 6. Engine protection devices shall have sensing elements located on the engine to initiate the following alarms and engine shutdowns:
 - a. Low lubrication oil pressure shutdown with indicator
 - b. High coolant temperature shutdown with indicator
 - c. Over speed shutdown with indicator
 - d. Over crank lockout with indicator
 7. Provide low coolant shutdown, which shall activate high engine temperature lamp and shutdown.
 8. Engine starter battery charging alternator, with solid state voltage regulator.

D. Engine Cooling System:

1. Engine shall be radiator cooled by engine mounted radiator system including belt driven pusher fan, coolant pump, and thermostat temperature control. Performance of components shall be as required by the manufacturer.
2. The generator equipment supplier shall provide and install 50% ethylene glycol antifreeze solution to fill engine cooling system at start-up.

E. Engine Exhaust System:

1. Exhaust muffler shall be provided for each engine of size(s) as recommended by manufacturer. Muffler shall be of the critical type, mounted on top of weather protective housing with tail pipe and rain cap.
2. Flexible exhaust connection shall be provided as required for connection between engine exhaust manifold and exhaust line, in compliance with applicable codes and regulations.
3. All exhaust system components shall be properly sized to assure proper operation without excessive back pressure when installed. Make provisions as required for pipe expansion and contraction.

F. Generator:

1. Generator shall be single bearing, self aligning, four pole, synchronous type, revolving field, with amortisseur windings, with direct drive centrifugal blower for proper cooling and minimum noise, with temperature compensated solid state voltage regulator, with brushless rotating rectifier exciter system. No brushes will be allowed. Generator shall be directly connected to engine flywheel housing and driven through a flexible coupling to insure permanent alignment. Insulation shall meet NEMA standards for Class F type. The maximum temperature rise shall not exceed 100 degrees C at 40 degree C ambient. Generator design shall prevent potentially damaging shaft currents.
2. The three phase, broad range, re-connectable generator shall have 12 leads brought out to allow connection by user to obtain any of the available voltages for the unit.
3. Voltage regulator shall be solid state design and shall function by controlling the exciter magnetic field between stator and rotor to provide no load to full load regulation of rated voltage within +/- 2% during steady state conditions. The engine generator set and regulator must sustain at least 90% of no load voltage for ten (10) seconds with 250% of rated load at near zero power factor connected to its terminals. A rheostat shall provide a minimum of + 5% voltage adjustment from rated value.
4. The generator, exciter, and voltage regulator shall be designed and manufactured by the engine generator set manufacturer so that the characteristics shall be matched to the torque curve of the prime mover. This design allows the prime mover to use its fullest power producing capacity (without exceeding it or over compensating) at speeds lower than rated, to provide the fastest possible system recovery from transient speed dips.

5. Exciter shall be three phase, full wave, rectified, with heavy duty silicon diodes mounted on the common rotor shaft and sized for maximum motor starting loads.
6. Generator design shall be of the self protecting type, as demonstrated by the prototype short circuit test as described under "Testing" herein. All other generator performance criteria shall be equal to that of the specified equipment.

H. Engine-Generator Set Controls:

1. Provide a lighted, unit mounted control module that is factory built, wired, tested, and mounted by the generator manufacturer.
2. Engine generator set control shall include the following:
 - a. Gauges and meters: oil pressure gauge, coolant temperature gauge, charge rate voltmeter and running time meter.
 - b. Manual selector switch: RUN OFF/RESET-AUTO
3. Remote, two wire controls start up terminals.
4. Manual reset safeguard breaker.
5. Automatic engine shut down for the following fault conditions:
 - a. Over crank
 - b. Over speed
 - c. Low oil pressure
 - d. High engine temperature
6. Indicator lamps shall be provided to signal the following functions:
 - a. SYSTEM READY indicates system is in "AUTO" mode
 - b. PRE LOW OIL PRESSURE indicates oil pressure is marginally low
 - c. PRE HIGH ENGINE TEMPERATURE indicates engine temperature is marginally high
 - d. LOW OIL PRESSURE indicates engine has shutdown because of critically low oil pressure
 - e. HIGH ENGINE TEMPERATURE indicates engine has shut down because of critically high temperature
 - f. OVERSPEED indicates engine has shut down because of excessive r/min
 - g. OVERCRANK indicates the starter has been locked out because cranking time was excessive
 - h. LOW ENGINE TEMPERATURE indicates engine temperature is marginally low for starting
 - i. LOW FUEL indicates fuel supply is sufficient for only 2.5 hours run time at full load, on secondary tank.
 - j. GENERATOR NOT IN AUTO indicates control switch is not in the "AUTOMATIC" position.
 - k. Provide two additional fault condition lamps to be designated later.
7. A fault reset switch shall be provided to clear fault indications and allow restarting of the engine after shut down faults. The control design shall be such that the fault indication shall remain until reset. The fault indicator memory shall not be dependent on the presence of either A C or D C voltage and shall retain the fault status memory even through complete removal and replacement of the starting batteries. The fault reset function shall operate only when the RUN STOP REMOTE switch is in the STOP position.

8. A locking screwdriver type potentiometer shall be provided to adjust the voltage + 5% from rated value.
9. Manual reset exciter field circuit breaker.
10. A locking screwdriver type potentiometer (electronic governor) shall be provided to adjust the speed + 2% from rated value.
11. AC voltmeter, 90 degree scale, 2 1/2" (61.25mm) flange, 2% switchboard meter.
12. AC ammeter, 90 degree scale, 2 1/2" (61.25mm) flange, 2% switchboard meter.
13. Frequency meter 45 65 Hz., 90 degree scale, 2 1/2" (61.25mm) flange, +0.6 Hz panel meter.
14. Four position AC meters phase selector switch to read line current and voltage in each phase with off position.

I. Auxiliary Equipment:

1. Starting Battery: One (1) battery system, consisting of nickel-cadmium batteries, shall be supplied for each engine and shall be mounted in a battery rack within the engine generator set skid base.
2. Battery Charger: A voltage regulated battery charger shall be provided for each engine generator set. Chargers shall be equipped with float, taper, and equalize charge setting. The charger power shall be supplied from the normal source; contractor shall provide circuits as required.
3. Vibration Isolators: Each engine generator set shall be mounted on vibration isolators either internal or external to the set skid base.
4. A 120 VAC heater with thermostat shall be provided within the engine generator set control panel to eliminate condensation.
 - a. Electrical contractor shall provide necessary circuits from normal utility source as required for both the heater and battery charger.
5. Remote Alarm Annunciator: Provide remote alarm annunciator for engine generator set with one light indicator as follows:
 - a. Generator fault - Electrical contractor shall provide control circuits to the remote alarm annunciator as shown on the plans.
6. A weather protective housing with access panels and ventilation openings.
7. Skid mounted fuel tank sized by manufacturer for minimum 24 hour operation with initial fill and re-filled after testing.
8. Provide generator output breaker(s) as shown on the drawings.

2.02 AUTOMATIC TRANSFER SWITCHES:

- A. Furnish and install automatic transfer switches with number of poles, ampere rating, voltage and withstand ratings as shown in plans. This system shall be the product of one manufacturer. The system shall be listed to the latest requirements of Underwriters' Laboratories Standard UL-1008 and rated for Total System Load.

- B. Electrical operation shall be accomplished by a momentarily energized single solenoid operating mechanism which receives power from the source to which the load is being transferred. Fuse or thermal protection of the main operator is prohibited. The operating transfer time shall be one-sixth of a second or less. Mechanical locking in each position shall be accomplished without the aid of permanent magnets, latching solenoid, or motor operators.
- C. Operation shall be inherently double-throw whereby all contacts move simultaneously and with no programmed delay in a neutral position. Electrical spacing shall be equal to or exceed those listed in table 15.1 of UL-1008. Only those main contact structures specifically manufactured for transfer switch service shall be acceptable. An overload or short circuit shall not cause the switch to go to a neutral position.
- D. Inspection of all contacts (movable and stationary) shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. A manual operating handle shall be provided for maintenance purposes. The maintenance handle shall permit the operator to stop the contacts at any point throughout the entire travel to properly inspect and service the contacts when required.
- E. The transfer switch shall have fully rated neutral transfer contacts which momentarily interconnect the neutrals of the sources and load for 100 milliseconds maximum, during the transfer/ retransfer operation. The neutrals shall remain so interconnected until the line contacts close on the alternate source. Line and neutral contacts shall be driven by a single main operator.
- F. The automatic transfer switch shall include a separately mounted control panel with adjustable solid state sensing and timing functions. The following operational characteristics shall be provided:
 - 1. Time delay on momentary dips in normal source (0.5-6.0 seconds) factory set at 1.0 second.
 - 2. Time delay on transfer to emergency for controlled loading of generator (0-5 minutes), factory set at 0 minutes or as shown on plans.
 - 3. Time delay on retransfer to normal (0-30 minutes), factory set at 0 minutes.
 - 4. Toggle switch to manually bypass the time delay on the retransfer.
 - 5. Time delay on engine shutdown after retransfer to normal (0-5 minutes), factory set at 5 minutes.
 - 6. Close differential voltage sensing of all normal source phases (pickup 85-100% of nominal and dropout 75-98%), factory set at 85% dropout and 95% pickup of nominal.
 - 7. Independent single phase voltage (85-100%) and frequency (90-100% pickup) sensing of the emergency source to prevent premature transfer, factory set at 90% voltage and 95% frequency of nominal.
 - 8. Test switch (momentary type). To simulate failure of normal source.
 - 9. Gold plated 10 amp contact which closes to initiate engine starting.

10. Pilot lights to indicate switch positions.
 11. Auxiliary contacts (1 closed on "Normal" and 1 closed on "Emergency") rated 10 amps, 480 VAC.
 12. An in-phase monitor shall be provided. The monitor shall control transfer/retransfer operation between live sources so that closure on the alternate source will occur only when the two sources are approaching synchronism and the two sources are within 15 electrical degrees maximum so that inrush currents do not exceed normal starting currents. The monitor shall function over a frequency difference range of up to +2.0 Hz. with a maximum operating transfer time of one-sixth of a second. If the voltage of the load-carrying source falls below 70%, the in-phase function shall be automatically bypassed. The monitor shall not require inter-wiring with the generator controls, or active control of the governor.
 13. All time delay and sensing functions shall be adjustable over the ranges indicated and operated with minimum drift (not to exceed 3%) over -20 degrees C. to +70 degrees C. The control panel shall be provided with a protective cover. The control panel shall not draw more than 15 volt-amperes continuously under normal operating conditions.
- G. The switch must comply with UL-1008 and NEMA Std. Pub. ICS2-447. In addition, the switch must meet or exceed the following requirements and if so requested, be verified by certified laboratory test report:
1. Temperature Rise: Measurements shall be made after the overload and the endurance tests.
 2. Withstand: UL listed to withstand the magnitude of fault current available at the switch terminals when coordinated with respective protective devices as shown on the plans at an X/R ratio of 6.6 or less. The main contacts of the transfer switch shall not trip open or weld when subjected to fault currents.
 3. Dielectric: Test, following the withstand current rating test, at 1960 VAC rms minimum.
 4. Transient Withstandability: Control panel voltage surge withstand capability test per IEEE Std. 472-1974 and voltage impulse withstand test per NEMA Std. Pub. ICS-1-109.
- 2.03 ACCEPTABLE MANUFACTURERS:
- A. Products of the following manufacturers, which comply with these specifications, are acceptable:
1. Engine driven generator sets: Caterpillar, Cummins, Generac, Detroit Diesel, Kohler.
 2. Transfer Switches: ASCO, Russelectric, Zenith

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION:

- A. Installation: Emergency generator and all components shall be installed, including all connections, at locations and as indicated on drawings, and in accordance with approved shop drawings, manufacturer's instructions, and manufacturer's standard specification and dimension sheets.
- B. Instruction, Drawings, Parts and Operation Information: Two copies of complete instructions shall be in booklet form and shall consist of operating and maintenance of the equipment and major components supplied.
- C. Owner Orientation: A representative of the supplier shall meet with representative of the owner at the time of final acceptance tests, shall review the operation and parts books, correct starting and control methods, and recommend preventive maintenance procedure.

