



SM No. CBWO3143820011

PROPOSAL AND CONTRACT DOCUMENTS

FOR THE CONSTRUCTION OF
(EXEMPT)

220

Construction necessary to build a storage facility with offices and an equipment shed, known as State Project No. BWO-3143-82(001) 501614 & BWO-3145-82(001)/ 501628301, in the County of Yazoo, State of Mississippi.

Project Completion: January 30, 2008

NOTICE

**BIDDERS MUST PURCHASE A BOUND PROPOSAL
FROM MDOT CONTRACT ADMINISTRATION DIVISION
TO BID ON 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**

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

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PROJECT: STORAGE FACILITY WITH OFFICES AND EQUIPMENT SHED FOR DISTRICT THREE HEADQUARTERS COMPLEX AT YAZOO CITY, YAZOO COUNTY, MISSISSIPPI

**PROJECT NUMBER: BWO-3143-82(001) 501614
BWO-3145-82(001) 501628**

DATE: NOVEMBER 20, 2006

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 Storage Facility with Offices for District Three Headquarters Complex at Yazoo City, Yazoo County, Mississippi, Project No. BWO-3143-82(001) 501614, in accordance to these Specifications and conforming to the Drawings.

DESCRIPTION B: The existing site is an asphalt paved parking lot. This Work shall consist of minor site work and all construction work necessary in constructing an Equipment Shed for District Three Headquarters Complex at Yazoo City, Yazoo County, Mississippi, Project No. BWO-3145-82(001) 501628 in accordance to these Specifications and conforming to the Drawings. Electrical Specification Sections for this portion of the Contract are designated with an "S" suffix.

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

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MISSISSIPPI DEPARTMENT OF TRANSPORTATION

ADVERTISEMENT FOR BIDS DOCUMENT 00100

Sealed bids will be received by the Mississippi Transportation Commission in the Office of the Contract Administration Engineer, Mississippi Department of Transportation Office Building, Jackson, Mississippi, until 9:30 o'clock A.M., Tuesday, January 23, 2007. Thereafter bids will be received in the First Floor Auditorium of the Mississippi Department of Transportation Office Building, Jackson, Mississippi, until 10:00 o'clock A.M., Tuesday, January 23, 2007, and shortly thereafter publicly opened for

Construction necessary to build a new Storage Facility with Offices and Equipment Shed for District Three Headquarters Complex at Yazoo City, Yazoo County, Mississippi, known as Project No. BWO-3143-82(001) 501614 and BWO-3145-82(001) 501628.

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 Yazoo City 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 Plans Print Shop, Room 1100, Administration Building, 401 North West Street, Jackson, Mississippi 39201, Telephone (601) 359-7460, FAX (601) 359-7461, E-mail plans@mdot.state.ms.us.

Bid Bond, signed or countersigned by a Mississippi 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.

LARRY L. "BUTCH" BROWN
EXECUTIVE DIRECTOR

(SPWP)

END OF DOCUMENT
00100-1

MDOT – 3rd District – Yazoo

Advertisement for Bids

INSTRUCTIONS TO BIDDERS DOCUMENT 00200

Part 1 GENERAL

- 1.01 **QUESTIONS:** 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:** 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:
- A. **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.
 - B. **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 Bidder may be disqualified for having defaulted on a previous Contract.

- 1.05 **CONDITIONS OF WORK:** 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:** All Bidders, including the general Contractor and Subcontractors shall visit the building site, compare the Drawings and Project Manual (Proposal) 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:** 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:** 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:** 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.

Part 2 PROPOSAL FORM

- 2.01 **METHOD OF BIDDING:** 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).
- 2.02 **PROPOSAL FORMS:** 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.
- 2.03 **TIME OF COMPLETION:** 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.
- 2.04 **SUBSTITUTIONS:** 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 01630 entitled *Product Options and Substitution Procedures* which covers procedures after the award of Contract.
- 2.05 **ADDENDA:** 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. The Proposal Form will have ample space to indicate the receipt of addenda.

2.06 **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.

2.07 **BID SECURITY:** The Bid Security shall be in the form of a Bid Bond, or a Certified Check:

- A. **Bid Bond:** The Bidder may submit a Bid Bond by a Surety licensed in Mississippi in the amount of five percent (5%) of the base bid. The Bidder, the Surety and a Mississippi resident agent shall duly execute the Bid Bond. (No standard form is required for the Bid Bond.)
- B. **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. 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.

2.08 **POWER OF ATTORNEY:** Each bid security must be accompanied by an appropriate Power of attorney.

Part 3 SUBMITTING THE PROPOSAL FORM

3.01 **SUBMITTAL:** 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.

- A. **DO NOT** remove any part of the Contract Documents (Exception – An addendum requires substitution of second sheet of Document 00400).
- B. Failure to complete all of the applicable requirements may be cause for the Proposal to be considered irregular.
- C. **A stripped Proposal that is not re-assembled in its correct order is considered as an irregular bid and will be rejected.**
- D. The Proposal shall be submitted and sealed in the opaque envelope provided and mailed or hand-delivered.

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.

- 3.02 **MODIFICATION TO BID:** A Bidder may **not** modify the bid prior to the scheduled closing time indicated in the Advertisement for Bids in the following manner:
- A. **Notification on Envelope:** A modification may **not** be written on the outside of the sealed envelope containing the bid.
 - B. **Facsimile:** A facsimile (fax) will **not** be acceptable.
- 3.03 **WITHDRAWAL OF BID:** 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.

Part 4 BID OPENING AND AWARD OF CONTRACT

- 4.01 **OPENING OF BIDS:** Bids will be publicly opened shortly after the time stated in the advertisement for Bids. Bidder representatives are invited; however, attendance is not mandatory.
- 4.02 **IRREGULARITIES:** 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.
- 4.03 **PROTEST:** Any protest must be delivered in writing to the Owner within twenty-four (24) hours after the bid opening.
- 4.04 **ERRORS:** 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.
- 4.05 **AWARD OF CONTRACT:** 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.
- 4.06 **FAILURE TO ENTER INTO A CONTRACT:** 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.
- 4.07 **SECURITY FOR FAITHFUL PERFORMANCE:** 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:
- A. Licensed at the time of award by the State of Mississippi's Commissioner of Insurance for the purpose of providing surety.
 - B. 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.

- C. All Bonds shall be executed on the form provided in the Project Manual under Document 00600 entitled *Contract Bond*.
- D. A Mississippi resident agent with the name and address typed, or lettered legibly shall countersign all Bonds.
- E. All Bonds must be accompanied by an appropriate Power of Attorney.

Part 5 BIDDER'S CHECKLIST

5.01 PROPOSAL FORM

Base Bid

Write in the amount of the base bid in numbers.

Addenda

Acknowledge the receipt of each addendum by substituting the second sheet of Document 00400-2 with the substituted sheet listing the addendum number and date. Properly complete, sign and add the substituted sheet 00400-2 to the Proposal.

Certification Form

Certification (regarding Non-Collusion, Debarment and Suspension, etc.) Form has been executed in duplicate.

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.

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.

5.02 BID SECURITY

- Included Bid Bond.
- Or
- Included Certified Check payable to the STATE OF MISSISSIPPI.

5.03 POWER OF ATTORNEY

- Included Power of Attorney

5.04 NON-RESIDENT BIDDER

- Attached a Copy of Non-Resident Bidder's Preference Law
- Or
- Attached a Statement

Part 6 BIDDER'S CONTACT LIST

6.01 **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:

- A. Additional Proposals Emma Taylor – Contract Administration (601) 359-7744
- B. Additional Prints Clint Wells – MDOT Plans Print Shop (601) 359-7460
- C. Bid Forms B.B. House – Contract Admin. Engineer (601) 359-7730
- D. Specifications Glenn Hall – Construction Engineer (601) 359-7301
- E. Drawings Glenn Hall – Construction Engineer (601) 359-7301
- F. Bidder's List & Specimen Proposals are available online at:
<http://www.gomdot.com/business/bids/adv/default.htm>

END OF DOCUMENT

**NOTICE TO BIDDERS
DOCUMENT 00300**

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**

- 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/regulate/sw/>

- 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 Proposal Document 00400 (Section 905, dated 2/28/01, MDOT – Edited for Building Projects) 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 February 13, 2007, and the date for Notice to Proceed and Beginning of Contract Time will be March 8, 2007.
- B. The calendar date for completion of this Contract shall be January 30, 2008 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 01320 of these Specifications will be required.

1.09 **SUBCONTRACTING**

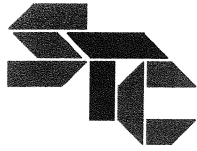
- A. The Bidder is specifically advised that any person, firm or other party to whom it proposes to award a subcontract must be acceptable to the Owner. The total allowable subcontract amount shall not exceed **sixty percent (60%) of the Contract Sum**, excluding the value of any "Specialty Items" listed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

Specialty Items

Termite Treatment
Plumbing Items
Heating, Ventilating and Air Conditioning Items
Electrical Items

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

END OF DOCUMENT



SOILTECH CONSULTANTS, INC.
Geotechnical and Environmental Engineering

MAY 15 2006

230 Highpoint Drive
Ridgeland, Mississippi 39157
Post Office Box 12466
Jackson, Mississippi 39236
(601) 952-2995 / (601) 952-2944 fax

May 8, 2006

Johnson Bailey Henderson McNeel, P.A.
1855 Lakeland Drive – Building O
Jackson, Mississippi 39216

Attention: Mr. Walter Cooper, AIA

Re: Geotechnical Investigation
MDOT District Headquarters Complex
Yazoo City, Mississippi

Gentlemen:

Submitted herein is the report of our investigation of soil and foundation conditions for the proposed building to be constructed at the MDOT complex in Yazoo City, Mississippi. Plans are to raze an existing building and construct a steel-framed building approximately 55 ft by 100 ft in planned dimensions. The building walls will be constructed of concrete blocks. The structure will be utilized as a maintenance shop, with offices, bridge and boat storage and storage of highway signs.

The purposes of this investigation were to determine soil conditions in the proposed construction area, evaluate pertinent physical properties of the soils encountered and develop guideline recommendations related to foundation design and construction. This work was performed in general agreement with our proposal dated February 15, 2006 and was authorized by Mr. Walter Cooper on April 5, 2006.

FIELD INVESTIGATION

Subsurface conditions at the project site were investigated by means of two borings made adjacent to the building planned to be razed. The borings were advanced to a depth of 20 ft each utilizing a tractor-mounted drill rig and machine auger drilling techniques. Graphical logs of the borings showing the types of soils encountered are attached. Symbols and soil classifications used on the boring logs are also attached.

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

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

LABORATORY INVESTIGATION

The engineering properties which were considered to be pertinent for this study are shear strength, compressibility and shrink-swell potential. These engineering properties were determined by means of tests completed in our laboratory. Laboratory tests completed for this study include unconfined compression tests, and natural moisture content, visual classification, and liquid and plastic limits. These tests were performed in accordance with recognize ASTM standards and procedures. The laboratory tests are discussed in the following paragraphs.

Unconfined Compression. Undrained shear strength values for the cohesive soils were evaluated by means of 5 unconfined compression tests. In an unconfined compression test, a cylindrical sample of soil is subjected to a uniformly increasing axial load until failure develops. For purely cohesive soils, the undrained shear strength is taken to be equal to one-half of the maximum normal stress which was observed to develop on the sample during the test. Undrained shear strength or simply "cohesion" values determined from the results of the unconfined compression tests are presented in the laboratory data section of the boring logs. Also shown are the natural moisture contents and unit weights determined as a part of each unconfined compression test. The cohesion values and moisture contents are also presented graphically on the boring logs as small open circles and shaded circles, respectively.

Liquid and Plastic Limits. The compressibility and shrink-swell potential of the subsurface soils were investigated indirectly by means of natural moisture content and liquid and plastic limit tests. For this study, 2 liquid and plastic limit tests were performed on selected samples. The results of the liquid and plastic limit tests can be used to classify fine-grained soils by the Unified Soil Classification System as silts or clays of high or low plasticity. The numerical difference between the liquid and plastic limit is defined as the plasticity index. The magnitude of the liquid limit and plasticity index and the proximity of the natural moisture content to the plastic limit are indicators of the potential for a soil to shrink or swell upon changes in moisture content or to consolidate under loading. The results of the liquid and plastic limit tests are plotted as small vertical lines interconnected by a horizontal-dashed line in the data section of the boring logs.

Moisture Contents. Natural moisture content tests and visual classifications were performed on 3 selected samples to verify field classifications for consistency in soil type and to extend the usefulness of plasticity data. Results of the moisture content tests are presented in the data section of the boring logs. Results of the visual classifications were utilized in the development of the "Description" section in the graphical boring logs.

SUBSURFACE CONDITIONS

The soil conditions within the depths explored at the boring locations consist of silty clays and silts. The general soil and groundwater conditions encountered at the project site and the engineering properties of these soils are discussed in the following paragraphs.

Soil Conditions. The near-surface soils at the site consist of firm to hard silty clays (Unified Soil Classification System – CL). The silty clays extended from the ground surface to a depth of approximately 11.5 ft. Unconfined compression tests performed on selected samples yielded undrained shear strengths varying from 620 lbs per sq ft to 4,180 lbs per sq ft with corresponding dry densities ranging from 93 lbs per cu ft to 107 lbs per cu ft. The moisture content of the silty clays varied from 18% to 27%. Liquid and plastic limits performed on selected samples yielded liquid limits varying from 33% to 39%, plastic limits of 24% and corresponding plasticity indices varying from 9 to 15. These materials are considered to be non-expansive to slightly expansive and with adequate bearing capacity to found a lightly loaded structure.