3.02 SPECIAL TESTING:

- A. The assembled engine-generator set is to be tested at the Engine manufacturer's location to ensure proper operation of the individual components, subassemblies, and the complete assembly. The test shall be run under the same conditions that will exist at the site, i.e. physical constraints such as louvers, grates, etc. and environment. All electrical and mechanical defects shall be remedied during testing.
 - 1. The following procedure shall be used:
 - a. Confirm all variable settings to engine-generator switchgear specifications.
 - b. Start unit and run at no load for five minutes, making an audible and visual check for abnormal noises, vibration, water and oil leaks.
 - c. Increase to 50% load for a minimum of thirty minutes. Record test data at end of run, at steady state.
 - d. Increase to 100% load for a minimum of thirty minutes. Record test data at end of run, at steady state.
 - e. Drain all water and oil.
 - f. Apply nucle oil or equivalent preservative to intake manifolds and oil pan sufficient for one year's engine protection.
 - g. Required test data:
 - 1) Time and reading
 - 2) Ambient air temperature
 - 3) rpm
 - 4) KW
 - 5) AC voltage, phase-to-phase
 - 6) AC amperes
 - 7) Frequency
 - 8) Exciter field voltage
 - 9) Exciter field amperes
 - 10) Jacket water temperature from engine
 - 11) Lubrication oil pressure to engine
 - 12) Lubrication oil temperature from engine
 - 13) Intake manifold pressure/vacuum
 - 14) Crankcase pressure
 - h. All safety shutdown points shall be set, tested, and recorded. Recorded charts shall be made of voltage and frequency for all load change.

2. Testing
 - a. An installation check, start-up, and load test shall be performed by the engine manufacturer's local representative at a time agreed upon by site engineer, operators, and maintenance staff. This representative must have received factory training within the previous two years. Resistive load banks shall be provided. Test shall be minimum four hours at full load.
 - b. The test shall consist of the engine manufacturer's standard procedures. All associated auxiliary systems shall be tested for proper connections and interaction with the engine-generator set.

3.03 TRAINING:

- A. The engine manufacturer's representative shall provide on-site training to Owner. Training shall include maintenance, parts ordering, safety, automatic operation, manual operation, engine safeties, protective relaying, complete system operation, troubleshooting, and a complete review of operation and service manuals.

END OF SECTION

SECTION 26 41 00 FACILITY LIGHTNING PROTECTION

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. All work specified in this Section shall comply with the provisions of Section 26 05 10.
- B. The work required under this section of the specifications consists of the installation of lightning protection systems. All materials and devices which are an integral part of the lightning protection system shall be provided under this section of the Specifications.
- C. Definitions: Terms as defined in UL 96A shall apply in this section.

1.02 QUALITY ASSURANCE:

- A. The following standards are incorporated into and become a part of this specification by reference.
 - 1. American National Standards Institute:
 - C2 National Electrical Safety Code
 - C62.1 Surge Arresters for Alternating - Current Power Systems
 - C62.2 Guide for Application of Valve Type Surge Arresters for Alternating - Current Systems
 - C114.1 (IEEE Std 142); IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems
 - 2. Underwriters Laboratories, Inc.
 - UL 96 Lightning Protection Components
 - UL 96A Installation Requirements for Lightning Protection Systems
 - 3. Lightning Protection Institute
 - LPI-175 Lightning Protection Installation Standard
 - LPI-176 Lightning Protection System Material and Components Standard
 - LPI-177 Inspection Guide for LPI Certified Systems
 - 4. National Electrical Manufacturers Association
 - Std. Pub. No. LA-1 Surge Arresters
 - 5. Institute of Electrical and Electronics Engineers
 - Std. 142 IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems
- B. Acceptable Manufacturers: Firms regularly engaged in manufacture of lightning protection system components, of types, sizes, and ratings required, and who are Class III installers - members of Lightning Protection Institute.
- C. Submittals: Submit manufacturer's data on lightning protection systems and associated components.
 - 1. Submit shop drawings to indicate information not fully described by the product data to indicate compliance with the contract drawings. Include layout indicating all system components and interconnection with each component identified for this project. Typical layouts are not acceptable.

2. UL Certification: Provide Owner with UL master label for overall system which is suitable for fastening to building for display purposes. Comply with UL 96A, "Master Labeled Lightning Protection Systems".

D. Coordination

Review shop drawings submitted under this and other sections, as well as other divisions, to ensure coordination for the work required among different trades. Coordinate the installation sequence with other Contractors to avoid conflicts and to provide the fastest overall installation schedule. Coordinate installation with architectural and structural features, equipment installed under other sections of the specifications and electrical equipment to insure access.

1.03 SUBMITTALS:

- A. Refer to Section 26 05 10 for submittal requirements.

- B. Manufacturer's Product Data:

Submit material specifications and installation data for products specified under Section PART 2 - PRODUCTS to include:

1. Air Terminals
2. Conductors
3. Bonding Plates
4. Cable Connectors
5. Grounding Plates
6. Lightning (Surge) Arresters
7. Rod Clamps
8. Splicers

PART 2 - PRODUCTS

2.01 LIGHTNING PROTECTION SYSTEM COMPONENTS:

- A. General: Provide lightning protection system material and components, of types, sizes, ratings, for Class II service, which comply with manufacturer's standard materials, design, and construction in accordance with published product information, and as required for complete installation. Where type components or materials are not otherwise indicated, comply with NFPA 78 and LPI standards.

- B. Class II Installation Materials:

1. Air Terminals: Solid copper; bright nickel plated; minimum diameter 1/2", minimum length 15 inches.
2. Main Conductors: Rope-lay copper cable consisting of 28 strands of 14 gauge copper wire. Minimum weight 380 lbs. per 1,000 ft. Area of conductivity 115,080 cm.

3. Secondary Conductors: Solid soft copper wire. 80 lbs. per 1,000 ft. Area of conductivity 26,240 cm.
- C. Ancillary Components:
 - Connectors: Bronze or stainless steel thru-roof right angle cable connector, 5/8" threaded stem to fit roof thickness.
 - Connectors: Bronze parallel Bolt Pressure type to connect main conductors.
 - Splicers: Bronze straight cable splicer. Four hex bolt pressure type for splicing main conductors.
 - Ground Rod: Solid copper clad 3/4" diameter x 10'.
 - Ground Rod Clamp: 3-inch direct contact along axis of cable and rod. Two 5/16" hex bolts and nuts.
 - Ground Plate: Sheet Copper 20 awg thick. 36" wide x 36" long with integral cable connector.
 - Bonding Plate: Cast bronze flat plate with 8 square inches of bonding surface. Bolt tension cable grip.
 - Surge Arrestor: Surge Arresters shall be provided in accordance with section 158 Lightning Protection Institute Standard of Practice 175.

PART 3 - EXECUTION

3.01 INSTALLATION OF LIGHTNING PROTECTION SYSTEMS:

- A. Install lightning protection systems as indicated, in accordance with equipment manufacturer's written instructions, and in compliance with applicable requirements of NEC and UL 96A to ensure that lightning protection systems comply with requirements.
- B. Coordinate with other work, including electrical wiring and roofing work, as necessary to interface installation of lightning protection system with other work.
- C. Install conductors with direct paths from air terminals to ground connections avoiding sharp bends and narrow loops.
- D. Install arresters as close as practical to equipment which they are to connect.

3.02 DOWN CONDUCTORS:

- A. Down conductors shall be installed in schedule 40 1" PVC conduit. Each perimeter roof cable shall be connected to at least 2 down leads or the down leads may be tied directly to the rebar prior to pouring the columns. The average distance between down leads shall not exceed 100', from upper roof to lower roof, or from roof to ground terminals. Irregularly shaped structures may require extra down conductors to provide a two way path to ground from each air terminal.

3.03 INTERCONNECTION OF METALS:

- A. All metal bodies within 6' of the conductor shall be bonded to the system with approved fittings and conductor. Connections between dissimilar metals shall be made with approved bimetallic connections.

- B. Bonding of all metallic objects and systems at roof levels and elsewhere on the structure shall be complete. Primary bonds for metal bodies of conductance shall be bonded with appropriate fittings and full-size conductor; and shall consist of, but not limited to, the following: Roof exhaust fans, HVAC units with related piping ductwork, exhaust vents and any other roof piping systems, cooling towers, and rail systems, window washing tracks, antenna mast for TV, radio and microwave, flag poles, roof handrails and/or decorative screens, roof ladders, skylights, metal plumbing stacks, etc. Exterior architectural metal fascia and/or curtain walls or mullions, which extend the full height of the structure, shall also be bonded, if not inherently bonded through the building frame.
- C. Metal bodies of inductance located within six (6) feet of a conductor or object with secondary bonds shall be bonded with secondary cable and fittings. Typical of these are: roof flashings, parapet coping caps, gravel guards, isolated metal building panels or siding, roof drains, down spouts, roof insulation vents and any other sizable miscellaneous metals, etc.

3.04 GROUNDING:

- A. Grounding terminals shall be located at the base of the structure. Ground connections shall be made around the perimeter of the structure and in no case shall average over 100 ft. apart.
- B. Ground connections shall be attached to the steel columns at the lowest available point with bonding plates having a surface area of not less than 8 square inches, or shall be cad-welded to cleaned areas of the structural columns. Ground terminals shall be 3/4" in diameter and shall be driven to a minimum depth of 10' and more if necessary to reach permanent moisture. One ground shall have connection to the water system where the water supply enters the building - in addition to artificial ground. In case of rock ledge or other conditions making it impossible to comply with the above, trenching or a copper ground plate will be permitted, providing it will meet the Underwriters Laboratories, Inc. requirements.
- C. Provide necessary common grounds between the lightning protection system and the electric and telephone service wires, TV and radio antenna ground.
- D. Provide equipment grounding and bonding connections, sufficiently tight to assure permanent and effective grounds and bonds, for lightning protection connection devices as specified.

END OF SECTION

SECTION 26 50 00 LIGHTING

PART 1 GENERAL

1.01 DESCRIPTION

- A. All work in this Section shall comply with the provisions of Section 26 05 10 "Electrical General Requirements".
- B. The equipment and materials specified in this Section shall contain no asbestos or PCBs.
- C. The work of this Section shall include the careful examination of the Architect/Structural and Mechanical drawings so as to become acquainted with the structural features of the building and the location of pipe and ductwork which would alter the location and spacing of outlets for fixtures. Where conflicts develop, same shall be referred to the A/E for a decision as to the proper location. The work of the Section shall also include responsibility for the proper reinforcement of any ductwork necessary to carry the added weight of lighting fixtures where same must be supported by such ductwork.

1.02 JOB CONDITIONS: Verify the compatibility of recessed lighting fixtures with the ceiling in which each fixture is to be located.

1.03 PRODUCT HANDLING

- A. Deliver fixtures sufficiently in advance of installation to prevent delay of work.
- B. Store all materials in a closed building, in original packaging, and protect from damage and the elements.

1.04 SUBMITTALS

- A. Shop Drawings: Show fixture locations and support details. Materials shall not be purchased until approved. Include copy of ballast warranty for each type of ballast required.
- B. Product Data:
 - 1. Provide lighting fixture submittals in a single, bound and indexed assembly for all lighting fixtures. Incomplete submittals will be returned without processing. Fixture submittals shall contain manufacturer's name and catalog illustration and number, dimensions and details, ballast and diffuser information, metal gauges, pre-treatment and paint data, UL-ETL approval, and connection details. Provide photometric data for fixture with lamp and ballast specified. Provide information on adjustable fixtures if such type fixture is required. Provide fuse type and size when specified.
 - 2. Provide complete ballast submittals of the exact ballast to be used for each fixture. Provide sound rating of ballast.
 - 3. Provide complete lamp submittals of the exact lamp to be used including color temperature,color rendering index and rated lamp life.
 - 4. Some fixtures may be required with multiple ballasts for two-level switching or other

PART 2 PRODUCTS

2.01 LIGHTING FIXTURES

- A. Fixtures shall bear U.L. and manufacturer's label. Furnish and install lighting fixtures as indicated and specified, complete with lamps, required ballasts and accessories.
- B. All recessed incandescent fixtures shall comply with Article 410-65,(C) of the N.E.C.
- C. Each lighting fixture shall have been tested and certified for proper operation by the fixture manufacturer for the type mounting and ceiling on/in which it is installed.
- D. Confirm exact locations of all lighting fixtures by coordination with the Architect/Engineer's Reflected Ceiling Plans and mechanical equipment above or on the ceiling. Confirm all ceiling types before ordering lighting fixtures. Each recessed lighting fixture shall have a trim to match the type of ceiling (plaster, exposed grid, concealed spline, exposed panel, etc.) in which it is being installed, regardless of catalog number given. Each lighting fixture recessed in a plastered ceiling of any type shall have a plaster frame.
- E. Most lighting fixtures are lettered or groups of fixtures are indicated by a letter. The lighting fixtures that are indicated by the letters shall be as indicated on the Lighting Fixture Schedule. No substitutions for any fixtures in the light fixture schedule shall be allowed without written permission of the Engineer.
- F. Each fixture shall be supplied with the necessary straps, supports, hangers, or other miscellaneous materials and devices to install them in a satisfactory manner and to conform to the Architect/Engineer's treatment in the areas in which they are to be installed. The Electrical Contractor shall consult all Architect/Engineer's plans in order that he may familiarize himself with all the necessary details for the various units to be installed throughout the building. Failure to do this will not relieve him of the responsibility of furnishing all necessary materials, to perform the function intended for the lighting system shown on the drawings.
- G. Unless specified otherwise, all prismatic diffusers for fluorescent lighting fixtures shall be prismatic acrylic KSH K12 with a thickness of 0.2", measured from the back side to the peak of the prism. All wraparound lenses shall be virgin acrylic, one-piece and injection molded.
- H. Fixtures with highly polished reflective surfaces shall not be handled with bare hands, but with clean, grease-free cotton gloves. Surfaces found with finger prints shall be cleaned or replaced with new fixtures.
- I. Fixtures shall be furnished with special anodized finishes and colors as indicated in the Lighting Fixture Schedule. Fixtures with special factory applied baked enamel finish must conform to a color sample supplied by the Architect/Engineer. Full-size finished samples of each fixture with special finish and/or color shall be delivered to the Architect/Engineer for written approval when requested.
- J. Prior to the application of any finish, all metal parts of all fixtures shall be protected by a rust-inhibiting process. The rust-inhibiting process shall be chemical. No type of sprayed, painted, or dipped primer may be used as the basic rust inhibitor. Any fixtures and /or parts of any fixtures which shall have begun to show signs of rusting or corroding at the time of completion of the job shall be removed and replaced by properly protected metal parts.

- K. Fixtures shall be constructed to provide continuous operation when installed in air plenums, or when surrounded with restrictive enclosures. Where space above ceiling is used as an air plenum changer for either supply or return air, the fixture shall be factory wired in accordance with Article 300-22 of the NEC.

2.02 LAMPS

A. General

1. The type lamps shall be as specified for each lighting fixture in the Lighting Fixture Schedule.
2. The lamp catalog number is the catalog number for General Electric and is given as a standard of the quality and performance required. Equal lamps by Sylvania, Philips or Westinghouse will be acceptable. When a lamp manufacturer's name is used along with the catalog number in the Lighting Fixture Schedule, it is considered unequaled by any other lamp and shall not be substituted. The lamp performance with energy conserving ballasts furnished under this Section shall be certified by a nationally recognized independent testing laboratory.
3. Contractor shall replace any lamps damaged during shipping or installation with lamps of like manufacturer to those installed in the fixture. Lamps used during construction shall be replaced with new lamps prior to final inspection.

- B. Fluorescent Lamps shall be as specified in the Lighting Fixture Schedule. No substitutions, or contractor submittals for value engineered products shall be allowed.

C. Incandescent Lamps

1. "A" type lamps shall be inside frosted, except where specified to be clear.
2. "R" and "PAR" type lamps shall have the beam type (spot or flood) as specified in the Lighting Fixture Schedule.
3. Quartz tubes shall be frosted.
4. All incandescent lamps, except quartz tubes, shall be rated for 130 volt operation.
5. All MR-16 lamps shall be by the same manufacturer and shall have the same lot code or number stamped on the lamp.
6. Handle all quartz lamps with clean cotton gloves.

- D. High Intensity Discharge (HID) lamps shall be the voltage and type specified in the Lighting Fixture Schedule.

2.03 BALLASTS

- A. Provide ballasts of the proper voltage rating to match the circuit voltage from which the units are supplied. All ballast shall bear the UL label.
- B. Fluorescent ballasts shall be the high frequency (20KHZ or greater) electronic type with a minimum power factor of 95 percent and a total harmonic distortion rating of no greater than 20 percent. Ballast shall be U.L. listed, non-PCB, have a class "A" sound rating and shall meet the requirements of the Federal Communications Commission Rules and Regulations, Part 18, Class A. Fluorescent ballasts shall have an automatic resetting thermostat to provide class P protection.
- C. Provide low temperature starting ballasts of required type for outdoor fixtures and in unheated areas. Starting temperature shall be 0 degrees Fahrenheit.

- D. Ballasts for metal halide lamps and high-pressure sodium lamps shall be properly selected for lamp characteristics, operating temperatures and lamp position, where critical. Ballasts shall be HPF type.
- E. Noisy ballasts shall be replaced at no additional cost to Architect/Engineer. Ballasts for indoor application shall be enclosed in a housing which provides necessary wiring compartments and provisions for required electrical connectors or devices. Ballast components shall be surrounded with a thermosetting fill to ensure adequate heat dissipation and quiet operation below local ambient noise level. Ballast shall be provided with necessary mounting hardware and vibration dampers.
- F. Ballasts for outdoor use shall be enclosed in weather-tight enclosures with proper outdoor type wiring devices.
- G. All ballasts shall be by Advance, Motorola, Magnetek or Energy Savings.
- H. Electronic fluorescent dimming ballasts shall be by Lutron or Advance with dimming range as specified in the Lighting Fixture Schedule. Light output shall be flicker-free and continuous over entire dimming range.
- I. Fixture fusing shall be provided as follows:
 - 1. All 240V high intensity discharge fixtures.
 - 2. All exterior lighting for all voltages. Fuses shall be in accessible locations, approved equal to Buss and of proper style. Exterior fixture fuses shall be Buss "TRON," or approved equal, in water-resistant enclosure where fixtures may come in contact with moisture or water.

PART 3 EXECUTION

3.01 SUPPORT OF LIGHTING FIXTURES:

- A. All lighting shall be supported from the building structure. The fixtures shall be supported in a manner that will ensure the fixture's weight being equally distributed from each support and the fixture remaining in a level position.
- B. Pendant-mounted incandescent fixtures shall be stem supported by a fixture stud mounted in the outlet box. Suspended fluorescent fixtures shall be supported as detailed on the drawings.

END OF SECTION

SECTION 28 23 00

SECURITY CCTV VIDEO SURVEILLANCE

PART 1 - GENERAL

1.01 SUMMARY

- A. This document covers the installation of a CCTV surveillance system which will also be able to share video information with the MDOT state wide security system.
- B. The CCTV surveillance system security access system shall incorporate the following:
 - 1. CCTV Cameras
 - 2. Camera Mounts
 - 3. Power Supplies
 - 4. Communication System
 - 5. Digital Video Recorder
- C. The Contractor shall provide and pay for all labor, materials, equipment, tools, utilities, construction equipment and machinery, transportation and other facilities and services necessary for the proper execution, operation and completion of the Work.
- D. Specification Language: Specifications and notes are written in imperative and abbreviated form. Imperative language of the technical specifications is directed at the Contractor, unless specifically noted otherwise. Incomplete sentences shall be completed by inserting "shall", "shall be", "the Contractor shall", and similar mandatory phrases by inference. The words "shall be" shall be supplied by inference where a colon (:) is used within product specifications.
- E. Drawings And Specifications:
 - 1. Contractor shall carefully study the Drawings and Specifications, and shall at once report any error, unforeseen circumstances, inconsistency or omission he may discover.

1.02 PROJECT DEFINITIONS

- A. General Definitions:
 - 1. CCTV: Closed-Circuit Television.
 - 2. DPDT: Double pole double throw switch
 - 3. DVR: Digital Video Recorder
 - 4. I/O: Input/Output.
 - 5. LAN: Local Area Network.
 - 6. NC: Normally closed contacts
 - 7. NO: Normally open contacts
 - 8. PDF: (Portable Document Format.) The file format used by the Acrobat document exchange system software from Adobe.
 - 9. RS-485: TIA/EIA standard for multipoint communications.
 - 10. SPST: Single pole single throw switch
 - 11. TCP/IP: Transport Control Protocol/Internet Protocol incorporated into Microsoft Windows.
 - 12. TPZ: Tilt Pan Zoon
 - 13. UPS: Uninterruptible Power Supply.

14. Windows: Operating system by Microsoft Corporation.

B. Definitions Contract Language:

1. Words that are in common use are used throughout the Drawings and Specifications except:
 - a. Words which have well-known technical or trade meanings are used in accordance with such recognized meanings.
 - b. Whenever the following listed words and phrases are used, they shall be mutually understood to have the following respective meanings:
 - 1) The words "as indicated." means: as shown on the Drawings, and in accordance with the Specifications.
 - 2) The words "as required." means: as required to provide a complete and satisfactory Work in full conformance with the Drawings and Specifications.
 - 3) The word "Provide" means: furnish, install, connect, test and make ready for use.
 - 4) The word "Work": The Work is the completed construction required by the Drawings and Specifications, and includes all labor necessary to produce such construction, and all materials and equipment incorporated or to be incorporated in such construction.
 - 5) The word "Furnish" means: supply item as specified. Item to be installed by others.
 - 6) Subcontractor is a person or entity who has a direct contract with the Contractor to perform any of the Work at the site.
 - 7) Project Record Drawings or Record Drawings are drawings that completely record and document all aspects and features of the Work. (Also known as "as-built" drawings.)

1.03 REFERENCES

- A. NFPA 70 – National Electrical Code
- B. UL 1449 – Surge Protective Devices

1.04 SYSTEM DESCRIPTION

- A. This project shall include the installation of CCTV cameras, camera mounts, power supplies, cabling, digital video recorder, and monitors that shall be compatible with the MDOT security standard.
- B. The CCTV Surveillance System shall be controlled from the District Security Center with video transfer capability over the MDOT WAN to the MDOT security center in Jackson.

1.05 SUBMITTALS

- A. Product Data: Submit nine (9) sets of three binders of manufactures supplied data. Each binder shall contain:
 1. Specification/cut sheets for equipment provided
 2. Design guides
 3. Installation and operating instructions

- B. Shop Drawings: Submit nine (9) copies of each submittal.
 - 1. Diagrams of cable layout with system labeling schedule.
 - 2. Wiring diagrams.
- C. Field quality-control test report showing all cameras and digital video recorders / devices are installed / tested and are functioning correctly.
- D. Project Record Drawings:
 - 1. The purpose of Project Record Drawings is to provide factual information regarding all aspects of the Work, to enable future service, modifications, and additions to the Work
 - 2. Project Record Drawings are an important element of this Work. Contractor shall accurately maintain Project Record Drawings throughout the course of this project.
 - 3. Project Record Drawings shall include documentation of all Work, including the camera locations, of setup perimeters, equipment, wiring, and cable runs.
 - 4. The contractor will be furnished with two (2) sets of site plans for Contractor's use in preparing Project Record Drawings. One set shall be used as a working set, the other shall be used to prepare the final record set.
 - 5. Project Record Drawings shall accurately show the physical placement of the following:
 - a. Cameras, power supplies, and digital video recorders.
 - b. Cable runs
 - c. Pull box locations.
 - d. Project Record Drawings shall show the physical placement of each camera and conduit to be accurate to within one foot (1') of the nearest landmark. Where the site plan conflicts with actual conditions, Contractor shall amend site plan as required. Indicate exact description of conduit runs and cable tray runs
 - e. Project Record Drawings shall show wire and cable runs, camera zone numbers, electrical panel/circuit breaker numbers from which equipment is powered, and splice points. Such information may be shown on the site plans.
 - f. Upon completion of Work, and prior to Final Acceptance, Contractor shall prepare and submit final record set of Project Record Drawings. This set shall reflect the installed work.
 - g. All final Project Record Drawings shall be provided to the MDOT or MDOT's representative.
 - 6. Closeout Submittals:
 - a. Provide a set Project Record Drawings to the Project Engineer including:
 - 1) Project Record Drawings
 - 2) Product Data
 - 3) Installation Manuals
 - 4) Operating Manuals
 - 5) Maintenance/Service Manuals

1.06 QUALITY ASSURANCE

- A. Contractor Minimum Qualifications:
 - 1. Contractor shall be an installation and service contractor regularly engaged in the sale, installation, maintenance and service of CCTV Surveillance System.