Beneath the silty clays were medium dense silts (ML). The moisture content of the silts varied from 17% to 18%. Standard penetration tests performed within the silts yielded blow counts (N) varying from 14 blows per ft to 26 blows per ft. The silts are considered to be non-expansive with adequate bearing capacity for the proposed structure.

Groundwater Conditions. Groundwater conditions at the project site were determined by observing water levels in the borings upon completion. No free water was encountered in either of the Borings. Notes pertaining to groundwater level observations are presented in the lower left portion of each graphical boring log. Proper note should be taken that groundwater conditions will fluctuate seasonally with variations of rainfall, and other environmental factors.

GUIDELINE FOUNDATION DESIGN RECOMMENDATIONS

Based on the results of this investigation, it is our opinion that the proposed steel-framed building can be supported on a shallow foundation. Recommendations related to design and construction of the foundation elements are discussed in the following paragraphs.

Objectionable Materials. Site preparation for this project should include, as a minimum, the removal of objectionable materials at or near the existing ground surface. Objectionable materials that should be removed from this project site include organic matter, debris, trees, stumps and roots. Since the placement, compaction effort, homogeneity, etc. of the fill materials are not known, these materials should also be removed. Further, the in situ fill materials should be spoiled and not reused as select fill because of the deleterious materials in these soils. After removal of objectionable materials, any areas that will receive select fill or structural concrete should be proof-rolled. Proof-rolling should be conducted with two passes by a fully-loaded dump truck or other suitable vehicle approved by the Engineer. After proof-rolling, any areas that are soft or that “pump” should be overexcavated and recompacted with select fill materials.

Pumping Soils. The soils at this project site are silty. Silty soils are sensitive to increases in moisture content and have a tendency to lose strength as the moisture content increases or as construction vehicles pass over the area. Such materials, if wet, are subject to pumping when being compacted. Pumping soils are not acceptable for placement of fill materials or structural concrete and should be removed and replaced to establish a stable surface. Soils that are stable during proof-rolling and compaction could become unstable from groundwater, exposure to inclement weather and/or construction vehicles. Therefore, the Contractor should be

cautioned to provide adequate drainage both during and after earthwork activities and to minimize construction traffic.

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

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

Foundation Design. The proposed lightly loaded structure can be satisfactorily supported on a shallow foundation. For a shallow foundation, we recommend a monolithic slab and grade beam system. The exterior grade beams should extend at least 2 ft below finish floor or outside finish grade, whichever would provide the lower bearing level. Interior ribs should be used to stiffen the floor slab. The interior ribs should extend at least 18-in. below the bottom of the floor slab and should be located beneath load-bearing walls or spaced on not more than 15-ft centers. The exterior grade beams and interior ribs should be reinforced for both positive and negative bending. The exterior grade beams and interior ribs could be dimensioned based on an allowable net soil bearing pressure of 2,500 lbs per sq ft with a minimum bearing width of 16 in. The allowable net soil bearing pressure should not be exceeded for any maximum combination of dead, live or wind loads.

The floor slab should also be reinforced for both positive and negative bending and could be designed based on a soil modulus, k , of 100 lbs per cu in. Concentrated or column loads exerted on the floor slab could be supported on thickened monolithic sections. The thickened sections could be designed based on the exterior grade beams as discussed above.

REPORT LIMITATIONS

The borings made for this report were located in the field by measurement from existing features at the site. The boring log shown in this report contain information related to the types of soil encountered at the specific locations and times and show lines delineating the interface between these materials, as well as results of tests performed in the laboratory on representative samples. The logs also contain our field representative's interpretation of conditions that are believed to exist in those depth intervals between the actual samples taken. Therefore, the boring logs contain both factual and interpretative information. It is not warranted that the logs are representative of subsurface conditions at other locations and times.

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

This report has been prepared for the exclusive use of Johnson Bailey Henderson McNeel, P.A. for specific application to design and construction of foundation elements for the proposed MDOT District Headquarters Complex in Yazoo City, Mississippi. The only warranty made by us in connection with the services provided is that we have used that degree of care and skill ordinarily exercised under similar conditions by reputable members of our profession practicing in the same or similar locality. No other warranty, expressed or implied, is made or intended.

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

Very truly yours,
SoilTech Consultants, Inc.



Charles R. Furlow, P.E.

Copies Submitted: (3)

SOIL BORING LOG

PROJECT: Geotechnical Investigation
 MDOT Headquarters Complex
 Yazoo City, Mississippi

No. B-2
 SHEET 1 OF 1

PROJECT NO.: 1290.01
 DATE: 4/25/06
 DRILLER: J. Ray
 TECHNICIAN: C. Woodward
 ENGINEER: C. Furlow

CLIENT: Johnson Bailey Henderson McNeel
 Jackson, Mississippi

Location: See Figure 1

LABORATORY DATA

Depth (ft)	Symbol	Samples	DESCRIPTION OF MATERIAL	Field Test Results	Undrained Shear Strength (ksf)	Moisture Content	Unit Weight (pcf)		Plasticity Index	○ Cohesion / Δ Triaxial (ksf)					
										PL 1 2 3 4 LL MC%					
							Moist	Dry		20 40 60 80					
			Surface Elevation: Hard gray silty clay (CL) - 4" asphalt - with red clayey sand gravel layer at 1' - tan below 2'		4.18	20	129	107							
5			- stiff below 5'		1.00	22	116	95	9						
10					1.21	18	112	95							
15			Medium dense tan and light gray silt (ML)	14 b/f 6-6-8		17									
20				15 b/f 5-6-9											

Terminal Depth at 20.0 ft

SOIL BORING LOG 1290.01.MDOT YAZOO CITY.GPJ NEEL SCHAFER.GDT 5/8/06

Groundwater Observations	Advancement Method	Notes
No groundwater encountered		
	Abandonment Method	
	Backfilled with soil cuttings	SoilTech Consultants, Inc.

SOIL CLASSIFICATION CHART

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

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

**PROPOSAL
DOCUMENT 00400**

(Section 905, dated 2/28/01, MDOT – Edited for Building Projects)

Date _____

Mississippi Transportation Commission
Jackson, Mississippi

Sirs: The following proposal is made on behalf of _____
(Company Name)

of _____
(Company Street Address)

(Company City, State, & Zip Code)

For constructing the following designated project(s) within the time(s) hereinafter specified.

The Contract Documents are composed of the Project Manual (Proposal) and the Drawings on file in the offices of the Mississippi Department of Transportation, Jackson, Mississippi.

I (We) certify that I (we) possess a copy of said Contract Documents.

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 Contract Documents, including the Instructions and Notice(s) to Bidders, herein, and have personally examined the site of the work. On the basis of the Contract Documents, Instructions and Notice(s) to Bidders, 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.

Attached hereto is a certified check, cashier's check or Proposal Guaranty Bond in the amount as required in the Advertisement (or, by law).

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 Contract Documents and to give such work my (our) personal attention in order to see that it is economically performed.

I (We) further propose to execute the attached Contract Agreement (Document 00500) 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 Contract Documents and Advertisement. I (We) also propose to execute the attached Contract Bond (Section 00600) 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.

Bidder acknowledges receipt of and has added to and made a part of the proposal and contract documents the following addendum (addenda):

ADDENDUM NO. _____ DATED _____ ADDENDUM NO. _____ DATED _____
ADDENDUM NO. _____ DATED _____ ADDENDUM NO. _____ DATED _____
ADDENDUM NO. _____ DATED _____ ADDENDUM NO. _____ DATED _____

TOTAL ADDENDA: _____
(Must agree with total addenda issued prior to opening of bids)

Respectfully submitted, _____
(Contractor)

BY _____
(Signature)

TITLE _____

ADDRESS _____
(Street Address)

ADDRESS _____
(City, State & Zip Code)

Date _____, 20

(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.

WORK NECESSARY FOR STORAGE FACILITY WITH OFFICES AND EQUIPMENT SHED FOR DISTRICT THREE HEADQUARTERS COMPLEX AT YAZOO CITY KNOWN AS PROJECT BWO-3143-82(001) 501614 AND BWO-3145-82(001) 501628, IN THE COUNTY OF YAZOO, 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 ITEM TOTALS ARE ENTERED AND THE BID CERTIFICATE (DOCUMENT 00604) IS SIGNED

REF. NO.	PAY ITEM NO.	UNIT with Approx. Quantity	DESCRIPTION	UNIT PRICE		ITEM TOTAL	
				Dollar	Cents	Dollar	Cents
(10)	1500 - A	lump sum	Storage Facility with Offices for District Three HQ Complex at Yazoo City, Yazoo County.....	\$			
(20)	1500 - A	lump sum	Equipment Shed for District Three Headquarters Complex at Yazoo City, Yazoo County	\$			

SUB-TOTAL\$ _____

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

END OF DOCUMENT

**AGREEMENT
DOCUMENT 00500**

(Section 902, dated 2/28/01, MDOT – Edited for Building Projects)

CONTRACT FOR: Project No. BWO-3143-82(001) 501614
Storage Facility w/ Offices for Dist Three HQ Complex

Project No. BWO-3145-82(001) 501628
Equipment Shed for District Three HQ Complex

LOCATED IN THE COUNTY OF: YAZOO

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 Contract Documents, 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 Contract Documents, 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 Contract Documents 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.

It is agreed and understood that each and every provision of law and clause required by 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) Company Name

By _____
(Signature)

MISSISSIPPI TRANSPORTATION COMMISSION

Title _____
Signed and sealed in the presence of:
(Names and address of witnesses)

By _____
Executive Director

Secretary to the Commission

Award authorized by the Mississippi Transportation Commission in session on the ____ day of _____, _____ Minute Book No. _____, Page No. _____

END OF DOCUMENT

**CONTRACT BOND
DOCUMENT 00600**

(Section 903, dated 2/28/01, MDOT – Edited for Building Projects)

CONTRACT FOR: Project No. BWO-3143-82(001) 501614
Storage Facility w/ Offices for Dist Three HQ Complex

Project No. BWO-3145-82(001) 501628
Equipment Shed for District Three HQ Complex

LOCATED IN THE COUNTY OF: YAZOO

STATE OF MISSISSIPPI,
COUNTY OF HINDS

Know all men by these presents: that we, _____

Principal, a _____
residing at _____ in the State of _____
and _____
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 Project(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 Drawings, 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 the approved Specifications, and save harmless said Mississippi Transportation Commission from any loss or damage arising out of or occasioned by the negligence, wrongful or criminal act, overcharge, fraud, or any other loss or damage whatsoever, on the part of said Principal(s), his (their) agents, servants, or employees in the performance of said Work or in any manner connected therewith, and shall be liable and responsible in a civil action instituted by the State at the instance of the Mississippi Transportation Commission or any officer of the State authorized in such cases, for double any amount in money or property, the State may lose or be overcharged or otherwise defrauded of, by reason of wrongful or criminal act, if any, of the Contractor(s), his (their) agents or employees, and shall promptly pay the said agents, servants and employees and all persons furnishing labor, material, equipment or supplies therefor, including premiums incurred, for Surety Bonds, Liability Insurance, and Workmen's Compensation Insurance; with the additional obligation that such Contractor shall promptly make payment of all taxes, licenses, assessments, contributions, damages, any liquidated damages which may arise prior to any termination of said Principal's Contract, any liquidated damages which may arise after termination of the said Principal's Contract due to default on the part of said Principal, penalties and interest thereon, when and as the same may be due this State, or any county, municipality, board, department, commission or political subdivision: in the course of the performance of said Work and in accordance with Sections 31-5-51 et seq. Mississippi Code of 1972, and other State statues 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 _____
(Signature)

By _____
(Signature) Attorney in Fact

Title _____
(Contractor's Seal)

(Name and address of local (Mississippi) representative
(Surety Seal)

END OF DOCUMENT

**NON-COLLUSION CERTIFICATION
DOCUMENT 00602**

(Non-Collusion Certification, dated 2/28/01, MDOT – Edited for Building Projects)
(Execute in duplicate)

State of Mississippi

County of _____

I, _____,
(Name of person signing Certification)

individually, and in my capacity as _____
(Title)

_____ do hereby certify under
(Name of Company, Partnership, or Corporation)

penalty of perjury under the laws of the United States and the State of Mississippi that

_____, Bidder
(Name of Company, Partnership, or Corporation)

for Project No. BWO-3143-82(001) 501614 and Project No. BWO-3145-82(001) 501628 at Yazoo City, Yazoo County, 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 _____
(Date) (Signature)

END OF DOCUMENT

NON-COLLUSION CERTIFICATION
DOCUMENT 00602

(Non-Collusion Certification, dated 2/28/01, MDOT – Edited for Building Projects)
(Execute in duplicate)

State of Mississippi

County of _____

I, _____,
(Name of person signing Certification)

individually, and in my capacity as _____
(Title)

_____ do hereby certify under
(Name of Company, Partnership, or Corporation)

penalty of perjury under the laws of the United States and the State of Mississippi that

_____, Bidder
(Name of Company, Partnership, or Corporation)

for Project No. BWO-3143-82(001) 501614 and Project No. BWO-3145-82(001) 501628 at Yazoo City, Yazoo County, 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 _____
(Date) (Signature)

END OF DOCUMENT

TO: EXECUTIVE DIRECTOR, MISSISSIPPI DEPARTMENT OF TRANSPORTATION
JACKSON, MISSISSIPPI

**CERTIFICATE
DOCUMENT 00604**

(Certificate, dated 2/28/01, MDOT – Edited for Building Projects)

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 _____
(Name of Company, Partnership, or Corporation)

By _____
(Signature)

Title _____

CERTIFICATE MUST BE EXECUTED

END OF DOCUMENT

**HAUL PERMIT FOR BRIDGES
WITH POSTED LOAD LIMITS
DOCUMENT 00605**

(Haul Permit for Bridges, dated 3/17/03, MDOT – Edited for Building Projects)

DATE: _____

PROJECT: BWO-3143-82(001) 501614 & BWO-3145-82(001) 501628

COUNTY: YAZOO

LOCATION: YAZOO CITY, MISSISSIPPI

A permit is issued to _____
(Company Name & Address)

for transporting loads exceeding the posted limit for any such bridge located on State designated routes within the project termini provided that such transport vehicles comply with all other governing statutory load limits.