2. Contractor shall have five (5) years experience with the installation, start-up and programming of systems of a similar size and complexity to the one proposed.
- B. Supervision of Work: Contractor shall employ a competent Foreman to be in responsible charge of the Work. The Foreman shall be on the project site daily during the execution of the Work. The Foreman shall be a regular employee, principle, or officer of the Contractor, who is thoroughly experienced in managing projects of a similar size and type. Contractor shall not use contract employees or Subcontractors as Foremen.
- C. Qualifications Of Technicians:
1. All electronic systems Work shall be performed by electronic technicians thoroughly trained in the installation and service of CCTV systems.
 2. Journeyman Wireman electrical workers may be used to install conduit, raceways, wiring, and the like, provided that final termination, hook-up, programming, and testing is performed by a qualified electronic technician, and that all such Work is supervised by the Contractor's Foreman.
 3. All incidental Work, such as cutting and patching, lock hardware installation, painting, carpentry, and the like, shall be accomplished by skilled crafts persons regularly engaged in such type of work. All such Work shall comply with the highest standards applicable to that respective industry or craft.
 4. All 120 VAC power wiring and connections are to be performed by a qualified Journeyman Wireman, licensed to perform such Work.
- D. Subcontractors:
1. Use of any Subcontractor is subject to the approval of the MDOT or MDOT's representative and shall be identified at the time of Bid submittal.
 2. The Contractor shall make no substitution for any Subcontractor previously selected without MDOT approval.
 3. Contractor's Foreman shall be on the project site daily during all periods when Subcontractors are performing any of the Work. Contractor's Foreman shall be in responsible charge of all Work, including any Work being performed by Subcontractors.
 4. By an appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the contractor by the terms of the Drawings and Specifications, and to assume toward the Contractor all the obligations and responsibilities which the Contractor, by these documents, assumes.
- E. Supervision And Construction Procedures:
1. The Contractor shall supervise and direct the Work, using his best skill and attention. Contractor is solely responsible for all construction means, methods, and techniques.
 2. The Contractor shall employ a competent foreman who shall be in attendance at the project site during the progress of the Work. The foreman shall represent the Contractor and all communications given to the foreman shall be as binding as if given to the Contractor.

F. Regulatory Requirements and Permits:

1. All Work shall conform to all applicable building, fire, and electrical codes and ordinances. In case of conflict between the Drawings/Specifications and codes, the codes shall govern. The Contractor shall inform the MDOT's representative of any such conflicts.
2. Contractor shall secure and pay for all licenses, permits, plan reviews, engineering certifications, and inspections required by regulatory agencies. Contractor shall prepare, at Contractor's expense, any documents, including drawings, that may be required by regulatory agencies.
3. The Contractor shall make application for and obtain any and all permits required by federal, state, county, city, or other authority having jurisdiction over the work.

G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

H. Comply with NFPA 70, "National Electrical Code."

1.07 DELIVERY, STORAGE, AND HANDLING

A. Security of Contractor's Tools and Equipment: The MDOT or the MDOT's representative is not responsible for the care, storage or security of any of the Contractor's tools or equipment.

1.08 PROJECT/SITE CONDITIONS

A. Environmental Conditions:

1. Dust Control: Make provisions to control all dust, dirt, and foreign material caused by the performance of the Work.
2. Notify MDOT or MDOT's representative immediately of any damage or possible damage to any other equipment.

B. Clean-Up:

1. Contractor shall clean-up, on a daily basis as the Work progresses, all dirt, dust and debris caused by Contractor's operations. Clean-up shall be completed by the end of each workday.
2. In the event that Contractor fails to clean-up, the MDOT or MDOT's representative may elect to have cleanup performed by others, with the costs of such clean-up being charged to the Contractor.

C. Construction Aids:

1. Definition: Construction Aids are facilities and equipment required by personnel to facilitate the execution of the Work. Construction Aids include scaffolds, staging, ladders, platforms, hoists, cranes, lifts, trenchers, core drillers, protective equipment, and other such facilities and equipment.
2. Contractor shall provide all Construction Aids required in the execution of the Work. Construction Aids that are the property of MDOT or other contractors shall not be used without permission.

3. Storage of Construction Aids shall be coordinated with MDOT or MDOT's representative.

D. Safety:

1. The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work.
2. Contractor shall comply with all local, state, and federal regulations and laws for the safety of the work place.

E. Accident Reports:

1. Serious or fatal accidents shall be reported immediately by telephone or radio to the MDOT or MDOT's representative.

1.09 SEQUENCING

- A. Description: This implementation plan describes the general approach that shall be followed in order to minimize the time for the CCTV Surveillance System to be operational.

- B. Approach: Contractor shall plan and schedule all work in such a sequence as to minimize the time before the system is operational. The following is a suggested work sequence:

1. Order all equipment needed and notify any subcontractors to schedule their participation.
2. Insure there are an adequate number of power receptacles available to operate all CCTV equipment and coordinate with MDOT or MDOT's representatives to where power is available.
3. Perform all system layout work.
4. Provide shop drawings to verify location of all equipment, conduit runs, power connections, etc. Submit shop drawings to MDOT or MDOT's representative.
5. Coordinate with MDOT or MDOT's representatives the access to the indicated camera location.
6. Prepare and pre-test all video equipment, set back light compensation to the greatest extent possible.
7. Install all equipment.
8. Test and inspect all systems.
9. Perform all other Work as required.
10. Perform the Acceptance Test.
11. Provide training.
12. Provide as-built drawings.

1.10 COMMISSIONING

- A. After all Work is completed, and prior to requesting the Acceptance test, Contractor shall conduct a final inspection, and pre-test all equipment and system features. Contractor shall correct any deficiencies discovered as the result of the inspection and pre-test.

- B. Contractor shall submit a request for the Acceptance test in writing to the MDOT's representative no less than fourteen days prior to the requested test date. The request for Acceptance test shall be accompanied by a certification from Contractor that all Work is complete and has been pre-tested, and that all corrections have been made.

- C. During Acceptance test, Contractor shall demonstrate all video equipment and system features to MDOT. Any portions of the Work found to be deficient or not in compliance with the Project Drawing and Specifications may be rejected.
- D. Contractor shall promptly correct all deficiencies. Upon correction of deficiencies, Contractor shall submit a request in writing to MDOT or MDOT's representative for another Acceptance Test.
- E. The contractor shall bare the cost for the second acceptance test.

1.11 MAINTENANCE

- A. Provide full procedures for testing video quality and alignment.
- B. Provide full procedures for any other tasks that must be performed to ensure the warranty remains intact.

PART 2 - PRODUCTS

2.02 EQUIPMENT AND MATERIALS

- A. Drawings and Specifications indicate major system components, and may not show every component, connector, module, or accessory that may be required to support the operation specified. Contractor shall provide all components needed for complete and satisfactory operation.
- B. All products not provided by MDOT shall be new and unused, and shall be of manufacturer's current and standard production.
- C. Where two or more equipment items of the same kind are provided, all shall be identical and provided by the same manufacturer.
- D. Product Availability:
 - 1. Contractor, prior to submitting a proposal, shall determine product availability and delivery time, and shall include such considerations into his proposed Contract Time.
 - 2. Certain products specified may only be available through factory authorized dealers and distributors. Contractor shall verify his ability to procure the products specified prior to submitting a proposal.

2.03 CAMERAS

- A. Available Manufacturers:
 - 1. COHU
 - 2. Hitachi Visual Technologies.
 - 3. Honeywell
 - 4. JVC Professional Products.
 - 5. Panasonic Security Systems Group.
 - 6. Pelco.
 - 7. Philips Communication, Security & Imaging; Philips Electronics N.V.
 - 8. Samsung Opto-Electronics America, Inc.

9. Sensormatic Electronics Corporation.
10. Toshiba Security Products.
11. Vicon Industries, Inc.
12. Watec America Corporation.

B. Color Fixed Camera (All Interior Installations)

1. Type:
 - a. Normal Color Camera
 - b. Day Night camera with retractable IR cut filter for night operation
2. Imaging Device: 1/3 inch
3. Minimum Picture Elements:
 - a. Normal Color Camera: 768 (H) x 494 (V)
 - b. Day Night Color Camera: 720 (H) x 540 (V)
4. Scanning System: 2:1 Interlace.
5. Minimum Horizontal Resolution: 504 TV lines.
6. Signal-to-Noise Ratio: Not less than 50 dB, with the camera AGC off.
7. Sensitivity:
 - a. Normal Camera: .3 lux
 - b. Day Night Camera:
 - 1) Day (color): 0.8 lux
 - 2) Night (B/W) .08 lux
8. Sensitivity: Camera shall deliver 1-V peak-to-peak video signal at the minimum specified light level. The illumination for the test shall be with lamps rated at approximately 2200-K color temperature, and with the camera AGC off.
9. Manually selectable modes for backlight compensation or normal lighting.
10. White Balance: Auto-tracing white balance, with manually settable fixed balance option.

C. Color Dome Fixed Camera: (All Exterior Installations)

Assembled and tested as a manufactured unit, containing a dome assembly, color camera, zoom lens, and receiver/driver.

1. Horizontal Resolution: 540 lines.
2. Signal-to-Noise Ratio: Not less than 50 dB, with the camera AGC off. With AGC, manually selectable on or off.
3. Sensitivity: Camera indicated shall be combination day/night cameras.
4. Sensitivity: Camera shall deliver 1-V peak-to-peak video signal at the minimum specified light level. The illumination for the test shall be with lamps rated at approximately 2200-K color temperature, and with the camera AGC off.
5. Manually selectable modes for backlight compensation or normal lighting.
6. Preset positioning: minimum 8 user-definable scenes, each allowing 16-character titles. Controls shall include the following:
 - a. In "sequence mode," camera shall continuously sequence through preset positions, with dwell time and sequencing under operator control.
 - b. Motion detection shall be available at each camera position.
 - c. Up to four preset positions may be selected to be activated by an alarm. Each of the alarm positions may be programmed to output a response signal.
7. White Balance: Auto-tracing white balance, with manually settable fixed balance option.
8. Software: Shall include the vendor supplied software necessary to control the Zoom features.

- D. Lenses: Optical-quality coated optics, designed specifically for video surveillance applications, and matched to specified camera. Provide lenses for camera manufacture if available.
- E. CCTV Camera Mounting:
 - 1. Parapet wall mount – Pelco model PP350 or equal
 - 2. Parapet rooftop mount – Pelco model PP351 or equal
 - 3. Wall mount – Pelco model WM2000 or equal
 - 4. Corner mount adaptor for WM2000 – Pelco model CM100 or equal.

2.04 POWER SUPPLIES

- A. Power Supplies: Low-voltage power supplies matched for voltage and current requirements of cameras and accessories, type as recommended by camera manufacturer.
 - 1. Acceptable Manufactures:
 - a. Pelco
 - b. Altronix
 - 2. Output Voltage: 24 or 28 Vac selectable
 - 3. Protection Individual camera fuse or circuit barker
 - 4. Enclosure: Power supplies used externally shall be NEMA Type 4X /IP66 rated.
 - 5. Current sized for application with minimal 20% safety factor.

2.05 UTP Transceivers

- A. General Requirements:
 - 1. Type: Passive
 - 2. Input:
 - a. BNC connector
 - b. Impedance: 75 Ohm
 - 3. Output:
 - a. RJ-45 connector or screw terminal
 - b. Impedance: 100 to 200 Ohm
 - 4. Bandwidth: DC to 8 MHz
 - 5. Max input voltage: 1.1 V p-p
 - 6. Maximum insertion Loss: 2 dB (DC to 8 MHz)
 - 7. Minimum return loss: 15 dB (DC to 8 MHz)
 - 8. Minimum common mode rejection: 40 dB
 - 9. Drive capability:
 - a. 24 AWG twisted pair
 - b. Impedance: 100 to 200 Ohm
 - c. Capacitance: 20 pf/foot
- B. UTP Transmitter:
 - 1. Internal to camera UTP 200 ohm output
 - 2. External transmitter: single channel Pelco TW3001P or equal
- C. UTP Receivers:
 - 1. Single Channel UTP/Coax Receiver: Pelco TW3001P or equal

2. 8 Channel UTP/Coax Receiver: Pelco TW3008P or equal
3. 16 Channel UTP/Coax Receiver: Pelco TW3016P or equal

2.06 DIGITAL VIDEO RECORDERS

A. Available Manufacturers:

1. Dedicated Micros USA.
2. Everfocus
3. Honeywell
4. Integral
5. JVC Professional Products.
6. Panasonic Security Systems Group.
7. Pelco.
8. Philips Communication, Security & Imaging; Philips Electronics N.V.
9. Samsung Opto-Electronics America, Inc.

B. Requirements:

1. Camera Inputs 16 Analog
2. Video input: 1 V p-p at 75 Ohm
3. Monitor Out: 1 BNC Composite 1 V p-p at 75 Ohm.
4. Video Format: NTSC
5. Recording Rate: 480 FPS (NTSC)
6. Compression: MPEG-4 or MJPEG
7. Storage of 500 GB minimum.
8. Storage External:
 - a. SCSI connector
 - b. Hot swapping
 - c. Capacity Minimum 4 position for 2 TB drives
9. Display Resolution: 720 by 480
10. Display Format: 1, 4 and 8 Multiscreen display.
11. Network Interface: Ethernet RJ-45 network connection
12. Intelligent motion detection with programmable area and programmable sensitivity.
13. Time and Date Generator: Records time (hr:min:sec) and date legend of each frame.
14. Watermark time and date stamp for exported files.
15. Title: Minimum 12 characters for each camera.

2.07 LCD MONITOR

- A. Type: Flat panel LCD
- B. Size: 19 inches minimum
- C. Input: VGA
- D. Resolution: Supports up to 1280 X 1024 for SXGA input
- E. Brightness: adjustable to 300 cd/m²
- F. Minimum Contrast Ratio: 500:1

- G. Maximum Response Time: 12 ms
- H. Industrial rated for 24 hour x7 days a week operation
- I. Power: 120 V ac @ 50 Watts

2.08 WIRE AND CABLE:

- A. General: Provide all wire and cable required to install systems as indicated.
 - 1. Video cable shall be sized to provide adequate video signal at the recording equipment. The maximum cable length are as follows:
 - a. RG-59 – 700 feet
 - b. RG-6 – 1200 feet
 - c. CAT 5e - 300 feet for network applications
 - d. CAT 5e - 750 feet for video and TPZ control
 - 2. Wire and cable shall be sized to provide adequate signal for the worst case distance.
- B. All cables shall be specifically designed for their intended use.
- C. Coax cable with only a foil shield and drain wire shall not be acceptable.
- D. Comply with equipment manufacturers recommendations for wire and cable size and type.
- E. Comply with all applicable codes and ordinances.

2.09 JUNCTION AND PULL BOXES:

- A. Interior Boxes: Sheet Metal Outlet Boxes: Sizes to be determined in accordance with code requirements for conductor fill. No box shall be smaller than a single gang 1-1/2" deep. Provide box covers as required.
- B. Exterior Boxes: Exterior boxes shall NEMA 4 or NEMA 3R, watertight and dust-tight.
- C. All interior and exterior boxes shall have their covers fastened using security screws.
- D. Lightning Protection:
 - 1. The Contractor shall provide suitable lightning protection for all security panels.
 - 2. All lightning protection equipment shall be UL listed.

PART 3 - EXECUTION

3.01 FIELD INSTALLATION

- A. Field located security panels where indicated.
- B. Mount field camera and power and run connecting cables to indicated.
- C. Align cameras as indicted.

- D. Set focal length (variable focal length (VFL) lenses) as required to encompass indicated view.
 - E. Set back light compensation. Use neutral density filters to simulate darkness to set with iris full open.
 - F. Set focus and depth of field. Set focus to give desired depth of field in lowest light level.
 - G. Check communication and operation of remote control (PTZ dome camera) Field locate cables form security panel to security work station.
 - H. Field locate cable and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other adverse conditions affecting installation.
- 3.02 EXAMINATION
- A. Junction and Pull Boxes:
 - 1. Interior Boxes: Sheet Metal Outlet Boxes: Sizes to be determined in accordance with code requirements for conductor fill. No box shall be smaller than a single gang 1-1/2 inches deep. Provide box covers as required.
 - 2. Exterior Boxes: Exterior boxes shall be NEMA 4 or NEMA 3R, watertight and dust-tight
 - 3. All interior and exterior boxes shall have their covers fastened using security screws.
 - B. Lightning Protection:
 - 1. The Contractor shall provide suitable surge protection at both the camera and at the recoding equipment for exterior cameras.
 - 2. Camera on poles or exposed in top of buildings shall have air terminals. The air terminals shall be bonded to the existing lightning protection system.
 - 3. All lightning protection equipment shall be UL listed.
 - C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 CABLING

- A. Layout, size, and plan new wire and cable runs as required.
- B. Wire and cable passing through metalwork shall be sleeved by an approved grommet or bushing.
- C. All splices shall be made in junction boxes (except at equipment). Power and CAT 5 splices shall be made with an approved crimp connection. Coax cable splices shall be made by first terminating the cable with a coax connector and then using barrel coax cable connectors to join the coax cables. Wire nuts shall not be used on any low-voltage wiring unless the device.
- D. Identify all wire and cable at terminations (both ends) and at every junction box. Identification shall be made with an approved permanent label, Brady or equal.

- E. Wiring Method: Install wiring in raceway and cable tray except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use NRTL-listed plenum cable in environmental air spaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.
- F. Install coax cables using techniques, practices, and methods that are consistent with coax video cable and that ensure coax video performance of completed and linked signal paths, end to end.
- G. Install LAN cables using techniques, practices, and methods that are consistent with Category 5E rating of components and that ensure Category 5E performance of completed and linked signal paths, end to end.
- H. Install cables without damaging conductors, shield, or jacket.
- I. Boxes and enclosures containing security system components or cabling, and which are easily accessible to employees or to the public, shall be provided with a lock. Boxes above ceiling level in occupied areas of the building shall not be considered to be accessible. Junction boxes and small device enclosures below ceiling level and easily accessible to employees or the public shall be covered with a suitable cover plate and secured with tamperproof screws.
- J. Wire and Cable Terminations:
 - 1. Identify all inputs and outputs on terminal strips with permanent marking labels.
 - 2. Neatly dress and tie all wiring. The length of conductors within enclosures shall be sufficient to neatly train the conductor to the terminal point with no excess. Run all wire and cable parallel or normal to walls, floors and ground.
 - 3. Install connectors as required by equipment manufacturers.
 - 4. Do not obstruct equipment controls or indicators with wire or cable.
 - 5. Route wire and cable away from heat producing components such as resistors, regulators, and the like.
 - 6. Comply with EIA/TIA-569, "Commercial Building Standard for Telecommunications Pathways and Spaces."
 - 7. Cable application requirements are minimum requirements and shall be exceeded if recommended or required by manufacturer of system hardware.
- K. Conduit and Raceway Installation:
 - 1. Lay-out, size and plan conduit and raceway systems as indicated or as required which ever will allow for the greatest number of cables.
 - 2. Route exposed conduit and raceway parallel and perpendicular to walls and adjacent piping.
 - 3. Maintain minimum six (6) inch clearance between conduit and piping.
 - 4. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps.
 - 5. Use conduit bodies to make sharp changes in direction, as around beams. Fasten conduits and raceways to structural steel using approved spring clips or clamps.
 - 6. No exposed conduit, raceway, or junction box shall be installed within any populated area.
 - 7. Install all boxes, card reader, intercoms and push buttons straight and plumb.
 - 8. Do not support conduit from mechanical, plumbing, or fire sprinkler systems.
 - 9. Do not use flexible conduit in lengths longer than six (6) feet.

- L. Penetrations: When penetrating a fire wall for passage of cables and/or conduit, provide a fire-stop system that complies with code and the local authority having jurisdiction.
 - M. Camera:
 - 1. Install number of conductor pairs recommended by manufacturer for the functions specified.
 - 2. Install coax cable form the camera to the DVR where required.
- 3.04 IDENTIFICATION
- A. Label both ends of each cable. Use unique, alphanumeric designation for each cable, and label cable and jacks, connectors, and terminals to which it connects with same designation. Use logical and systematic designations for facility's architectural arrangement.
 - B. Label each terminal strip and screw terminal or coax cable connector in each cabinet, rack, or panel.
 - 1. All wiring conductors connected to terminal strips shall be individually numbered, and each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with the name and number of the particular device as shown.
 - C. At completion, cable and asset management software shall reflect as-built conditions.
- 3.05 SYSTEM SOFTWARE
- A. Provide and install the DVR software and the CCTV software. Configure software to the project requirements. Assign software licenses to MDOT.
- 3.06 FIELD QUALITY CONTROL
- A. Provide wiring diagrams and labeling charts to properly identify all wiring.
 - B. Provide a screen capture of each CCTV view.
 - C. If corrections are needed, the Contractor shall perform the needed corrections in a timely fashion.
- 3.07 DEMONSTRATION - TRAINING
- A. Engage authorized service representative to train MDOT's maintenance personnel to adjust, operate, and maintain CCTV camera system

END OF SECTION

SECTION 28 31 00

FIRE DETECTION AND ALARM

- 1.01 GENERAL: Fire Detection and Alarm wiring shall be installed in conduit. Conduit and wiring though not shown shall be furnished and installed to accomplish the intent of the system as shown on the drawings by symbols and this specification.
- 1.02 INSTRUCTIONS:
- A. Fire Alarm System shall consist of an addressable general alarm system with automatic and manual detectors.
 - B. Actuation of any initiation device shall cause the following actions:
 - 1. Activate general alarms (audible & visual)
 - 2. Activate associated zone indicators (audible & visual)
 - 3. Turn off power to all air supply units.
 - C. The system shall have the capacity to transmit signal to a Central Fire reporting station. Furnish all necessary hardware required to accomplish this function and coordinate installation including the proper polarity reversing relays, if required.
 - D. System wiring shall be Class B as defined by NFPA. Any system circuit wiring ground or open, or any system component failure shall cause all trouble signals to operate. System components shall be protected against transient over voltages.
 - E. A photoelectric smoke detector shall be located as indicated on plans. Each detector shall be equipped with an integral 135 degree, heat sensing element. No radioactive material shall be used.
 - F. Manual stations shall be non-coded, dual action stations located as shown on drawings, ensure that one manual station is located at each egress door. Stations shall be red in color and fabricated of high impact Lexan.
 - G. Main terminal cabinet shall be equipped with a drill switch which, when activated, shall cause only the general alarm audible and visual signals to activate but no other general alarm functions shall be affected.
 - H. Main terminal cabinet shall have battery standby complete with metered charger. Batteries shall be maintenance free sealed type capable of operating system for 24 hours. Charger shall be rated for recovery of batteries from full discharge to full charge in 24 hours or less.
 - I. Main terminal cabinet shall contain proper devices and circuitry to cause the general alarm bells to sound for (5) minutes and then silence. Other alarm functions will not be affected.