This permit is valid on all State designated routes from the point of origin to the point of delivery for materials and equipment utilized in construction of said project and also valid for sub-contractors and vendors upon written permission of the Contractor. The permit is non-transferable and no other haul permit for posted bridges will be issued to other individuals, vendors, or companies for construction of this project.

A copy of this signed permit shall be carried in all vehicles operating under the authority of this permit and also a copy of the Contractor's written permission when the vehicle is other than Contractor owned.

In accordance with State law, the above named Contractor will be liable for damages directly attributable to vehicles operating under this permit.

LARRY L. "BUTCH" BROWN
EXECUTIVE DIRECTOR

**GENERAL CONDITIONS
DOCUMENT 00700**

Part 1 GENERAL

1.01 DESCRIPTION.

- A. The American Institute of Architects **AIA DOCUMENT A201-1997**, "General Conditions of the Contract for Construction", 1997, Fifteenth Edition, Articles 1 through 14 inclusive, except as may be added to or modified herein, is hereby made a part of the Contract Documents. For brevity, **AIA DOCUMENT A201-1997** 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 A201-1997**, "General Conditions of the Contract for Construction", 1997, Fifteenth Edition and Document 00800-*Supplementary Conditions*, Document 00800 shall control even if the conflicting provision in the **AIA DOCUMENT A201-1997** "General Conditions of the Contract for Construction" is not expressly deleted or revised by reference in Document 00800.

AIA[®] Document A201[™] – 1997

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address):

BWO-3143-82(001) 501614
STORAGE FACILITY WITH OFFICES &
BWO-3145-82(001) 501628
EQUIPMENT SHED FOR DISTRICT THREE COMPLEX
YAZOO CITY, YAZOO COUNTY, MISSISSIPPI

THE OWNER:

(Name and address):

THE ARCHITECT:

(Name and address):

TABLE OF ARTICLES

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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.

This document has been approved and endorsed by The Associated General Contractors of America

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User Notes:

(215429911)

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents consist of the Agreement between Owner and Contractor (hereinafter 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 other documents such as bidding requirements (advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid 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 Architect and Contractor, (2) between the Owner and a Subcontractor or Sub-subcontractor, (3) between the Owner and Architect or (4) between any persons or entities other than the Owner and 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 or 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 THE PROJECT MANUAL

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

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 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.

§ 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 which have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 CAPITALIZATION

§ 1.3.1 Terms capitalized in these General Conditions include those which 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

§ 1.4.1 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 EXECUTION OF CONTRACT DOCUMENTS

§ 1.5.1 The Contract Documents shall be signed by the Owner and Contractor. If either the Owner or Contractor or both do not sign all the Contract Documents, the Architect shall identify such unsigned Documents upon request.

§ 1.5.2 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.

§ 1.6 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.6.1 The Drawings, Specifications and other documents, including those in electronic form, prepared by the Architect and the Architect's consultants are Instruments of Service through which the Work to be executed by the Contractor is described. The Contractor may retain one record set. Neither the Contractor nor any Subcontractor, Sub-subcontractor or material or equipment supplier shall own or claim a copyright in the Drawings, Specifications and other documents prepared by the Architect or the Architect's consultants, and unless otherwise indicated the Architect and the Architect's consultants shall be deemed the authors of them and will retain all common law, statutory and other reserved rights, in addition to the copyrights. All copies of Instruments of Service, except the Contractor's record set, shall be returned or suitably accounted for to the Architect, on request, upon completion of the Work. The Drawings, Specifications and other documents prepared by the Architect and the Architect's consultants, and copies thereof furnished to the Contractor, are for use solely with respect to this Project. They are not to be used by the Contractor or any Subcontractor, Sub-subcontractor or material or equipment supplier 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. The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by the Architect and the Architect's consultants appropriate to and for use in the execution of their Work under the Contract Documents. All copies made under this authorization shall bear the statutory copyright notice, if any, shown on the Drawings, Specifications and other documents prepared by the Architect and the Architect's consultants. 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' copyrights or other reserved rights.

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 The Owner shall, at the written request of the Contractor, prior to commencement of the Work and thereafter, furnish to the Contractor reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. Furnishing of such evidence shall be a condition precedent to commencement or

continuation of the Work. After such evidence has been furnished, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.2 Except for permits and fees, including those required under Section 3.7.1, which are the responsibility of the Contractor under the Contract Documents, 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 Information or services required of the Owner by the Contract Documents shall be furnished by the Owner with reasonable promptness. Any other information or services relevant to the Contractor's performance of the Work under the Owner's control shall be furnished by the Owner after receipt from the Contractor of a written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Contractor will be furnished, free of charge, such copies of Drawings and Project Manuals as are reasonably necessary for execution of the Work.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

§ 2.3.1 If the Contractor fails to correct Work which is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or persistently 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

§ 2.4.1 If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a seven-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 after such seven-day period give the Contractor a second written notice to correct such deficiencies within a three-day period. If the Contractor within such three-day period after receipt of such second notice fails to commence and continue to correct any deficiencies, 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 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 other than the Contractor.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Since the Contract Documents are complementary, before starting each portion of the Work, the Contractor shall carefully study and compare the various Drawings and other 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 construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, any errors, inconsistencies or omissions discovered by the Contractor shall be reported promptly to the Architect as a request for information in such form as the Architect may require.

§ 3.2.2 Any design errors or omissions noted by the Contractor during this review shall be reported promptly to the Architect, but 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. The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, building codes, and rules and regulations, but any nonconformity discovered by or made known to the Contractor shall be reported promptly to the Architect.

§ 3.2.3 If the Contractor believes that additional cost or time is involved because of clarifications or instructions issued by the Architect in response to the Contractor's notices or requests for information pursuant to Sections 3.2.1 and 3.2.2, the Contractor shall make Claims as provided in Sections 4.3.6 and 4.3.7. If the Contractor fails to perform the obligations of Sections 3.2.1 and 3.2.2, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. The Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents or for differences between field measurements or conditions and the Contract Documents unless the Contractor recognized such error, inconsistency, omission or difference and knowingly failed to report it to the Architect.

§ 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 resulting loss or damage.

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

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

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 The Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Contract. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

§ 3.5 WARRANTY

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted, and that the Work will conform to the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, modifications 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

§ 3.6.1 The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor which 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 AND NOTICES

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit and other permits and governmental fees, licenses and inspections necessary for proper execution and completion of the Work which are customarily secured after execution of the Contract and which are legally required when bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 It is not the Contractor's responsibility to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, building codes, and rules and regulations. However, if the Contractor observes that portions of the Contract Documents are at variance therewith, the Contractor shall promptly notify the Architect and Owner in writing, and necessary changes shall be accomplished by appropriate Modification.

§ 3.7.4 If the Contractor performs Work knowing it to be contrary to laws, statutes, ordinances, building codes, and rules and regulations without such notice to the Architect and Owner, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 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;
- .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 in sufficient time to avoid delay in the Work.

§ 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. Important

communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case.

§ 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 and keep current, for the Architect's approval, a schedule of submittals which is coordinated with the Contractor's construction schedule and allows the Architect reasonable time to review 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

§ 3.11.1 The Contractor shall maintain at the site for the Owner one record copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to record field changes and selections made during construction, and one record 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.

§ 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 which 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. The purpose of their submittal is to demonstrate for those portions of the Work for which submittals are required by the Contract Documents the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents. 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 which 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 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. Submittals which are not marked as reviewed for compliance with the Contract Documents and approved by the Contractor may be returned by the Architect without action.

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

§ 3.13 USE OF SITE

§ 3.13.1 The Contractor shall confine operations at the site to areas permitted by law, ordinances, permits 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.

§ 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 from and about the Project waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the cost thereof shall be charged to the Contractor.

§ 3.16 ACCESS TO WORK

§ 3.16.1 The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

§ 3.17.1 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 and to the extent claims, damages, losses or expenses are not covered by Project Management Protective Liability insurance purchased by the Contractor in accordance with Section 11.3, 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.

§ 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 ADMINISTRATION OF THE CONTRACT

§ 4.1 ARCHITECT

§ 4.1.1 The Architect is the person lawfully licensed to practice architecture or an entity lawfully practicing architecture identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Architect" means the Architect or the Architect's authorized representative.

§ 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 new Architect against whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the former Architect.

§ 4.2 ARCHITECT'S 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 (1) during construction, (2) until final payment is due and (3) with the Owner's concurrence, from time to time during the one-year period for correction of Work described in Section 12.2. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified in writing in accordance with other provisions of the Contract.

§ 4.2.2 The Architect, as a representative of the Owner, will visit the site at intervals appropriate to the stage of the Contractor's operations (1) to become generally familiar with and to keep the Owner informed about the progress and quality of the portion of the Work completed, (2) to endeavor to guard the Owner against defects and

deficiencies in the Work, and (3) to determine in general if the Work 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 neither have control over or charge of, nor be responsible 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 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 will have authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve or take other appropriate action upon the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken with such reasonable promptness as to cause no delay in the Work or in the activities of the Owner, Contractor or separate contractors, 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.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion, will 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, and will issue a final Certificate for Payment upon compliance with the requirements of the Contract Documents.

§ 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. If no agreement is made concerning the time within which interpretations required of the Architect shall be furnished in compliance with this Section 4.2, then delay shall not be recognized on account of failure by the Architect to furnish such interpretations until 15 days after written request is made for them.

§ 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 initial 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 so 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.

§ 4.3 CLAIMS AND DISPUTES

§ 4.3.1 Definition. A Claim is a demand or assertion by one of the parties seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extension of time 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. Claims must be initiated by written notice. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 4.3.2 Time Limits on Claims. 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. Claims must be initiated by written notice to the Architect and the other party.

§ 4.3.3 Continuing Contract Performance. Pending final resolution of a Claim except as otherwise agreed in writing or as provided in Section 9.7.1 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.

§ 4.3.4 Claims for Concealed or Unknown Conditions. If conditions are encountered at the site which are (1) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, which 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, then notice by the observing party shall be given to the other party promptly 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 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 so notify the Owner and Contractor in writing, stating the reasons. Claims by either party in opposition to such determination must be made within 21 days after the Architect has given notice of the decision. If the conditions encountered are materially different, the Contract Sum and Contract Time shall be equitably adjusted, but if the Owner and Contractor cannot agree on an adjustment in the Contract Sum or Contract Time, the adjustment shall be referred to the Architect for initial determination, subject to further proceedings pursuant to Section 4.4.

§ 4.3.5 Claims for Additional Cost. If the Contractor wishes to make 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 10.6.

§ 4.3.6 If the Contractor believes additional cost is involved for reasons including but not limited to (1) a written interpretation from the Architect, (2) an order by the Owner to stop the Work where the Contractor was not at fault, (3) a written order for a minor change in the Work issued by the Architect, (4) failure of payment by the Owner, (5) termination of the Contract by the Owner, (6) Owner's suspension or (7) other reasonable grounds, Claim shall be filed in accordance with this Section 4.3.

§ 4.3.7 Claims for Additional Time

§ 4.3.7.1 If the Contractor wishes to make 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.

§ 4.3.7.2 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.

§ 4.3.8 Injury or Damage to Person or Property. If either party to the Contract 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.

§ 4.3.9 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.

§ 4.3.10 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 4.3.10 shall be deemed to preclude an award of liquidated direct damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 4.4 RESOLUTION OF CLAIMS AND DISPUTES

§ 4.4.1 Decision of Architect. Claims, including those alleging an error or omission by the Architect but excluding those arising under Sections 10.3 through 10.5, shall be referred initially to the Architect for decision. An initial decision by the Architect shall be required as a condition precedent to mediation, arbitration or litigation of all Claims between the Contractor and Owner arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Architect with no decision having been rendered by the Architect. The Architect will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 4.4.2 The Architect will review Claims and within ten days of the receipt of the 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 Architect is unable to resolve the Claim if the Architect lacks sufficient information to evaluate the merits of the Claim or if the Architect concludes that, in the Architect's sole discretion, it would be inappropriate for the Architect to resolve the Claim.

§ 4.4.3 In evaluating Claims, the Architect 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 Architect in rendering a decision. The Architect may request the Owner to authorize retention of such persons at the Owner's expense.

§ 4.4.4 If the Architect 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 provide a response on the requested supporting data, advise the Architect when the response or supporting data will be furnished or advise the Architect that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Architect will either reject or approve the Claim in whole or in part.