PART 2 – PRODUCTS

SYSTEM COMPONENTS: Components shall be the following as manufactured by Simplex or equal approved by Architect/Engineer.

<u>Item</u>	<u>Cat. No.</u>	<u>Box</u>
Main terminal cabinet, 4 zone max.	4001 Series	With device
Smoke detector, photo electric	2098 Series	4" octagon
Heat detector	2098 Series	4" octagon
Manual Station	2099 Series	4" Sq. with Lgg raised cover
Audible & visual signal	4903 Series	4" square
Visual signal	4904 Series	4" square

PART 3 – EXECUTION

3.01 TESTING:

- A. The entire Fire Alarm System shall be tested and certified in compliance with all state, local, and NFPA codes and standards. Provide copies of certification reports to the Owner and design engineer.

END OF SECTION

SECTION 31 10 00

SITE CLEARING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Site clearing as shown on the Drawings. Remove vegetation, improvements, concrete walks and curbs, asphalt paving, or obstructions interfering with installation of new construction. Remove such items elsewhere on the site or premises as specifically indicated or as directed by Project Engineer.

1.02 JOB CONDITIONS

- A. Provide protections necessary to prevent damage to existing improvements indicated to remain in place. Protect improvements on adjoining properties and on the Owner's property. Restore damaged improvements to their original condition, as acceptable to parties having jurisdiction.
- B. Salvageable Improvements: Carefully remove items indicated to be salvaged, and store on the Owner's premises where indicated, unless otherwise directed.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 SITE CLEARING

- A. Removal includes stumps and roots. Carefully and cleanly cut roots and branches of trees indicated to be left standing, where such roots and branches obstruct new construction.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated. Place fill material in horizontal layers not exceeding 6 inches loose depth, and thoroughly compact to a density equal to adjacent original ground.

3.02 TOPSOIL

- A. Definition: Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2 inches diameter, and without weeds, roots, and other objectionable material.
- B. Stripping: Strip topsoil to whatever depths encountered in a manner to prevent intermingling with the underlying subsoil or other objectionable material. Remove heavy growths of grass from areas before stripping.
- C. Stockpiling: Stockpile topsoil in storage piles in areas shown, or where otherwise directed. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent windblown dust.

3.03 DISPOSAL OF WASTE MATERIALS

- A. Burning is not permitted on the Owner's property.
- B. Disposal: Remove waste materials and unsuitable and excess topsoil from the Owner's property and dispose of legally.

END OF SECTION

SECTION 31 23 12 EXCAVATION, FILLING AND GRADING

PART 1 - GENERAL.

1.01 SECTION INCLUDES

- A. The extent of excavation, filling and grading is shown on the Drawings. Preparation of subgrade for building slabs, walks, and pavements is included as part of this Work. Backfilling of trenches within the building lines is included as part of this Work. Preparation of topsoil in grassed areas is included as part of this Work.

1.02 RELATED SECTIONS

- A. Section 01 45 29 – Testing Laboratory Services.

1.03 SUBMITTALS

- A. Notification shall be provided to Project Engineer indicating source of borrow material in advance of start of Work and certification provided that proposed soil material is satisfactory for specified use.

1.04 QUALITY ASSURANCE

- A. Perform excavation Work in compliance with applicable requirements of governing authorities having jurisdiction.
- B. Compaction density shall be 95 percent of the maximum dry density value as determined by ASTM D 698 (Standard Proctor Test) of AASHTO T-99.
- C. Soils compaction control tests shall be performed as specified herein and under Section 01455 - Testing Laboratory Services. Stability is defined as absence of significant yielding or pumping of soils under compaction effort.
- D. Number of Tests: Make test(s) in accordance with AASHTO T-99 for each class of material. Make in-place density tests in accordance with AASHTO T-238 (Nuclear Method) for density tests, as the fill and backfill work progresses. At least one test per lift of any isolated portions and each footing.
- E. Work on Non-Tested Areas: Placing permanent construction over fill that has not been tested and approved may require removal of permanent Work, re-compacting the fill and replacing the Work at no additional cost to the Owner.

1.05 EXISTING UTILITIES

- A. Locate existing underground utilities in the areas of Work. If utilities are to remain in place, provide adequate means of protection during earthwork operations. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult the Utility Owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
- B. Do not interrupt existing utilities serving facilities occupied and used by Owner or others except when permitted in writing by Project Engineer and then only after acceptable temporary utility services have been provided. Demolish and completely remove from site existing underground utilities indicated "To Be Removed". Coordinate with utility companies for shut off of services if lines are active.

1.06 PROTECTION OF PERSONS AND PROPERTY

- A. Barricade open excavations occurring as part of this Work and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

1.07 EXPLOSIVES

- A. The use of explosives is NOT permitted.

PART 2 - PRODUCTS

2.01 BACKFILL AND FILL

- A. Select fill shall be an approved select material free from trash, debris, stones larger than 3 inches, roots and other organic matter.

2.02 GRANULAR FILL

- A. Below existing natural grade line: Sandy clay with a liquid limit less than 45 and PI in range of 10 to 22, or clayey sand with PI not less than 7 and liquid limit not greater than 35.
- B. Above existing natural grade under slabs and footings: Silty or sandy clay as above or clayey-sand with LL less than 35 and PI of 3 to 15.

2.03 TOPSOIL

- A. Provide topsoil to supplement that for reuse at site. Provide clean, fertile, friable, natural loam obtained from a local, well drained source.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which excavating, filling, and grading are to be performed and notify the Contractor, in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in an acceptable manner.

3.02 EXCAVATION

- A. Excavation consists of removal and disposal of material encountered when establishing required grade elevations.
- B. Earth excavation includes removal and disposal of pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, material of any classification indicated in data on subsurface conditions, and other materials encountered that are not classified as rock excavation or unauthorized excavation.

- C. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Project Engineer. Unauthorized excavation, as well as remedial Work directed by the Project Engineer, shall be at the Contractor's expense. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to Project Engineer.
- D. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by the Project Engineer.
- E. Additional Excavation: When excavation has reached required subgrade elevations, notify the Project Engineer / Architect who will make an inspection of conditions. If unsuitable bearing materials are encountered at the required subgrade elevations, carry excavations deeper and replace the excavated material as directed by the Project Engineer / Architect. Removal of unsuitable material and its replacement as directed will be paid on the basis of contract conditions relative to changes in work.
- F. Stability of Excavations. Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.
- G. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross braces, in good serviceable condition. Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.
- H. Dewatering: Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrade and foundations.
 - 1. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
 - 2. Convey water removed from excavations and rainwater to collecting or run-off areas. Establish and maintain temporary drainage ditches and other diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.

3.03 MATERIAL STORAGE

- A. Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage. Locate and retain soil materials away from edge of excavations. Dispose of excess soil material and waste materials as herein specified.

3.04 EXCAVATION FOR STRUCTURES

- A. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 feet, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection. In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive concrete.

3.05 EXCAVATION FOR PAVEMENTS

- A. Cut surface under pavements to comply with cross-sections, elevations and grades as shown.

3.06 EXCAVATION FOR TRENCHES

- A. Dig trenches to the uniform width required for the particular item to be installed, sufficiently wide to provide ample working room. Excavate trenches to the depth indicated or required. Carry the depth of trenches for piping to establish the indicated flow lines and invert elevations. Beyond the building perimeter, keep bottoms of trenches sufficiently below finish grade to avoid freeze-ups.
- B. Grade bottoms of trenches as indicated, notching under pipe bells to provide solid bearing for the entire body of the pipe. Backfill trenches with concrete where trench excavations pass within 18 inches of column or wall footings and which are carried below the bottom of such footings, or which pass under wall footings. Place concrete to the level of the bottom of adjacent footings.
- C. Do not backfill trenches until tests and inspections have been made and backfilling authorized by the Project Engineer. Use care in backfilling to avoid damage or displacement of pipe systems.

3.07 COLD WEATHER PROTECTION

- A. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

3.08 COMPACTION

- A. Control soil compaction during construction providing minimum percentage of density specified for each area classification. Compact soil to not less than the following percentages of maximum dry density.
- B. Building Slabs and Steps: Compact top 12 inches of subgrade and each layer of backfill or fill material at 95 percent maximum dry density.
- C. Lawn or Unpaved Areas: Compact top 6 inches of subgrade and each layer of backfill or fill material at 90 percent maximum dry density.
- D. Walkways and Pavements Compact top 6 inches of subgrade and each layer of backfill or fill material at 95 percent maximum dry density.

3.09 MOISTURE CONTROL

- A. Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

3.10 BACKFILL AND FILL

- A. Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.
- B. In excavations and under grassed areas by Owner; use satisfactory excavated or borrow material. Under grassed areas by Owner, loosen subgrade to depth of 4 inches, and spread topsoil to depth of 4 inches. Till surface to a level, fine texture.
- C. Under buildings, walks and pavements, use sub-base material, or satisfactory excavated or borrow material, or combination of both. Backfill excavations as promptly as work permits, but not until completion of the following:
 - 1. Acceptance by Project Engineer of construction below finish grade including, where applicable, dampproofing, waterproofing, and soil treatment.
 - 2. Inspection, testing, approval, and recording locations of underground utilities.
 - 2. Removal of concrete formwork, shoring and bracing, and backfilling of voids with satisfactory materials.
 - 4. Removal of trash and debris.

3.11 GROUND SURFACE PREPARATION

- A. When existing ground surface has a density less than that specified under "Compaction" for the particular area classification, break up the ground surface, pulverize, moisture condition to the optimum moisture content, and compact to required depth and percentage of maximum density.

3.12 PLACEMENT AND COMPACTION

- A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content. Compact each layer to required percentage of maximum dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
- C. Place backfill and fill materials evenly adjacent to structures, to required elevations. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around structure to approximately same elevation in each lift.

3.13 GRADING

- A. Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

- B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes, and as follows:
1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10 feet above or below the required subgrade elevations.
 2. Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 0.10 feet above or below the required subgrade elevation.
 2. Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than 1/2 inch above or below the required subgrade elevation.
 4. Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.14 COMPACTION

- A. After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

3.15 MAINTENANCE

- A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
- B. Reconditioning Compacted Areas: Where subsequent construction operations or adverse weather disturbs completed compacted areas, scarify surface, re-shape, and compact to required density prior to further construction.

3.16 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Remove waste materials, including unacceptable excavated material, trash and debris, and dispose of it off the Owner's property.

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 diluent. Provide a working solution of one of the following chemical elements:
 - 1. Horizontal barrier: Cypermethrin, Prevail or Talstar.
 - 2. Vertical barrier: Fipronil.
- B. Other solutions may be used as recommended by Applicator and if acceptable to local and state governing authorities. Use soil treatment solutions that are not injurious to plants.

PART 3 - EXECUTION

3.01 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 32 16 15 CONCRETE CURBS AND SIDEWALKS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Concrete walks, VPC cast-in-place truncated dome tiles, paving, and curbs, including reinforcement and accessories for a complete installation.

1.02 RELATED SECTIONS

- A. Prepared sub-base is specified in Section 31 23 11. Concrete and related materials are specified in Division 03. Joint fillers and sealers are specified in Section 07 92 00.

1.03 SUBMITTALS

- A. Submit manufacturer's technical product data, installation instructions and recommendations for products specified, in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE

- A. Comply with local governing regulations, codes and standards if more stringent than herein specified.

PART 2 - PRODUCTS

2.01 FORMS

- A. Use steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Use flexible spring steel forms to form radius bends as required.
- B. Coat forms with a non-staining form release agent that will not discolor or deface the surface of the concrete.

2.02 WELDED WIRE MESH

- A. Welded plain cold-drawn steel wire fabric, ASTM A 185. Furnish in flat sheets, not rolls, unless otherwise acceptable to Project Engineer.

2.03 REINFORCING BARS

- A. Deformed steel bars, ASTM A 615, Grade 60, unless otherwise indicated.

2.04 JOINT DOWEL BARS

- A. Plain steel bars, ASTM A 615, Grade 60 unless otherwise indicated. Cut bars true to length with ends square and free of burrs.

2.05 METAL EXPANSION CAPS

- A. Furnish for one end of each dowel bar in expansion joints. Design caps with one end closed and a minimum length of 3 inches to allow bar movement of not less than 1 inch, unless otherwise indicated.

2.06 HOOK BOLTS

- A. ASTM A 307, Grade 307, Grade A bolts, internally and externally threaded. Design the hook bolt-joint assembly to hold the coupling against the pavement form and in position during concrete placement, and to permit removal without damage to the concrete or hook bolt.

2.07 CONCRETE MATERIALS

- A. Comply with requirements of applicable Division 3 Sections for concrete materials, admixtures, bonding materials, curing materials, and others as required.

2.08 EXPANSION JOINT MATERIALS

- A. Comply with requirements of Section 07920 for performed expansion joint fillers and sealers.

2.09 CONCRETE MIX DESIGN

- A. All concrete shall be Class "B" and have 3000-psi minimum compressive strengths at 28 days, unless noted otherwise. Maximum slump for normal weight concrete shall be 4 inches. All concrete shall have 5 to 7 percent entrained air.

210. VPC CAST-IN-PLACE TRUNCATED DOME ARMOR-TILES

- A. Materials shall meet the following requirements:
 - 1. Vitrified Polymer Composite (VPC) Cast-In-Place Detectable/Tactile Warning Surface Tile with Sound Amplifying Plate.
 - 2. Depth: 1-3/8 inch.
 - 3. Face Thickness: 3/16 inch.
 - 4. Pattern, size, and texture shall be as noted on the Drawings.
 - a. Americans with Disabilities Act (ADA) acceptable truncated domes units required in areas where noted on the Drawings.
 - 5. Color to be selected by Owner and Project Architect from standard manufacturer's range.
- B. Acceptable Product/Manufacturer: Armor-Tile as manufactured by Engineered Plastics, Inc., 300 International Drive, Suite 100, Williamsville, NY. Tel. (800) 682-2525 or approved equal.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which concrete curbs, walks, and paving 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 an acceptable manner.

3.02 SURFACE PREPARATION

- A. Remove loose material from the compacted sub-base surface immediately before placing concrete. Check for unstable areas and the need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.

3.03 VPC CAST-IN-PLACE TRUNCATED DOME ARMOR-TILES-INSTALLATION

- A. Concrete shall be poured and finished true and smooth to the required dimensions and slope prior to tile placement.
 - 1. Immediately after finishing concrete check that the required slope is achieved.
 - 2. Place tile true and square to curb edge in accordance with the Drawings.
 - 3. Tamp (or vibrate) tile into the fresh concrete to ensure that the field level of the tile is flush to the adjacent concrete surface.
- B. Comply with manufacturers installation instructions.

3.04 FORM CONSTRUCTION

- A. Set forms to the required grades and lines, rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of the work and so that forms can remain in place at least 24 hours after concrete placement.
- B. Check completed formwork for grade and alignment to the following tolerances:
 - 1. Top of forms not more than 1/8 inch in 10 feet.
 - 2. Vertical face, on longitudinal axis, not more than 1/4 inch in 10 feet.
- C. Clean forms after each use, and coat with form release agent as often as required to ensure separation from concrete without damage.

3.05 REINFORCEMENT

- A. Locate, place and support reinforcement as specified in Division 3 sections, unless otherwise indicated.

3.06 CONCRETE PLACEMENT

- A. Comply with the requirements of Division 3 sections for mixing and placing concrete, and as herein specified.

- B. Do not place concrete until sub-base and forms have been checked for line and grade. Moisten sub-base if required to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- C. Place concrete using methods that prevent segregation of the mix. Consolidate concrete along the face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices. Deposit and spread concrete in a continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2 hour, place a construction joint.

3.07 JOINTS

- A. Construct expansion and construction joints true to-line with face perpendicular to surface of the concrete, unless otherwise indicated. Construct transverse joints at right angles to the centerline, unless otherwise indicated. When joining existing structures, place transverse joints to align with previously placed joints, unless otherwise indicated. Where load transfer-slip dowel devices are used, install so that one end of each dowel bar is free to move, as shown on drawings.
- B. Construction Joints: Place construction joints at the end of all pours and at locations where placement operations are stopped for a period of more than 12 hours, except where such pours terminate at expansion joints. Construct joints as shown or, if not shown, use standard metal keyway section forms.
- C. Expansion Joints: Provide pre-molded joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks and other fixed objects, unless otherwise indicated. Locate expansion joints at 50 feet on center unless otherwise indicated.
- D. Extend joint fillers full-width and depth of joint, and not less than 1/2 inch or more than one inch below finished surface where joint sealer is indicated. If no joint sealer, place top of joint filler flush with finished concrete surface. Furnish joint fillers in continuous lengths for the full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together. Protect the top edge of the joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.
- E. Fillers and Sealants: Comply with the requirements of Section 07920 for preparation of joints, materials, installation, and performance and as herein specified.

3.08 CONCRETE FINISHING

- A. After striking-off and consolidating concrete, smooth the surface by screening and floating. Use hand methods only where mechanically floating is not possible. Adjust the floating to compare the surface and produce a uniform texture. After floating, test surface for flatness with a 10-foot straightedge. Distribute concrete as required to remove surface irregularities, and re-float repaired areas to provide a continuous smooth finish.
- B. Work edges of slabs and formed joints with an edging tool, and round to 1/1 inch radius, unless otherwise indicated. Eliminate any tool marks on concrete surface.

- C. After completion of floating and when excess moisture or surface sheen has disappeared, apply broom finish by drawing a fine-hair broom across concrete surface, perpendicular to line of traffic. Repeat operation if required to provide a fine line texture acceptable to Project Engineer / MDOT Architect.
- D. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Project Engineer.

3.09 CURING

- A. Protect and cure finished concrete paving, complying with applicable requirements of Division 3 Sections. Use moist-curing methods for initial curing whenever possible.

3.10 REPAIRS AND PROTECTIONS

- A. Repair or replace broken or defective concrete, as directed by Project Engineer. Drill test cores where directed by Project Engineer, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to pavement with epoxy resin grout.
- B. Protect concrete from damage until acceptance of Work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur. Sweep concrete pavement and wash free of stains, discoloration, dirt and other foreign material just prior to final inspection.

END OF SECTION

SECTION 32 92 00 TURF AND GRASSES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Topsoil, seeding and related products at all exterior ground areas within the limits of the Contract, except surfaces occupied by buildings, structures and pavement, and areas indicated as undisturbed or otherwise planted as shown on Drawings. The Work shall include furnishing and/or spreading topsoil, finish grading, preparing seedbed, and providing plant establishment.

1.02 SUBMITTALS

- A. Submit product data and technical specifications, installation instruction and general recommendations for each product specified.

1.03 SITE CONDITIONS

- A. Permanent seeding shall be conducted only between April 1st and September 1st. If the completion schedule of the Work falls between September 1st and April 1st, temporary winter seeding will be required followed by permanent seeding executed as soon as possible thereafter within the allowable planting schedule.
- B. Seeding operations shall not begin until all construction procedures have been completed, unless otherwise approved.

PART 2 - PRODUCTS

2.01 FERTILIZER

- A. Commercial fertilizer shall be 13-13-13 formula 13 percent nitrogen, 13 percent phosphoric acid, and 13 percent potash. Fertilizer shall be dry, granular, and bagged in manufacturer's original unopened container.

2.02 AGRICULTURAL LIME

- A. Ground or pulverized, containing not less than 90 percent calcium carbonate, and shall be ground to such a fineness that 50 percent will pass through a 100-mesh sieve and 90 percent will pass through a 20-mesh sieve.

2.03 MULCHING

- A. Threshed straw of cereal grain (wheat, rice, oats). All material shall be free of Johnson grass, broom sedge, weed seed and noxious materials. Hydro seeding mulch shall be equal to Conwed binder and mulch material.

2.04 TOPSOIL

- A. Natural, fertile, friable soil possessing characteristics of representative productive soils in the vicinity. It shall be free of stones, lumps, plants, roots, obnoxious grass and weeds and other foreign matter. It shall be of uniform composition throughout, not excessively acid or alkaline, nor contain substances, which may be harmful to plant growth. Existing on-site soil may be utilized in planting soil mix if of good quality to promote healthy growth. Topsoil shall not be stripped, collected or deposited while wet.

2.05 ASPHALTIC EMULSION

- A. Spray at the same rate of 10 to 13 gallons per 1000 square feet. DO NOT damage other Work by allowing drift to settle. Do not spray on windy days.

2.06 SEED

- A. All seed shall comply with the seed laws of the State of Mississippi and all applicable regulations. The seed shall be fresh, clean, of the best grade, vitality, purity and germination, and shall be delivered in bags showing percent of germination, and purity of seed, and the percent of obnoxious weeds and inert matter.
- B. Bermuda (cynodon dactylon - permanent grass) common hulled, new crop seed, tested 98 percent for purity and 90 percent for germination.
- C. Perennial Rye (temporary grass): Testing 95 percent for purity and 85 percent for germination.
- D. Centipede Grass (eremochloaophiuroides): Testing 95 percent for purity and 85 percent for germination.

PART 3 - EXECUTION

3.01 GROUND PREPARATION

- A. Thoroughly loosen the surface of all areas to be seeded to a depth of 4 inches by plowing, discing and harrowing, or by other approved methods. All clods and lumps shall be pulverized to provide a smooth, uniformly loose, well-broken surface, free of roots and other objectionable foreign matter.
- B. Topsoil shall be placed evenly to an average depth of 3 inches with a minimum depth of 2 inches at any one area.
- C. At least 7 days prior to seeding, lime shall be applied at a rate of 50 pounds per 1000 square feet and thoroughly incorporated into the soil to a depth of 3 inches.
- D. Grade lawn areas to finish grades, filling as needed or removing surplus dirt and floating areas to a smooth, uniform grade. Slope all lawn areas to drain. Roll, scarify, rake and level as necessary to obtain true even lawn surfaces.

- E. Hand dressing will be used in all areas within 20 feet of any building construction to obtain a perfectly smooth and properly graded area to provide drainage away from the structure and paved areas with elevations as shown on the Drawings. All other areas shall be machine graded unless otherwise noted. Allow for sod thickness in areas to be sodded.

3.02 FERTILIZING

- A. Apply fertilizer at the rate of 20 pounds per 1000 square feet. Incorporate into soil to a depth of 3 inches by using a plow and disc harrow, rotary tilling machinery or other means.

3.03 SEEDING

- A. All seed shall be sown in compliance with the dates indicated in Part I, Paragraph 1.03.
- B. No seeding shall be conducted during windy weather or when the ground is frozen, excessively wet, or in a non-tillable condition.
- C. Seed shall be uniformly sown at the rate of 3 pounds per 1000 square feet for bermuda grass; 6 pounds per 1000 square feet for rye grass.
- D. Seed shall be sown by mechanical spreaders. Entire seeded area shall be raked to cover the seed to a depth of 1/8 inch to 1/2 inch, thoroughly rolled and then watered deeply with a fine spray.

3.04 MULCH

- A. Mulch shall be placed uniformly in a continuous blanket at a rate of one bale per 1000 square feet. Mulching shall take place within 24 hours after completion of seeding operations and shall begin on the windward side of areas and from tops of slopes. The use of wet vegetative materials will not be permitted and baled material shall be loose and thoroughly broken before it is distributed.

3.05 ESTABLISHMENT AND MAINTENANCE

- A. Lawn areas shall be protected and maintained by watering, mowing and reseeding as may be necessary for at least 30 days after completion of the last lawn operation and as much longer as is necessary to produce a uniform stand of grass. Grass shall be considered established and accepted when each square foot of grass area contains a sufficient number of well-rooted and growing grass plants to provide a reasonable green cover, sufficient erosion control, and a definite green appearance during the growing season.