§ 4.4.5 The Architect will approve or reject Claims by written decision, which shall state the reasons therefor and which shall notify the parties of any change in the Contract Sum or Contract Time or both. The approval or rejection of a Claim by the Architect shall be final and binding on the parties but subject to mediation and arbitration.

§ 4.4.6 When a written decision of the Architect states that (1) the decision is final but subject to mediation and arbitration and (2) a demand for arbitration of a Claim covered by such decision must be made within 30 days after the date on which the party making the demand receives the final written decision, then failure to demand arbitration within said 30 days' period shall result in the Architect's decision becoming final and binding upon the Owner and Contractor. If the Architect renders a decision after arbitration proceedings have been initiated, such decision may be entered as evidence, but shall not supersede arbitration proceedings unless the decision is acceptable to all parties concerned.

§ 4.4.7 Upon receipt of a Claim against the Contractor or at any time thereafter, the Architect or 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 Architect or the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 4.4.8 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 prior to resolution of the Claim by the Architect, by mediation or by arbitration.

§ 4.5 MEDIATION

§ 4.5.1 Any Claim arising out of or related to the Contract, except Claims relating to aesthetic effect and except those waived as provided for in Sections 4.3.10, 9.10.4 and 9.10.5 shall, after initial decision by the Architect or 30 days after submission of the Claim to the Architect, be subject to mediation as a condition precedent to arbitration or the institution of legal or equitable proceedings by either party.

§ 4.5.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be in accordance with the Construction Industry Mediation Rules of the American Arbitration Association currently in effect. Request for mediation shall be filed in writing with the other party to the Contract and with the American Arbitration Association. The request may be made concurrently with the filing of a demand for arbitration but, in such event, mediation shall proceed in advance of arbitration or legal or equitable 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.

§ 4.5.3 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.

§ 4.6 ARBITRATION

§ 4.6.1 Any Claim arising out of or related to the Contract, except Claims relating to aesthetic effect and except those waived as provided for in Sections 4.3.10, 9.10.4 and 9.10.5, shall, after decision by the Architect or 30 days after submission of the Claim to the Architect, be subject to arbitration. Prior to arbitration, the parties shall endeavor to resolve disputes by mediation in accordance with the provisions of Section 4.5.

§ 4.6.2 Claims not resolved by mediation shall be decided by arbitration which, unless the parties mutually agree otherwise, shall be in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association currently in effect. The demand for arbitration shall be filed in writing with the other party to the Contract and with the American Arbitration Association, and a copy shall be filed with the Architect.

§ 4.6.3 A demand for arbitration shall be made within the time limits specified in Sections 4.4.6 and 4.6.1 as applicable, and in other cases within a reasonable time after the Claim has arisen, and in no event shall it be made after the date when institution of legal or equitable proceedings based on such Claim would be barred by the applicable statute of limitations as determined pursuant to Section 13.7.

§ 4.6.4 Limitation on Consolidation or Joinder. No arbitration arising out of or relating to the Contract shall include, by consolidation or joinder or in any other manner, the Architect, the Architect's employees or consultants, except by written consent containing specific reference to the Agreement and signed by the Architect, Owner, Contractor and any other person or entity sought to be joined. No arbitration shall include, by consolidation or joinder or in any other manner, parties other than the Owner, Contractor, a separate contractor as described in Article 6 and other persons substantially involved in a common question of fact or law whose presence is required if complete relief is to be accorded in arbitration. No person or entity other than the Owner, Contractor or a separate contractor as described in Article 6 shall be included as an original third party or additional third party to an arbitration whose interest or responsibility is insubstantial. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of a Claim not described therein or with a person or entity not named or described therein. 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.

§ 4.6.5 Claims and Timely Assertion of Claims. 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.

§ 4.6.6 Judgment on Final Award. 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.

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 will promptly reply to the Contractor in writing stating whether or not the Owner or the Architect, after due investigation, has reasonable objection to any such proposed person or entity. Failure of the Owner or Architect to reply promptly 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 change a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitute.

§ 5.3 SUBCONTRACTUAL RELATIONS

§ 5.3.1 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 which 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 which 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.

§ 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.

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 Section 4.3.

§ 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 when directed to do so. 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 which 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 Owner shall be reimbursed by the Contractor for costs incurred by the Owner which are payable to a separate contractor because of delays, improperly timed activities or defective construction of the Contractor. The Owner shall be responsible to the Contractor for costs incurred by the Contractor because of delays, improperly timed activities, damage to the Work or defective construction of a separate contractor.

§ 6.2.4 The Contractor shall promptly remedy damage wrongfully caused by the Contractor 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

§ 6.3.1 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 change in the Work;
- .2 the amount of the adjustment, if any, in the Contract Sum; and
- .3 the extent of the adjustment, if any, in the Contract Time.

§ 7.2.2 Methods used in determining adjustments to the Contract Sum may include those listed in Section 7.3.3.

§ 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 7.3.6.

§ 7.3.4 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.

§ 7.3.5 A Construction Change Directive signed by the Contractor indicates the agreement of the Contractor 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.

§ 7.3.6 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the method and the adjustment shall be determined by the Architect 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, a reasonable allowance for overhead and profit. 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 7.3.6 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.

§ 7.3.7 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change which 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.

§ 7.3.8 Pending final determination of the total cost of a Construction Change Directive to the Owner, amounts not in dispute for such changes in the Work shall be included in Applications for Payment accompanied by a Change Order indicating the parties' agreement with part or all of such costs. For any portion of such cost that remains in dispute, the Architect will make an interim determination for purposes of monthly certification for payment for those costs. That 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 4.

§ 7.3.9 When the Owner and Contractor agree with the 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 shall be recorded by preparation and execution of an appropriate Change Order.

§ 7.4 MINOR CHANGES IN THE WORK

§ 7.4.1 The Architect will have 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 shall be effected by written order and shall be binding on the Owner and Contractor. The Contractor shall carry out such written orders promptly.

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. Unless the date of commencement is established by the Contract Documents or a notice to proceed given by the Owner, the Contractor shall notify the Owner in writing not less than five days or other agreed period before commencing the Work to permit the timely filing of mortgages, mechanic's liens and other security interests.

§ 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 which 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 Section 4.3.

§ 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

§ 9.1.1 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

§ 9.2.1 Before the first Application for Payment, the Contractor shall submit to the Architect a schedule of values allocated to various portions of the Work, 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 for operations completed in accordance with the schedule of values. 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 reflecting retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.8, such applications may include requests for payment on account of changes in the Work which 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 Such applications may not include requests for payment for portions of the Work for which the Contractor does not intend to pay to a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that the Work has progressed to the point indicated and that, to the best of the Architect's knowledge, information and belief, 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 another 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 persistent 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.

§ 9.6 PROGRESS PAYMENTS

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

§ 9.6.2 The Contractor shall promptly pay each Subcontractor, upon receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of such 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 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 Payment to material 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

§ 9.7.1 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 arbitration, 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.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion which 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 11.4.1.5 and authorized by public authorities having jurisdiction over the Work. 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 written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in

the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

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

§ 9.10.3 If, after 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

§ 10.1.1 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 give notices and comply with applicable laws, ordinances, rules, 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 load or permit any part of the construction or site to be loaded so as to endanger its safety.

§ 10.3 HAZARDOUS MATERIALS

§ 10.3.1 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 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 verify that it has been 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. 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, which adjustments shall be accomplished as provided in Article 7.

§ 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) and provided that such damage, loss or expense is not due to the sole negligence of a party seeking indemnity.

§ 10.4 The Owner shall not be responsible under Section 10.3 for materials and substances brought to the site by the Contractor unless such materials or substances were required by the Contract Documents.

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

§ 10.6 EMERGENCIES

§ 10.6.1 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 Section 4.3 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 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 which 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 date of commencement of the Work until date of final payment and termination of any coverage required to be maintained after final payment.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work. 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. If any of the foregoing insurance coverages are required to remain in force after final payment and are reasonably available, an additional certificate evidencing continuation of such coverage shall be submitted with the final Application for Payment as required by Section 9.10.2. 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 in accordance with the Contractor's information and belief.

§ 11.2 OWNER'S LIABILITY INSURANCE

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

§ 11.3 PROJECT MANAGEMENT PROTECTIVE LIABILITY INSURANCE

§ 11.3.1 Optionally, the Owner may require the Contractor to purchase and maintain Project Management Protective Liability insurance from the Contractor's usual sources as primary coverage for the Owner's, Contractor's and Architect's vicarious liability for construction operations under the Contract. Unless otherwise required by the Contract Documents, the Owner shall reimburse the Contractor by increasing the Contract Sum to pay the cost of purchasing and maintaining such optional insurance coverage, and the Contractor shall not be responsible for purchasing any other liability insurance on behalf of the Owner. The minimum limits of liability purchased with such coverage shall be equal to the aggregate of the limits required for Contractor's Liability Insurance under Sections 11.1.1.2 through 11.1.1.5.

§ 11.3.2 To the extent damages are covered by Project Management Protective Liability insurance, the Owner, Contractor and Architect waive all rights against each other for damages, except such rights as they may have to the proceeds of such insurance. The policy shall provide for such waivers of subrogation by endorsement or otherwise.

§ 11.3.3 The Owner shall not require the Contractor to include the Owner, Architect or other persons or entities as additional insureds on the Contractor's Liability Insurance coverage under Section 11.1.

§ 11.4 PROPERTY INSURANCE

§ 11.4.1 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 11.4 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.4.1.1 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.

§ 11.4.1.2 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 which 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.

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

§ 11.4.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.4.1.5 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.

§ 11.4.2 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.

§ 11.4.3 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.

§ 11.4.4 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.

§ 11.4.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.4.7 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.

§ 11.4.6 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 11.4. 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.

§ 11.4.7 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 11.4 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.

§ 11.4.8 A loss insured under 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 11.4.10. 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.

§ 11.4.9 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 in accordance with an arbitration award in which case the procedure shall be as provided in Section 4.6. 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.

§ 11.4.10 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 as provided in Sections 4.5 and 4.6. The Owner as fiduciary shall, in the case of arbitration, make settlement with insurers in accordance with directions of the arbitrators. If distribution of insurance proceeds by arbitration is required, the arbitrators will direct such distribution.

§ 11.5 PERFORMANCE BOND AND PAYMENT BOND

§ 11.5.1 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.

§ 11.5.2 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 permit a copy to be made.

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 required 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 which 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, 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

§ 12.2.1.1 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 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 performance 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 which 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 which 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 which the Contractor might have 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

§ 12.3.1 If the Owner prefers to accept Work which 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

§ 13.1.1 The Contract shall be governed by the law of the place where the Project is located.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to the other party hereto and to partners, successors, assigns and legal representatives of such other party in respect 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 an institutional lender providing construction financing for the Project. In such event, the lender shall assume 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

§ 13.3.1 Written notice shall be deemed to have been duly served if delivered in person to the individual or 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 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 thereunder, 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 required by the Contract Documents or by laws, ordinances, rules, regulations or orders of public authorities having jurisdiction shall be made at an appropriate time. 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 tests, inspections or approvals which do not become requirements until after bids are received or negotiations concluded.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

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

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

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

§ 13.6 INTEREST

§ 13.6.1 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 COMMENCEMENT OF STATUTORY LIMITATION PERIOD

§ 13.7.1 As between the Owner and Contractor:

- .1 Before Substantial Completion. As to acts or failures to act occurring prior to the relevant date of Substantial Completion, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than such date of Substantial Completion;
- .2 Between Substantial Completion and Final Certificate for Payment. As to acts or failures to act occurring subsequent to the relevant date of Substantial Completion and prior to issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of issuance of the final Certificate for Payment; and
- .3 After Final Certificate for Payment. As to acts or failures to act occurring after the relevant date of issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of any act or failure to act by the Contractor pursuant to any Warranty provided under Section 3.5, the date of any correction of the Work or failure to correct the Work by the Contractor under Section 12.2, or the date of actual commission of any other act or failure to perform any duty or obligation by the Contractor or Owner, whichever occurs last.

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 which requires all Work to be stopped;
- .2 an act of government, such as a declaration of national emergency which 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 and for proven loss with respect to materials, equipment, tools, and construction equipment and machinery, including reasonable overhead, profit 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 persistently 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 persistently or 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 persistently disregards laws, ordinances, or rules, regulations or orders of a public authority having jurisdiction; 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 Architect 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 take possession of the site and 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 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 Architect, 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.

Additions and Deletions Report for AIA[®] Document A201[™] – 1997

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

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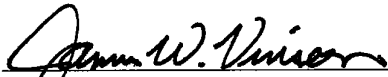
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Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, James W. Vinson, 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 15:34:55 on 12/13/2006 under Order No. 1000237945_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™ – 1997 - 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)

12-4-06

(Dated)

SUPPLEMENTARY CONDITIONS
Document 00800

SUMMARY

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 A201-1997**, "General Conditions of the Contract for Construction", 1997, Fifteenth Edition. 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 1 of the Specifications.

1.02 Verification Of Dimensions: 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: The Specifications and the Drawings 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: Sections of Division 1 General Requirements govern the execution of the Work of all Sections 2-16 of the Specifications.

1.05 Workmanship: 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: 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: 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:** 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.

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

- 1.6.1** 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 ADMINISTRATION OF THE CONTRACT

4.1 ARCHITECT

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.

4.5 MEDIATION

4.5.1 Delete this Subparagraph in its entirety.

4.5.2 Delete this Subparagraph in its entirety.

4.5.3 Delete this Subparagraph in its entirety.

4.6 ARBITRATION

4.6.1 Delete this Subparagraph in its entirety.

4.6.2 Delete this Subparagraph in its entirety.

4.6.3 Delete this Subparagraph in its entirety.

4.6.4 Delete this Subparagraph in its entirety.

4.6.5 Delete this Subparagraph in its entirety.

4.6.6 Delete this Subparagraph in its entirety.

- 4.7 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).

- 4.7.1 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.

- 4.7.2 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.

- 4.7.3 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.

4.7.4 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.

4.7.5 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.

4.7.6 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.

4.7.7 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.

4.7.8 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.

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

7.2.3 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

9.7.1 Change this Subparagraph 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.

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.

- 10.4 Delete this Subparagraph in its entirety.
- 10.5 Delete this Subparagraph in its entirety.

Article 11 INSURANCE AND BONDS

11.1 CONTRACTOR’S LIABILITY INSURANCE

11.1.4 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 Occurrence
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

11.1.5 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.

11.1.6 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

11.2.1 Delete this Subparagraph in its entirety and substitute the following:

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 PROJECT MANAGEMENT PROTECTIVE LIABILITY INSURANCE

Delete this Paragraph in its entirety.

11.4 PROPERTY INSURANCE (BUILDER'S RISK OR INSTALLATION FLOATER)

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

The Contractor shall purchase...

11.4.1.2 Delete this Clause under Subparagraph 11.4.1 in its entirety.

11.4.1.3 Change the following Clause in Subparagraph 11.4.1.3 to read as follows:

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

11.4.2 Delete this Subparagraph in its entirety.

11.4.3 Delete this Subparagraph in its entirety.

11.4.4 Delete this Subparagraph in its entirety.

11.4.5 Delete this Subparagraph in its entirety.

11.4.6 Delete this Subparagraph in its entirety.

11.4.10 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.

END OF DOCUMENT

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

**ADDENDA
DOCUMENT 00910**

DATE: DECEMBER 4, 2006

**PROJECT: STORAGE FACILITY WITH OFFICES AND
EQUIPMENT SHED FOR DISTRICT THREE
HEADQUARTERS COMPLEX AT YAZOO CITY,
YAZOO COUNTY, MISSISSIPPI**

**PROJECT NUMBER: BWO-3143-82(001) 501614
BWO-3145-82(001) 501628**

PART 1 GENERAL

1.01 DESCRIPTION

- A. Any Addendum issued on this Project will be included in Section 00910 and become part of the Standard Form of the Agreement Between the Owner and the Contractor.
- B. Bidders shall acknowledge receipt of addendum by inserting its number and date in the designated spaces on their Proposal.

PART 2 PRODUCTS
Not Used

PART 3 EXECUTION
Not Used

END OF DOCUMENT

SECTION 01110

SUMMARY OF WORK

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 Yazoo City, Yazoo 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, plus unit prices for the Pay Items.

- | | | |
|----|---|----------|
| 1. | Description: 501614-A. Storage Facility with Offices. | Lump Sum |
| 2. | Description: 501628-B. Equipment Shed. | Lump Sum |

TOTAL CONTRACT SUM **LUMP SUM**

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 01295 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 and protection of existing structures to remain. 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 01310 – Project Management & Coordination.

1.02 CONTRACTOR'S USE OF PREMISES

- A. Confine operations at the site to areas permitted by:
 1. Law
 2. Ordinances
 3. Permits
 4. Contract Documents
 5. Owner
- B. Do not unreasonably encumber site with materials or equipment.
- C. Do not load structure with weight that will endanger structure.
- D. Assume full responsibility for protection and safekeeping of products stored on premises.
- E. Move 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 Divisions and Sections using the 16-division format and CSI/CSC's "MasterFormat" numbering system.
 1. Division 1: Sections in Division 1 govern the execution of the Work of all Sections 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.

END OF SECTION

SECTION 01290

PAYMENT PROCEDURES

PART 1 GENERAL

1.01 METHOD OF MEASUREMENT: The method of measurement and payment shall conform to the applicable provisions of Article 9 of the AIA Document A201-1997 General Conditions of the Contract for Construction and Document 00800 – Supplementary Conditions that modify Article 9 of these General Conditions.

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.
2. Subtotals shall be indicated for each building with a total for the Contract.

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 01770-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 01320-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.

D. Substantiating Data:

1. Submit data justifying dollar amounts in question when requested.
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, address, social security number, 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 Three. The Work includes Storage Facility with Offices and Equipment Shed for District Three Headquarters Complex at Yazoo City, Yazoo 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-3143-82(001) 501614
 Storage Facility with Offices for District Three HQ Complex
 at Yazoo City, Yazoo County lump sum
- 2. DESCRIPTION B:
 MDOT Project No. BWO-3145-82(001) 501628
 Equipment Shed for District Three Headquarters Complex
 at Yazoo City, Yazoo County lump sum

TOTAL PROJECT CONTRACT SUM

LUMP SUM

PART 2 PRODUCTS & PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01295

SCHEDULE OF VALUES

PART 1 GENERAL

1.01 DESCRIPTION

- A. Scope: Submit 8 copies of the Schedule of Values to the MDOT Architectural Services Unit at least 10 days prior to submitting first Application for Payment. 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. Upon Project Engineer / MDOT Architect's request, support the values given with data substantiating their correctness. List quantities of materials. 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. 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 2- 16. Identify each line item with number and title as listed in Table of Contents of this Specification.
- C. 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.
- D. 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.
- E. Review and Re-submittal: After Project Engineer / MDOT Architect's review, if requested, revise and resubmit schedule in same manner as described above.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01298

CHANGE ORDER PROCEDURES

PART 1 GENERAL

- 1.01 SCOPE: 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 01630 - 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.

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 01310

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 Architectural Services Unit Director. Upon approval, he will remain until the Project is completed and cannot be removed during construction without the written consent of the Project Engineer.

1.02 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 the Project Engineer and the Architectural Services Unit Director each Monday for the previous week.
 - 4. Electrical: Take special care to coordinate and supervise the Work of the 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. The superintendent shall advise the 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.
- 1.03 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.
- 1.04 SUBCONTRACTOR'S DUTIES: The Subcontractor is responsible to coordinate and supervise his employees in the Work accomplished under his part of the Contract.
- A. Schedules: Conduct Work to assure compliance with construction schedules.
 - B. Suppliers: Transmit all instructions to his material suppliers.
 - C. Cooperation: Cooperate with the Project Coordinator and other subcontractors.

PART 2 PRODUCTS & PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01315

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 prior to commencement of the Work.
- B. Location: A central site, convenient for all parties, designated by the Contractor and approved by the Project Engineer.
- C. Attendance: Attending shall be the Project Engineer and MDOT representatives associated with the Project, the MDOT Architect and Consultants (if requested by the District), 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: Project Engineer's 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 and Consultants (if requested by the District), 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 01320

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 within 15 days after date of Notice to Proceed.
 - 2. Submit to the Project Engineer periodically updated schedules accurately depicting progress to first day of each month.
 - 3. Submit 2 copies to the Project Engineer.
- 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 01330

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 01630 – Product Options and Substitution Procedures, for requirements concerning products that will be acceptable on this Project.
- B. Shop Drawings: Original (**Legible**) drawings prepared by Contractor, subcontractor, supplier or distributor which illustrate 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. Reproductions for submittals: 9 Prints.
 5. Shop drawings shall be stamped and signed by the Contractor certifying accuracy, completeness and compliance with Contract requirements prior to submitting to the MDOT Architectural Services Unit.
- C. Product Data: Provide 9 copies each. Minimum information 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 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 one copy 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 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. Order no materials or begin no 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 9 copies of shop drawings and product data with additional number of copies, if required, by Contractor for distribution.
 3. Submit number of samples specified in each Specification Section.
 4. Accompany submittals with transmittal letter, in duplicate, 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.
 5. Each copy of submittals shall include the following:
 - 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.
 - 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, any 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 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;
 3. Other conditions became apparent which indicates acceptance of such substitute item to be in the best interest of the Owner.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01355

RENOVATION PROJECT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDE

- A. Project coordination and assignment of the work of all Parties and the scheduling of all elements of alterations and renovation work by procedures and methods to expedite completion of the Work for each Part.
- B. The Work to be assigned, coordinated and scheduled includes, but is not limited to, the following:
 - 1. The work of each Division and Section of the Specifications as shown on the Drawings and in the Specifications.
 - 2. The procedures and activities required under the provisions of this Section.

1.02 PROJECT COORDINATION

- A. Definition: Project Coordination is the process utilized to guide all participants in the Project's construction and includes assigning, scheduling, expediting, reviewing, and modifying, as appropriate, the activities required to produce the total Work to the designated quality and within the assigned time.
- B. Responsibility: Except otherwise provided by the Contract Documents, all Project Coordination shall be the entire responsibility of the Contractor. The Contractor shall set forth procedures and conditions for coordination of the Work and shall personally be responsible for the implementation of the required coordination which shall include the following:
 - 1. Communications: Establish lines of authority and communication at the Job Site.
 - 2. General Coordination: Closely coordinate all work of Project participants to effect quality construction and steady progress in all phases and aspects of the Work with a minimum of delays and interference.
 - 3. Special Coordination: Give additional careful attention to the work of the following:
 - a. Mechanical / Electrical Subcontractors and be responsible for the following:
 - 1) Establishment of locations, clearances and precedence for all piping, conduit and ductwork (underground and above ceilings).
 - 2) Submittal of Schematic Drawings giving location and clearance information for Architect / Engineer review.
 - 4. Supervision: Supervise the activities of every phase of the Work of the Project. Make frequent inspections of the Work to determine progress and quality; proceed immediately to remedy problems and to effect changes needed in the construction process and personnel.
 - 5. Interpretations of Contract Documents:
 - a. Consultation: Consult with Project Engineer to obtain interpretations.
 - b. Assistance: Assist in resolution of any questions.
 - c. Stop all work not in accordance with the requirements of the Contract Documents.

6. Division One: Coordinate requirements of Division One and specifically as follows:
 - a. Testing: Coordinate all required testing. Refer to Section 01455.
 - b. Temporary Facilities and Controls: Allocate, maintain and monitor all temporary facilities. Refer to Section 01500.
 - c. Cutting and Patching: Supervise and control all cutting and patching. Refer to Section 01735.
 - d. Cleaning: Direct and execute a continuing cleaning program throughout the construction, requiring each trade to dispose of their own debris, except as otherwise provided in the Contract Documents. Refer to Section 01740.
 - e. Project Record Documents: Maintain up-to-date project record documents. Refer to Section 01785.
7. Enforce all safety requirements.
8. Maintain quality control of all work.

1.03 QUALITY CONTROL

- A. Assign all elements of the work to trades qualified to perform each type of work.
- B. Patch, repair and refinish existing work using skilled mechanics who are capable of matching existing quality of workmanship. Quality of patched or extended work shall be not less than that specified for new work.

1.04 PROJECT MEETINGS

- A. When required by Project Engineer or by individual Specification Sections, convene meetings to coordinate the Work and / or to review conditions at the Site and to outline procedures by which the Work will be performed. Refer to Sections 01310 and 01315.
- B. Require attendance by all affected Parties.

1.05 CONSTRUCTION ACCESS: Access to construction area for construction materials and exit way for demolition debris shall be as directed by the Project Engineer.

1.06 PROTECTION OF WORK

- A. Protect from damage, existing finishes, equipment, adjacent work scheduled to remain, and all new work.
 1. Protect existing and new work from temperature extremes. Maintain interior work above 60 degrees F.
 2. Provide heat and humidity control as needed to prevent damage to existing work and new work.
 3. Provide dust partitions as needed to prevent damage to existing work and new work.

1.07 CUTTING AND PATCHING

- A. Scope: Provide the necessary cutting, fitting and patching required to complete all elements of the Work including, but not limited to, the following procedures:
 1. To integrate with other work, to fit properly together.
 2. To uncover work to provide for installation of ill-timed work.

3. To remove and replace defective and / or non-conforming work.
 4. To remove installed material for testing.
 5. To provide openings for penetration of mechanical and electrical work.
- B. Preparation: Prior to commencing cutting and patching, examine existing conditions (including structure and elements subject to movement) and advise Project Engineer in writing of any condition that could be adversely affected by cutting and patching.
1. Submit written request in advance of cutting or alteration that affects:
 - a. Structural integrity of any element of the Project.
 - b. Integrity of weather-exposed or moisture-resistant element.
 - c. Efficiency, maintenance, or safety of any operational element.
 - d. Visual qualities of sight exposed elements.
 - e. Work of User or separate contractor.
 2. Include in the request:
 - a. Identification of Project.
 - b. Location and description of affected work.
 - c. Necessity for cutting or alteration.
 - d. Description of proposed work, and products to be used.
 - e. Alternatives to cutting and patching.
 - f. Effect on work of User or separate contractor.
 - g. Written permission of affected separate contractor.
 - h. Date and time work will be executed.
- C. Procedures: Perform cutting and patching as required in Part 3 Execution of this Section.
1. Proceed only when permitted and after temporary supports and other devices are in place to ensure structural integrity and to protect other portions of the Project from damage.
 2. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.
 3. Cut rigid materials using masonry saw or core drill. Pneumatic tools are not allowed without prior approval from the Project Engineer.
 4. Restore work with new products in accordance with requirements of the Contract Documents.
 5. Fit work air tight to pipes, sleeves, ducts, conduits and other penetrations through surfaces.
 6. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material, to full thickness of the penetrated element.
 7. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

1.08 WORK RESTRICTIONS

- A. Project participants shall not perform any work on any Sunday or any Legal Holidays (as defined in Section 3-3-7, Mississippi Code of 1972, Annotated) except as required by emergency conditions and approved by the Project Engineer.
- B. "No Smoking" shall be observed in the work areas.