3.06 PROTECTION

- A. Restrict pedestrian and vehicular traffic from seeded and sodded areas after planting and until grass is established and accepted.

3.07 REPAIRING / RESEEDING

- A. Unaccepted areas requiring reseeding or re-sodding shall be so designated by the Project Engineer. Reseeding shall be in compliance with these Specifications and in accordance with the planting schedule. Re-seeded areas shall also be re-mulched.
- B. When grassed areas have become eroded or otherwise damaged during the period of this Contract, the affected areas shall be repaired to re-establish the surface and condition of the soil as provided for in these Specifications. Such areas shall be re-seeded as specified. Placing and reshaping of all earthwork shall be in accordance with the direction of the Project Engineer.
- C. No Additional payment will be made for re-fertilizing, re-seeding, re-mulching, or repairing eroded areas.

3.08 SCHEDULE

- A. Seeding - entire area affected by construction of this project that is not to be sodded.
- B. Sodding - area affected by construction of this project that has a slope equal to or greater than 1 foot in 8 feet.

END OF SECTION

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

PROCUREMENT AND CONTRACTING FORMS

DIVISION 50

SECTION 905 - PROPOSAL

Date _____

Mississippi Transportation Commission
Jackson, Mississippi

Sirs: The following proposal is made on behalf of _____
_____ of _____

for constructing the following designated project(s) within the time(s) hereinafter specified.

The plans are composed of drawings and blue prints on file in the offices of the Mississippi Department of Transportation, Jackson, Mississippi.

The Specifications are the current Standard Specifications of the Mississippi Department of Transportation approved by the Federal Highway Administration, except where superseded or amended by the plans, Special Provisions and Notice(s) to Bidders attached hereto and made a part thereof.

I (We) certify that I (we) possess a copy of said Standard and any Supplemental Specifications.

Evidence of my (our) authority to submit the Proposal is hereby furnished. The proposal is made without collusion on the part of any person, firm or corporation. I (We) certify that I (we) have carefully examined the Plans, the Specifications, including the Special Provisions and Notice(s) to Bidders, herein, and have personally examined the site of the work. On the basis of the Specifications, Special Provisions, Notice(s) to Bidders, and Plans, I (we) propose to furnish all necessary machinery, tools, apparatus and other means of construction and do all the work and furnish all the materials in the manner specified. I (We) understand that the quantities mentioned herein are approximate only and are subject to either increase or decrease, and hereby propose to perform any increased or decreased quantities of work at the unit prices bid, in accordance with the above.

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.

SECTION 905 -- PROPOSAL (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.

New Maintenance Headquarters and Equipment Shed in Kalem, known as State Project No. BWO-5195-62(001) / 502308301 & BWO-5196-62(001) / 502308302, in the County of Scott, State of Mississippi.

I (We) agree to complete the entire project within the specified contract time.

***** SPECIAL NOTICE TO BIDDERS *****

**BIDS WILL NOT BE CONSIDERED UNLESS BOTH UNIT PRICES AND ITEM TOTALS ARE ENTERED.
 BIDS WILL NOT BE CONSIDERED UNLESS THE BID CERTIFICATION LOCATED AT THE END OF THE BID SHEETS IS SIGNED**

*****BID SCHEDULE*****

Line No.	Item Code	Adj Code	Quantity	Units	Description	Unit Price		Item Amount	
						Dollar	Ct	Dollar	Ct
Building Items									
0010	1500-A001		1	Lump Sum	Construction of Equipment Shed	XXXXXXXX	XXX		
0020	1500-A001		1	Lump Sum	Construction of Maintenance Area Headquarters	XXXXXXXX	XXX		
0030	607-B041		185	Linear Feet	72" Type I Chain Link Fence, Class I , With Top Guard				
0040	607-G120		2	Each	Gate (72" Chain Link, Galv. Steel), (24' DBL),(W/Top Guard)				
0050	607-P1009		17	Each	Line Post, 9' x 2" Galvanized Steel				
0060	607-P2021		6	Each	Brace Post, 9' 6" x 2 1/2" Galvanized Steel				
0070	607-P3020		4	Each	Gate Post, 11' x 3 1/2" Galvanized Steel				

*** BID CERTIFICATION ***

TOTAL BID.....\$_____

*** SIGNATURE STATEMENT ***

BIDDER ACKNOWLEDGES THAT HE/SHE HAS CHECKED ALL ITEMS IN THIS PROPOSAL FOR ACCURACY AND CERTIFIED THAT THE FIGURES SHOWN THEREIN CONSTITUTE THEIR OFFICIAL BID.

BIDDER'S SIGNATURE

BIDDER'S COMPANY

BIDDER'S FEDERAL TAX ID NUMBER

CONDITIONS FOR COMBINATION BID

If a bidder elects to submit a combined bid for two or more of the contracts listed for this month's letting, the bidder must complete and execute these sheets of the proposal in each of the individual proposals to constitute a combination bid. In addition to this requirement, each individual contract shall be completed, executed and submitted in the usual specified manner.

Failure to execute this Combination Bid Proposal in each of the contracts combined will be just cause for each proposal to be received and evaluated as a separate bid.

COMBINATION BID PROPOSAL

I. This proposal is tendered as one part of a Combination Bid Proposal utilizing option ___* of Subsection 102.11 on the following contracts:

* Option to be shown as either (a), (b), or (c).

<u>Project No.</u>	<u>County</u>	<u>Project No.</u>	<u>County</u>
1. _____	_____	6. _____	_____
2. _____	_____	7. _____	_____
3. _____	_____	8. _____	_____
4. _____	_____	9. _____	_____
5. _____	_____	10. _____	_____

A. If option (a) has been selected, then go to II, and sign Combination Bid Proposal.

B. If option (b) has been selected, then complete the following, go to II, and sign Combination Bid Proposal.

SECTION 905 - COMBINATION BID PROPOSAL (Continued)

Project Number	Pay Item Number	Unit	Unit Price Reduction	Total Item Reduction	Total Contract Reduction
1. _____	_____ _____	_____ _____	_____ _____	_____ _____	
2. _____	_____ _____	_____ _____	_____ _____	_____ _____	
3. _____	_____ _____	_____ _____	_____ _____	_____ _____	
4. _____	_____ _____	_____ _____	_____ _____	_____ _____	
5. _____	_____ _____	_____ _____	_____ _____	_____ _____	
6. _____	_____ _____	_____ _____	_____ _____	_____ _____	
7. _____	_____ _____	_____ _____	_____ _____	_____ _____	
8. _____	_____ _____	_____ _____	_____ _____	_____ _____	

SECTION 905 - COMBINATION BID PROPOSAL (Continued)

Project Number	Pay Item Number	Unit	Unit Price Reduction	Total Item Reduction	Total Contract Reduction
9. _____	_____ _____	_____ _____	_____ _____	_____ _____	
10. _____	_____ _____	_____ _____	_____ _____	_____ _____	

C. If option (c) has been selected, then initial and complete one of the following, go to II. and sign Combination Bid Proposal.

_____ I (We) desire to be awarded work not to exceed a total monetary value of \$ _____.

_____ I (We) desire to be awarded work not to exceed _____ number of contracts.

II. It is understood that the Mississippi Transportation Commission not only reserves the right to reject any and all proposals, but also the right to award contracts upon the basis of lowest separate bids or combination bids most advantageous to the State.

It is further understood and agreed that the Combination Bid Proposal is for comparison of bids only and that each contract shall operate in every respect as a separate contract in accordance with its proposal and contract documents.

I (We), the undersigned, agree to complete each contract on or before its specified completion date.

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

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-5195-62(001) / 502308301 & BWO-5196-62(001) / 502308302**,

in Scott 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-5195-62(001) / 502308301 & BWO-5196-62(001) / 502308302**,

in Scott 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-5195-62(001) / 502308301 & BWO-5196-62(001) / 502308302**

LOCATED IN THE COUNTY(IES) OF **Scott**

STATE OF MISSISSIPPI,
COUNTY OF HINDS

This contract entered into by and between the Mississippi Transportation Commission on one hand, and the undersigned contractor, on the other witnesseth;

That, in consideration of the payment by the Mississippi Transportation Commission of the prices set out in the proposal hereto attached, to the undersigned contractor, such payment to be made in the manner and at the time of times specified in the specifications and the special provisions, if any, the undersigned contractor hereby agrees to accept the prices stated in the proposal in full compensation for the furnishing of all materials and equipment and the executing of all the work contemplated in this contract.

It is understood and agreed that the advertising according to law, the Advertisement, the instructions to bidders, the proposal for the contract, the specifications, the revisions of the specifications, the special provisions, and also the plans for the work herein contemplated, said plans showing more particularly the details of the work to be done, shall be held to be, and are hereby made a part of this contract by specific reference thereto and with like effect as if each and all of said instruments had been set out fully herein in words and figures.

It is further agreed that for the same consideration the undersigned contractor shall be responsible for all loss or damage arising out of the nature of the work aforesaid; or from the action of the elements and unforeseen obstructions or difficulties which may be encountered in the prosecution of the same and for all risks of every description connected with the work, exceptions being those specifically set out in the contract; and for faithfully completing the whole work in good and workmanlike manner according to the approved Plans, Specifications, Special Provisions, Notice(s) to Bidders and requirements of the Mississippi Department of Transportation.

It is further agreed that the work shall be done under the direct supervision and to the complete satisfaction of the Executive Director of the Mississippi Department of Transportation, or his authorized representatives, and when Federal Funds are involved subject to inspection at all times and approval by the Federal Highway Administration, or its agents as the case may be, or the agents of any other Agency whose funds are involved in accordance with those Acts of the Legislature of the State of Mississippi approved by the Governor and such rules and regulations issued pursuant thereto by the Mississippi Transportation Commission and the authorized Federal Agencies.

The Contractor agrees that all labor as outlined in the Special Provisions may be secured from list furnished by

It is agreed and understood that each and every provision of law and clause required by law to be inserted in this contract shall be deemed to be inserted herein and this contract shall be read and enforced as though it were included herein, and, if through mere mistake or otherwise any such provision is not inserted, then upon the application of either party hereto, the contract shall forthwith be physically amended to make such insertion.

The Contractor agrees that he has read each and every clause of this Contract, and fully understands the meaning of same and that he will comply with all the terms, covenants and agreements therein set forth.

Witness our signatures this the _____ day of _____, _____.

Contractor (s)

By _____

MISSISSIPPI TRANSPORTATION COMMISSION

Title _____

By _____

Signed and sealed in the presence of:
(names and addresses of witnesses)

Executive Director

Secretary to the Commission

Award authorized by the Mississippi Transportation Commission in session on the ____ day of _____, _____, Minute Book No. _____, Page No. _____.

S E C T I O N 9 0 3
PERFORMANCE AND PAYMENT BOND

CONTRACT BOND FOR: **BWO-5195-62(001) / 502308301 & BWO-5196-62(001) / 502308302**

LOCATED IN THE COUNTY(IES) OF: **Scott**

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

SECTION 903 - CONTINUED

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 **New Maintenance Headquarters and Equipment Shed in Kalem, known as State Project No. BWO-5195-62(001) / 502308301 & BWO-5196-62(001) / 502308302, in the County of Scott, State of Mississippi.**

NOW THEREFORE, the condition of this obligation is such that if the aforesaid Principal shall be awarded the contract, the said Principal will, within the time required, enter into a formal contract and give a good and sufficient bond to secure the performance of the terms and conditions of the contract, then this obligation to be void; otherwise the Principal and Surety will pay unto the Obligee the difference in money between the amount of the bid of the said Principal and the amount for which the Obligee legally contracts with another party to perform the work if the latter amount be in excess of the former, but in no event shall liability hereunder exceed the penal sum hereof.

Signed and sealed this _____ day of _____, 20__

(Principal) (Seal)

(Witness)

By: _____
(Name) (Title)

(Surety) (Seal)

(Witness)

By: _____
(Attorney-in-Fact)

MS Agent

Mississippi Insurance ID Number