PART 2 PRODUCTS

2.01 SALVAGED MATERIALS

- A. Coordinate with Project Engineer in identifying salvageable materials. The Owner has first right of refusal for all items.
- B. Contractor shall take proper care in removing and placement where directed in designated area on Site.
- C. Salvage sufficient quantities of cut or removed material to replace damaged work of existing construction, when material is not readily obtainable on current market.
 - 1. Items not required for use in repair of existing work to remain shall be discarded if of no value to the Owner.
 - 2. Do not incorporate salvaged or used material in new construction unless approved in writing by the Project Engineer.

2.02 PRODUCTS FOR PATCHING, EXTENDING AND MATCHING

- A. Provide products or types of construction same as in existing structure, as needed to patch, extend or match existing work to make work complete and consistent to standards of quality of connected and / or similar adjacent construction. Except otherwise indicated all products shall be new.
- B. Where Contract Documents do not define products or standards of workmanship in existing construction, Contractor shall determine products by inspection and any necessary testing, and upgrade by use of the existing as a sample of comparison.

PART 3 EXECUTION

- 3.01 EXAMINATION: Verify that demolition is complete and areas are ready for beginning of repairing, refinishing and new construction.
- 3.02 PREPARATION: Cut, move, or remove existing construction as necessary for access to alterations and renovations work; repair, replace, and restore where existing affected construction is to remain a part of final completed work.
- 3.03 ADJUSTMENTS
 - A. Where partitions are removed, patch floors, walls, and ceilings for installation of new materials.
 - B. Where removal of partition(s) results in adjacent spaces becoming one space, rework floor surfaces and ceilings to provide smooth planes without breaks, steps, or bulkheads.
 - C. Where extreme change of plane occurs, request instructions from Project Engineer as to method of making transition.
 - D. Where new work adversely affects existing conditions beyond work limits defined, new work shall extend to facilitate proper joining and finishing of work.

3.04 DAMAGED SURFACES

- A. Patch and replace any portion of an existing finished surface which as a result of this construction, is found to be damaged, lifted, discolored, or shows other imperfections, with matching material.
 - 1. Provide adequate support of substrate prior to matching the finish.
 - 2. Refinish patched portions of painted or coated surfaces in a manner to produce uniform color and texture over entire surface.
- B. Patch and replace any portion of an existing surface to be refinished as a finished surface that is found to be damaged, lifted, discolored or show imperfections that renders surface or substrate unsuitable for application of new finish material.
 - 1. Refinish patched portion to match existing adjacent surface in order to produce a uniform color and texture.
- C. Where new or existing wall is patched or damaged, the wall surface shall be patched and refinished from base to ceiling and end to end, or nearest natural break, and shall match new work in quality.

3.05 TRANSITION FROM EXISTING TO NEW WORK

- A. When new work abuts or finishes flush with existing work, make a smooth and workmanlike transition. Patched work shall match existing adjacent work in texture and appearance.
- B. When finished surfaces are cut in such a way that a smooth transition with new work is not possible, terminate existing surface in a neat manner along a straight line at a natural line of division.

3.06 CLEANING – PERIODIC AND FINAL

- A. General Requirements:
 - 1. Maintain the Project Space, including areas used for passage of Project personnel and materials, in a neat, clean and orderly condition at all times.
 - 2. Do not allow the accumulation of scrap, debris, waste material, and other items not required for the Work.
 - 3. Provide adequate storage for all items awaiting removal from Site, observing all requirements for fire prevention and protection of the environment.
- B. Periodic Cleaning, as follows:
 - 1. Daily and more often if necessary, inspect the Project Space and pick up all scrap, debris, and waste material; remove to designated storage.
 - 2. At completion of work of each trade, clean area and make surfaces ready for work of successive trades.
 - 3. One each week, more often if necessary, remove all stored waste material and legally dispose of off the Site.
- C. Final Cleaning: Under provision of Section 01740.

END OF SECTION

SECTION 01425

REFERENCE DOCUMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Identification and purpose of Reference Documents.
- B. Administrative procedures and responsibility for the use of Reference Documents.

1.02 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 Documents" 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.

1.03 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 Documents. 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 Project Engineer'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 01430

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 fabricator and installer/applicator 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 fabricator's and installer's/ applicator's performance of the work hereunder shall be to the satisfaction of the Architect and Owner. 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 installer/applicator 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 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 01455

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 02315, Excavation, Filling, and Grading.
 - 2. Section 03200, Concrete Reinforcement.
 - 3. Section 03300, 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.

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. 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 01500

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

- 1.01 GENERAL: 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: The Contractor will not be required to provide a temporary field office and storage shed(s).
- A. Copies of Construction Documents: It shall still be the responsibility of the Contractor to maintain storage files suitable to keep 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 is to provide the Project Engineer with job site and emergency telephone numbers.
- B. 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: 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: 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: Supply water service. The operating costs shall be borne by the Owner.
- 1.06 ROADS AND ACCESS: 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: 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: 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: 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: 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: 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 01610

BASIC PRODUCT REQUIREMENT

PART 1 GENERAL

1.01 SECTION INCLUDES: 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. Selected Products.
2. 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 Project Engineer'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 / Engineer 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 Project Engineer'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 01630-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 / Engineer 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 01770 - 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 Project Engineer 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 01630

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. Substitution 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 Project Engineer 4 copies of complete list of all proposed product substitutions.
- 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.

1.04 SUBSTITUTIONS

A. The Project Engineer 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 01330 - 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 Project Engineer's judgment, the product or material is not equal.

PART 2 PRODUCTS
Not Used

PART 3 EXECUTION
Not Used

END OF SECTION

SECTION 01735 CUTTING AND PATCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Scope: To set forth broad general conditions covering cutting and patching that applies to everyone and everything on the job.
- B. Execute cutting including excavating, fitting or patching or work required to:
 - 1. Make several parts fit properly.
 - 2. Uncover work to provide for installation of ill-timed work.
 - 3. Remove and replace defective work.
 - 4. Remove and replace work not conforming to Contract requirements.
 - 5. Install specified work in existing construction.
- C. In addition to Contract requirements, upon Project Engineer's written instructions:
 - 1. Uncover work for observation of covered work.
 - 2. Remove samples of installed materials for testing.
 - 3. Remove work to provide alteration of existing work.
- D. Do not cut or modify work of another Contractor without his consent.
- E. Payment for Costs: Costs caused by ill-timed, defective or work not conforming to the Contract will be borne by party responsible for ill-timed, defective or non-conforming work.

PART 2 PRODUCTS

- 2.01 GENERAL: 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 01740 CLEANING

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: 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. Broom clean paved surfaces; rake clean other surfaces of grounds.
- C. Remove temporary fencing and leave in same condition as surrounding landscaped areas.
- D. Keep Project clean until occupied by Owner.

END OF SECTION

SECTION 01770

CLOSEOUT PROCEDURES

PART 1 GENERAL

- 1.01 DESCRIPTION: 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's Inspection: The Contractor shall make written request for a Final Inspection to the Project Engineer. 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 Section 15080 and 6 copies of a list prepared by the Contractor of deficiencies, which will be edited by the Project Engineer. 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 judgment, the Project is not ready for an Inspection, the Project Engineer may schedule another inspection.
 - B. Owner's Inspection: After the Project Engineer has 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 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: The Mississippi Department of Transportation presently does not recognize the term "Substantial Completion". Therefore, the Project is not complete and time does not end until all defects are remedied and Final Acceptance is given.
- 1.04 CLOSEOUT DOCUMENTS: Unless otherwise notified, the Contractor shall submit to the Owner through the Project Engineer, 2 copies the following before final payment is made:
- A. Request for Final Payment: AIA Document G702, current edition, completed in full or a computer generated form having similar data.
 - B. Contractor's Affidavit of Payment of Debts and Claims: AIA Document G706, current edition, completed in full.

- C. 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.
- D. Consent of Surety Company to Final Payment: AIA Document G707, current edition, completed in full by the Bonding Company.
- E. Power of Attorney: Closeout Documents should be accompanied by an appropriate Power of Attorney.
- F. 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 Final Acceptance, except where specified for longer periods.
 - 1. 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".
 - 2. All guarantees and warranties shall be obtained in the Owner's name.
 - 3. 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.
 - 4. 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.
 - 5. 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.
- G. Project Record Documents: Furnish all other record documents as set forth in Section 01785 - Project Record Documents.
 - 1. 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

H. Additional Documents Specified Within the Project Manual:

1. 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.
2. 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 01783

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 1 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Division 1 Section "Closeout Procedures" for submitting operation and maintenance manuals.
 - 3. Division 1 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
 - 4. Divisions 2 through 16 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 at least 15 days before requesting inspection for Substantial Completion. 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 15 days before final inspection. MDOT Architect will return one copy with comments (if required) within 15 days after 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.
1. 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.
 - 1. 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.

- 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.
 - 1. 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. 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.
 - 1. 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 01785

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.
- B. Maintenance of Documents:
1. 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.
 2. Store Record Documents apart from Documents used for construction.
 3. Maintain Record Documents in clean, dry, and legible condition. Do not use Record Documents for construction purposes.
 4. Make Record Documents available at all times for inspection by the Project Engineer and Owner.
- C. Recording:
1. 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.
 2. Contract Drawings: Legibly mark to record actual construction:
 - a. Horizontal and vertical location of underground and overhead utilities with their connections referenced to permanent surface improvements.
 - b. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
 - c. Field changes that involve dimension and detail.
 - d. Changes made by Supplemental Agreement (Change Order) or Field Order.
 3. Product Data List: Legibly list by each Specification Section to record manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed. The list shall include the supplier / subcontractor's name, contact person, street address, e-mail address, telephone and fax numbers.
 4. Shop Drawings: Maintain as Record Documents; legibly mark Drawings to record changes made after review.

D. Submittals:

1. Furnish two (2) copies of all Record Documents.
2. 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.
3. The Product Data list with name and address of each subcontractor and material supplier shall be listed in front of each binder.
4. 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 02221 TRENCHING, BEDDING AND BACKFILLING FOR PIPE AND MISCELLANEOUS STRUCTURES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section includes furnishing labor, equipment, and materials necessary to perform the earthwork operations and other items incidental to storm drainage and utilities installation as shown on the Contract Drawings. The work includes, but is not necessarily limited to excavation, dewatering, backfilling, bedding, compaction, shoring, and hauling and disposal of materials unsuitable for backfill.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Backfill shall be performed with the excavated materials from the trench or structure excavation, provided that the material is, in the opinion of the independent testing agency, suitable for backfilling.
- B. Whenever excavated materials are deemed unsuitable for backfill, resulting in insufficient suitable material from the excavation to complete the backfill, the Contractor shall obtain suitable backfill as required for backfilling.
- C. Granular Bedding Material for Class "C" Pipe Bedding: Granular bedding material shall be natural or crushed stone aggregates, well graded and shall meet the following graduations:

<u>Sieve Size</u>	<u>Percent Passing (by weight)</u>
1 in.	100
1/2 in.	50 - 100
No. 4	20 - 60
No. 40	0 - 20
No. 200	0 - 5

PART 3 EXECUTION

3.01 EXCAVATION AND BACKFILL

- A. Trenches shall be dug so that the pipe or utility line can be laid to the line and grade shown on the Drawings. The trench walls shall be maintained as near vertical as possible to an elevation one foot above the top of the utility. The clear space between the barrel of the pipe and the trench shall not exceed nine inches. The width of the trench above the one foot elevation shall be ample to permit the utility to be laid and jointed properly, and backfill is to be placed and compacted as specified. Trenches shall be of such extra width when required to permit the convenient placing of timber supports, sheeting, and bracing and handling of fittings. No more than 100 feet of trench shall be excavated in advance of the pipe or utility installation without the prior written consent of the Architect. Excavated material suitable for use as backfill material shall be stacked a sufficient distance from the trench bank to prevent slides or cave-ins. To avoid excessive surcharge, the Contractor shall provide such grading as may be necessary to prevent surface water from flowing into the trench or other excavations.

- B. In the event the trench is erroneously excavated below the elevation required, the Contractor shall backfill with granular bedding material to the design grade at his own expense. The bedding material shall be placed and compacted in maximum six inch, loose measure, lifts, except as otherwise noted.
 - C. Backfill for trenches shall be placed in eight inch maximum lifts with each lift being compacted to a minimum ninety-five (95%) percent of The Standard Proctor Maximum Density. One sand cone density test shall be required for each 200 linear feet of trench per each lift. Any structure or pipe damaged during compaction procedures shall be replaced at the Contractor's expense.
 - D. In the event the design invert of a pipe is in a fill area, the fill shall be placed to two (2) feet above proposed top of pipe and excavated back to design pipe invert.
 - E. Bell holes shall be dug to permit the entire straight barrel of the pipe to rest on the trench bottom. Boulders or loose rocks which might bear against the pipe shall be removed from the trench bottom and replaced with suitable backfill.
 - F. Unstable material removed due to the fault or neglect of the Contractor in his performance of water removal, sheeting and shoring, or other specified requirements, shall be excavated and replaced with granular bedding material at the Contractor's expense.
 - G. If rock is encountered within six (6) inches of the design pipe invert, the rock shall be removed to a minimum of six (6) inches below bottom of pipe and replaced with bedding material as hereinafter specified. Refer to the General Conditions for rock removal.
- 3.02 SHEETING AND BRACING
- A. Trenches shall be sloped, sheeted or constructed with use of a drag box in accordance with the governing state, local, and federal ordinance to protect life, property, and the work. The minimum angle of repose for trench depths in excess of five feet shall be 45°.
- 3.03 DEWATERING
- A. The Contractor shall at all times during construction provide means and devices to remove and dispose promptly of all water entering the trench and structure excavations and shall keep the excavations acceptably dry until the structures to be built therein are completed. All water pumped or drained from the excavation shall be legally disposed of.
 - B. Water shall not be allowed in the trenches while the pipes are being laid. A well point dewatering system shall be used on any runs where the pipe will be below the ground water elevation. When this system is used, a minimum horizontal separation of ten feet shall be maintained between the centerline of the pipe and the centerline of the well point line. Sump and pump type trenching may be used only on short, shallow runs where well points would be impractical.
 - C. No masonry shall be placed in water and no water shall be allowed to rise over masonry until the concrete or mortar has attained its initial set. Water shall not be allowed to rise so as to set up unequal pressures in the structures until the concrete or mortar has set at least 24 hours.
- 3.04 PIPE BEDDING
- A. The Contractor shall furnish and install all pipe on the type of bedding shown on the Contract Drawings and as specified herein.

- B. Bedding classes are as defined below and shown on the Drawings:
1. Two types of bedding are specified:
 - a. For Class "C" bedding, gravel shall be compacted in the trench bottom, and compacted around the pipe to a depth shown on the Drawings.
 - (1) Where the trench bottom has been excavated below grade, Class "C" bedding shall be used.
 - (2) Where consolidated rock has been removed from the trench bottom, Class "C" bedding shall be used.
 - (3) Where Polyvinyl Chloride Pipe or Vitrified Clay Pipe is used, Class "C" bedding shall be used.
 - b. For Class "D" bedding, the trench bottom shall be hand shaped to receive the portion of the circumference of the pipe barrel shown on the Drawings. Class "D" bedding shall be used for all pipe bedding except in cases described above where Class "C" bedding is required.

3.05 SPECIAL REQUIREMENTS

- A. Appurtenances: Excavation for manholes, headwalls and similar structures shall be sufficient to leave at least twelve inches clear between the outer surfaces of the structure and the embankment or timber that may be used to hold and protect the banks.

END OF SECTION

SECTION 02320

EXCAVATING, BACKFILLING, AND COMPACTING FOR
STRUCTURES

PART 1 - GENERAL

1.01 REFERENCES

- A. ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils.
- B. ASTM D698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³).
- C. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
- D. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
- E. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.02 DEFINITIONS

- A. Granular subbase: Granular fill directly beneath slabs-on-grade.
- B. Backfill: Fill immediately behind foundation elements or retaining walls.
- C. Structural fill: Fill under the structure other than the granular subbase.

1.03 SUBMITTALS

- A. Upon request, submit soil test reports performed by the Structural Testing/Inspection Agency.

1.04 QUALITY ASSURANCE

- A. Structural Testing/Inspection Agency shall perform the following quality related items:
 - 1. Verify structural fill complies with specifications.
 - 2. Determine particle size, liquid limit, plastic limit, plasticity index and maximum density of each type of soil.
 - 3. Observe proofrolling and mitigation of pumping and unsuitable material. Approve subgrade prior to placement of structural fill.
 - 4. Perform a sufficient number of field density tests to verify compaction of structural fill. As a minimum, perform one test per lift for every 2500 square feet of fill placed.
 - 5. Verify foundation bearing areas for proper compaction prior to concrete and reinforcing steel placement.
 - 6. Verify quantities of material removed and quantities of material placed where Unit Prices are involved.

1.05 SURVEY

- A. Prior to construction, have structure location staked and certified by a licensed surveyor. If discrepancies between actual lines and elevations exist, notify Architect/Structural Engineer before proceeding with layout of structure.

1.06 SUBSURFACE CONDITIONS

- A. Copies of a subsurface investigation of the site will be made available upon request. The data is not intended as a representation or warranty of the continuity of such conditions. Owner will not be responsible for interpretation or conclusions drawn by the Contractor. The data is made available for the convenience of the Contractor and is not guaranteed to represent all conditions that may be encountered.
- B. Part of the new facility is a replacement facility. The fill for the existing facility shall be removed due to the unknown material and compaction efforts.
- C. Contractor may examine the site and make his own subsurface explorations at no additional cost to the Owner. Notify Owner prior to making any subsurface explorations.

1.07 EXISTING UTILITIES

- A. Locate existing underground utilities by careful hand excavation. If utilities are to remain in place, provide protection from damage during construction operations.
- B. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Do not interrupt existing utility service facilities occupied and used by Owner or others, unless written permission is given by the Architect and then only after temporary utility services have been provided.
- C. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult the Architect immediately for directions.
- D. Repair damaged utilities to satisfaction of utility owner.

1.08 NOTICE

- A. Notify the Architect/Structural Engineer 48 hours prior to the beginning of any excavation work.

PART 2 - PRODUCTS

2.01 GRANULAR SUBBASE

- A. Granular subbase: Sound and free-draining, such as sand, gravel or crushed stone with less than 15% passing the 200 sieve. Maximum diameter shall be 1-1/2 inches.

2.02 BACKFILL

- A. Backfill: Sound and free-draining, such as sand, gravel or crushed stone with less than 15% passing the 200 sieve. Maximum diameter shall be 1-1/2 inches.

2.03 STRUCTURAL FILL

- A. Structural fill: Silty Clay or Sandy Clay with a Plasticity Index less than 25, and a Liquid Limit less than 45. The near-surface silty clay and clayey silts present at the site may be suitable for reuse as fill materials.
- B. Structural fill shall be free of organics, debris and deleterious materials.

PART 3 - EXECUTION

3.01 STRIPPING

- A. Strip vegetation, topsoil, roots, and other unsuitable material to a depth determined by the Structural Testing/Inspection Agency but not less than one foot, nor less than 10 feet outside the perimeter of the structure.
- B. Stockpile sufficient amounts of topsoil as required in order to cover areas to be landscaped with a minimum of six inches of material.

3.02 BUILDING PAD EXCAVATION AND PREPARATION

- A. Excavate not less than 10 feet outside the perimeter of the structure.
- B. Excavation shall be considered unclassified. Excavations shall comply with U.S. Department of Labor, Occupation Safety and Health Administration (OSHA) regulations.
- C. The existing fill shall be removed due to unknown material and compaction efforts.
- D. Do not excavate to full depth when there is probability of frost forming or ground freezing in excavation before concrete is placed.
- E. Ground water may be encountered during the foundation excavation. Provide a system for controlling the ground water below excavations.
- F. Keep excavations dry by sloping ground away from holes and trenches.
- G. Provide positive drainage away from the footing excavations, both during and after construction.
- H. Provide final grades and slopes away from the foundations to promote the rapid runoff of surface water away from the building.
- I. Avoid footing excavations during inclement weather and place concrete within the excavations within 24 hours after completion of the excavations;
- J. If water is allowed to accumulate within a footing excavation and softens the bearing soils, the deficient soils should be removed from the excavation prior to concrete placement.
- K. Place a "mudmat" of lean concrete to seal the bearing stratum in the event wet conditions are experienced or expected; and

- L. Minimize traffic in footing excavations to only that necessary to place the steel and concrete for the footings.

3.03 PROOFROLLING

- A. After stripping or excavation and before any fill placement, fill areas shall be proofrolled with a minimum of two coverages of a loaded dump truck or scraper in each of two perpendicular directions.
- B. Areas found to be soft or pumping shall have the soft soil removed and replaced with structural fill and compacted as outlined herein.

3.04 PLACEMENT OF GRANULAR SUBBASE

- A. Do not place granular subbase on subgrade that contains frost, mud or is frozen.
- B. Compact granular subbase to 95 percent of the maximum dry density as measured by Standard Proctor, ASTM D698.

3.05 PLACEMENT OF BACKFILL

- A. Backfill behind wall shall be placed in layers of six inches.
- B. Compact backfill behind walls to 95 percent of the maximum dry density as measured by Standard Proctor, ASTM D698.

3.06 PLACEMENT OF STRUCTURAL FILL

- A. Do not place structural fill on subgrade that contains frost, mud or is frozen.
- B. Structural fill shall be placed and compacted in 9-inch thick loose layers. If hand compaction methods are used, the maximum lift thickness shall be 5-inches.
- C. Compact structural fill to 95 percent of the maximum dry density as measured by Standard Proctor, ASTM D698, with water content within +3/-3 percent of the optimum moisture content.

3.07 CLEAN UP

- A. Remove excess excavated materials from job site and upon completion leave site in clean condition.

END OF SECTION

SECTION 02365

SOIL TREATMENT FOR TERMITE CONTROL

PART 1 GENERAL

- 1.01 SECTION INCLUDES: Soil treatment for termite control.
- 1.02 SUBMITTALS
- A. Submit manufacturer's technical product data and application instructions prior to application for Project Engineer's 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: In addition to the requirements of these Specifications, comply with manufacturer's instructions and recommendations for the Work, including preparation of substrate and application.
- A. 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.
 - B. The professional pest control operator specializing in Soil Treatment for Termite Control, with 5 years minimum experience, shall have completed work similar to that indicated for this Project and have a record of successful in-service performance.
 - C. 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.
- 1.05 GUARANTEE: Furnish 3 copies of written guarantee certifying that the applied soil poisoning treatment will prevent the infestation of subterranean 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 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: 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 02622 POLYVINYL CHLORIDE PIPE AND FITTINGS FOR PRESSURE MAINS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall supply all labor, equipment, materials and incidentals necessary to install all piping and appurtenances located outside the buildings and structures and test as shown on the Drawings and as specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02221: Trenching, Bedding and Backfilling for Pipe and Miscellaneous Structures
- B. Section 02623: Polyvinyl Chloride Pipe and Fittings for Gravity Sewers
- C. Section 02640: Valves and Appurtenances for Site Utilities
- D. Plumbing piping is included in Division 15.

1.03 DESCRIPTION OF SYSTEM

- A. Water Distribution Mains, except fire hydrant branches.
- B. Water Supply Lines.
- C. Sanitary Sewer Force Mains.

1.04 SUBMITTALS

- A. Submit shop drawings to the Architect for approval, showing the manufacturers' drawings and specifications indicating complete details of all items. The above shall be submitted to the Architect for approval before fabrication and shipment of these items.
- B. Test certificates in accordance with Section 13 of AWWA C504 shall be furnished to the Architect prior to shipment of valves to the job site.

1.05 INSPECTION

- A. All pipe and fittings to be installed under this contract may be inspected at the site for compliance with these Specifications by the Architect. The cost of inspection of all pipe approved for this Contract, plus the cost of inspection of a reasonable amount of disapproved pipe, will be borne by the Owner.

1.06 QUALITY ASSURANCE

- A. All plastic pipe, fittings, and appurtenances shall be furnished by a single manufacturer who is fully experienced, reputable, and qualified in the manufacture of the items to be furnished. The pipe and fittings shall be designed, constructed, and installed in accordance with the best practices and methods and shall comply with these Specifications.

PART 2 PRODUCTS

2.01 POLYVINYL CHLORIDE PIPE AND FITTINGS

A. Polyvinyl chloride (PVC) pipe shall be in accordance with ASTM D-1784 and ASTM D-1785, Class 1120 PVC Pipe conforming to AWWA C-900 and as manufactured by Celanese Piping Systems, Chemtrol Division, Cabot Company, Johns Manville or approved equal.

B. Pipe Less Than 4 Inches Diameter:

1. Screw-Joint: Pipe to dimensional requirements of ASTM D 1785 Schedule 80, with joints meeting requirements of 150 psi working pressure, 200 psi hydrostatic test pressure, unless otherwise shown or specified. Pipe couplings when used, must be hydrostatically tested as required by ASTM D 2464.
2. Elastomeric-Gasket Joint: Pipe shall be to dimensional requirements of ASTM D 1785, Schedule 40 with joints meeting the requirements of 150 psi working pressure, 200 psi hydrostatic test pressure, unless otherwise shown or specified, or it may be pipe conforming to requirements of ASTM D 2241, elastomeric joint, with the following applications:

<u>SDR</u>	<u>MAXIMUM WORKING PRESSURE</u>	<u>MINIMUM HYDROSTATIC PRESSURE</u>
26	100	133
21	120	160
17	150	200
13.5	200	266

In addition to the above requirements, the pipe, couplings and fittings must be hydrostatically tested as required by AWWA C900, and must be to iron pipe (I.P.S.) or cast iron outside diameter (CIOD) size dimensions.

3. Solvent Cement Joint: Pipe to dimensional requirements of ASTM D 1785 or D 2241 with joints meeting the requirements of 150 psi working pressure and 200 psi hydrostatic test pressure.

C. Pipe 4-Inch Through 12-Inch Diameter: Pipe, couplings and fittings 4-inch through 12-inch diameter shall conform to the requirements of AWWA C900, Class 150, CIOD pipe dimensions only, elastomeric-gasket joint only, unless otherwise shown or specified.

D. The pipe shall be suitable for field cutting, welding, bending, and coupling, shall be Schedule 80 unless otherwise specified or shown on the drawings and shall be of the sizes shown on the drawings.

E. All pipe shall be bundled or packaged in such a manner as to provide adequate protection for the ends during transportation from the manufacturer.

F. Joints for pipe, fittings, and couplings for pipe shall be as specified for PVC pipe. Joints connecting pipe of differing materials shall be made in accordance with the manufacturer's recommendation as approved by the Architect.

G. Fittings:

1. For pipe less than 4-inch diameter, fittings shall be elastomeric-gasket bell-and-socket fittings with built-in stops, pipe ends tapered to fit the socket or elastomeric-gasket couplings with built-in stops, pipe end tapered to fit the coupling. Gasket shall conform to the requirements of ASTM F 477, High Head Application.

2. For pipe 4-inch through 12-inch diameter: Fittings and specials shall be cast iron, bell end in accordance with AWWA C110, 150 psi pressure rating unless otherwise shown or specified, except that profile of bell may have special dimensions as required by the pipe manufacturer; or may be fittings and specials of the same material as the pipe with elastomeric gaskets, all in conformance with the requirements of AWWA C900. Cast-iron fittings and specials shall be cement-mortar lined (standard thickness) in accordance with AWWA C104. Fittings shall be for bell-and-spigot pipe or plain end pipe, or as applicable.
- H. Caulking for plastic pipe in wall sleeve shall be by a mechanical, modular, rubber sealing element placed in between the sleeve and pipe and expanded to make a tight fit or other method approved by the Project Engineer.

PART 3 EXECUTION

3.01 HANDLING PIPE AND FITTINGS

- A. Care shall be taken in loading, transporting and unloading to prevent injury to the pipe or coatings. Pipe or fittings shall not be dropped. All pipe for fittings shall be examined before laying, and no piece shall be installed which is found to be defective. Any damage to the pipe coatings shall be repaired as directed by the Project Engineer.
- B. All pipe and fittings shall be subjected to a careful inspection and hammer test just prior to being laid or installed.
- C. If any defective pipe is discovered after it has been laid it shall be removed and replaced with a sound pipe in a satisfactory manner at no additional expense to the Owner. All pipe and fittings shall be thoroughly cleaned before laying, shall be kept clean until they are used in the work, and when installed or laid, shall conform to the lines and grades required.

3.02 POLYVINYL CHLORIDE PIPE INSTALLATION

- A. The installation of plastic pipe shall be strictly in accordance with the manufacturer's technical data and printed instructions.
- B. Joints for plastic pipe shall be strictly in accordance with manufacturer's instructions.
- C. Installation of valves and fittings shall be strictly in accordance with manufacturer's instructions. Particular care shall be taken not to overstress threaded connections at sleeves. In making solvent weld connections, the solvent shall not be spilled on valves if allowed to run from joints.
- D. The locations of all pipes shall conform to the locations indicated on the drawings. In most cases, a certain amount of flexibility in positioning of pipes will be allowed, especially where new pipes will connect to existing structures or piping.
- E. All plastic pipe to metal pipe connections shall be made in accordance with the manufacturer's recommendations as approved by the Architect. Metal piping shall not be threaded into plastic fittings, valves, or coupling, nor shall plastic piping be threaded into metal valves, fittings, or couplings.
- F. Plastic piping shall be laid along the trench to provide for expansion and contraction. The pipe shall be backfilled with selected fine excavated material and thoroughly compacted to one foot above the top of the pipe and thereafter backfilled as specified in Section 02221.

G. Placing and Laying:

1. Pipe and accessories shall be carefully lowered into the trench by means of derrick, ropes, belt slings, or other appropriate equipment. Under no circumstances shall any of the water line materials be dropped or dumped into the trench. Care shall be taken to avoid abrasion of the pipe coating. Except where necessary in making connections with other lines or as authorized by the Architect, pipe shall be laid with the bells facing in the direction of laying. The full length of each section of pipe shall rest solidly upon the pipe bed, with recesses excavated to accommodate bells, couplings, and joints. Pipe that has the grade or joint disturbed after laying shall be taken up and relaid. Pipe shall not be laid in water or when trench conditions are unsuitable for the work. Water shall be kept out of the trench until joining is completed. When work is not in progress, open ends of pipe, fittings, and valves shall be securely closed so that no trench water, earth, or other substance will enter the pipes or fittings. Where any part of the coating or lining is damaged, the repair shall be made by the Contractor at his expense in a satisfactory manner. Pipe ends left for future connections shall be valved, plugged, or capped, anchored, and marked, as shown.
2. Where connections are made between new work and existing mains, the connections shall be made by using specials and fittings to suit the actual conditions. Standard methods are available for making connections to various types of pipe, either under pressure or in the dewatered condition. Where made under pressure, these connections shall be installed as approved by the Architect.

3.03 ADJACENT FACILITIES

- A. Sewer Lines: Where the location of the water pipe is not clearly defined in dimensions on the drawings, the water pipe shall not be laid closer horizontally than 10 feet from a sewer except where the bottom of the water pipe will be at least 12 inches above the top of the sewer pipe, in which case the water pipe shall not be laid closer horizontally than 6 feet from the sewer. Where water lines cross under gravity-flow sewer lines, the sewer pipe for a distance of at least 10 feet each side of the crossing shall be fully encased in concrete or shall be made of pressure pipe with no joint located within 3 feet horizontally of the crossing. Water lines shall in all cases cross above sewer force mains or inverted siphons and shall be not less than 2 feet above the sewer main. Joints in the sewer main, closer horizontally than 3 feet to the crossing, shall be encased in concrete. The thickness of the concrete encasement, including that at the pipe joints, shall be not less than 4 inches.
- B. Water lines shall not be laid in the same trench with sewer lines, gas lines, fuel lines, or electric wiring.
- C. Structures: Where water pipe is required to be installed within 3 feet of existing structures, the water pipe shall be sleeved as required for roads, railroads, and airfields. Care shall be exercised and proper precautions taken during installation of the water pipe and sleeve to assure that there will be no damage to the structures and no settlement or movement of foundations or footings. Any damage occurring as a result of the Contractor's operation shall be corrected and all costs connected therewith shall be borne by the Contractor.

3.04 JOINT DEFLECTION

- A. Maximum offset in alignment between adjacent pipe joints shall be as recommended by the manufacturer and approved by the Architect, but in no case shall it exceed 5 degrees.

3.05 THRUST BLOCKS

- A. Longitudinal thrust along pressure pipe lines of bends, tees, reducers, hydrants, valves and caps or plugs shall be counteracted by thrust blocking, as shown on the drawings. Where the bends are in a vertical plane, the thrust shall be counteracted by enough weight of concrete to counterbalance the vertical thrust forces.
- B. Where undisturbed trench walls are not available for thrust blocking, the Contractor shall furnish and install suitable pipe harnesses or ties designed and manufactured specifically for this purpose.
- C. Joints shall be protected by felt roofing paper prior to placing concrete.
- D. Bearing area of thrust blocks shall be adequate to prevent any movement of the fitting and shall be of the size and dimensions shown on the drawings.
- E. Concrete for thrust blocking shall be no leaner than 1 part cement, 2-1/2 parts sand and 5 parts stone and shall have a compressive strength of not less than 2000 psi after 28 days. Concrete shall be placed against undisturbed material, and shall not cover joints, bolts, or nuts, or interfere with the removal of any joint. Wooden side forms shall be provided for thrust blocks.
- F. In lieu of thrust blocking and with prior approval, pipe harnesses and/or ties or restrained push on or restrained mechanical joints may be used.
- G. Pipe lines smaller than 4" in diameter shall not require thrust blocking, except as shown on the Drawings.

3.06 CLEANING

- A. At the conclusion of the work, the Contractor shall thoroughly clean the new pipe line by flushing with water or other means to remove all dirt, stones, pieces of wood or other material which may have entered during the construction period. If, after this cleaning, obstructions remain, they shall be removed.

3.07 TESTING

- A. Furnish all necessary equipment and labor for carrying out a pressure test and leakage test on the pipelines. Make any traps and furnish all necessary caps, plugs, water, etc. as required in conjunction with testing a portion of the pipe between valves. Also, furnish a test pump, gauges, and any other equipment required with carrying out the hydrostatic tests.
- B. Where any section of a water line is provided with concrete thrust blocking for fittings or hydrants, the hydrostatic tests shall not be made until at least 5 days after installation of the concrete thrust blocking unless otherwise approved. The method proposed for disposal of waste water from hydrostatic tests and disinfection shall be submitted to the Architect for approval prior to performing hydrostatic tests.

C. Pressure Test

1. After the pipe is laid, the joints completed, fire hydrants permanently installed, and the trench partially backfilled leaving the joints exposed for examination, the newly laid piping or any valved section of piping shall, unless otherwise specified, be subjected for 2 hours to a hydrostatic pressure test of 200 psi. Each valve shall be opened and closed several times during the test. Exposed pipe, joints, fittings, hydrants and valves shall be carefully examined during the partially open trench test. Joints showing visible leakage shall be replaced or remade as necessary. Cracked or defective pipe, joints, fittings, hydrants, and valves, discovered in consequence of this pressure test shall be removed and replaced with sound material, and the test shall be repeated until the test results are satisfactory. The requirement for the joints to remain exposed for the hydrostatic tests may be waived by the Architect when one or more of the following conditions is encountered:
 - a. Wet or unstable soil conditions in the trench.
 - b. Compliance would require maintaining barricades and walkway around and across an open trench in a heavily used area that would require continuous surveillance to assure safe conditions.
 - c. Maintaining the trench in an open condition would delay completion of the contract.
 - d. An unforeseeable cause that would result in excess cost.
2. The Contractor may request the waiver, setting forth in writing the reasons for the request and stating the alternative procedure proposed to comply with the required hydrostatic tests.
3. Sanitary sewer force main piping shall be pressurized to 200 psi minimum, and shall be tested for a minimum of two (2) hours with no pressure drop.

D. Leakage Test:

1. Leakage test shall be conducted after the pressure tests have been satisfactorily completed. The duration of each leakage test shall be at least 2 hours, and during the test the water line shall be subjected to 200 psi pressure. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved or approved section thereof, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled. No piping installation will be accepted until the leakage is less than the number of gallons per hour as determined by the formula:

$$L = \frac{SDP}{133,200}$$

In which L equals the allowable leakage in gallons per hour; S is the length of pipeline tested in feet; D is the nominal diameter of the pipe in inches; and P is the average test pressure during the leakage test, in psi gage.

2. Should any test of pipe disclose leakage greater than that specified the defective joints shall be located and repaired until the leakage is within the specified allowance, without additional cost to the Owner.

- E. Time for Making Test: Except for joint material setting or where concrete reaction backing necessitates a 5-day delay, pipelines jointed with rubber gaskets, mechanical or push on joints, or couplings may be subjected to hydrostatic pressure, inspected, and tested for leakage at any time after partial completion of backfill. Cement-mortar lined pipe may be filled with water as recommended by the manufacturer before being subjected to the pressure test and subsequent leakage test.

- F. Concurrent Hydrostatic Tests: The Contractor may elect to conduct the hydrostatic tests using either or both of the following procedures. Regardless of the sequence of tests employed, the results of pressure tests, leakage tests, and disinfection shall be satisfactory as specified. All replacement, repair or retesting required shall be accomplished by the Contractor at no additional cost to the Owner.
 - G. Pressure test and leakage test may be conducted concurrently.
 - H. Hydrostatic tests and disinfection may be conducted concurrently, using the water treated for disinfection to accomplish the hydrostatic tests. If water is lost when treated for disinfection and air is admitted to the unit being tested, or if any repair procedure results in contamination of the unit, disinfection shall be reaccomplished.
- 3.08 DISINFECTION
- A. The entire water piping system shall be thoroughly disinfected using the Continuous Feed Method as outlined in Standard for Disinfecting Water Mains, AWWA C651, latest edition. The chlorinating material shall be either liquid chlorine or sodium hypochlorite solution. The chlorinated water shall be retained in the main for at least 24 hours, during which time all valves and hydrants in the treated section shall be operated to ensure disinfection of the appurtenances. At the end of this 24 hour period, the treated water in all portions of the main shall have a residual of not less than 10 mg/L free chlorine. Disinfection applies only to domestic water systems unless otherwise required by Federal, State, and/or local agencies.
 - B. After disinfection, the solution shall be flushed immediately from the system to avoid prolonged contact of the solution with pipe lining. Flush with clean water until chlorine measurements show that the concentration in the water leaving the main is no higher than generally prevailing in the system or is acceptable for domestic use.
 - C. Disposal of the chlorinated water shall be done in accordance with the above-mentioned AWWA Standard and shall be only by methods allowed by federal, state and local regulatory agencies.

END OF SECTION

SECTION 02623 POLYVINYL CHLORIDE PIPE AND FITTINGS FOR GRAVITY SEWERS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall supply all labor, equipment, materials and incidentals necessary to install all piping and appurtenances located outside the buildings and structures and test as shown on the drawings and as specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02221: Trenching, Bedding and Backfilling for Pipe and Miscellaneous Structures.
- B. Plumbing piping is included in Division 15.

1.03 DESCRIPTION OF SYSTEM

- A. Storm sewers 12 inches and smaller.
- B. Sanitary sewer lines, unless otherwise specified.

1.04 SUBMITTALS

- A. Submit shop drawings to the Architect for approval, showing the manufacturer's drawings and specifications indicating complete details of all items. The above shall be submitted to the Architect for approval before fabrication and shipment of these items.

1.05 INSPECTION

- A. All pipe and fittings to be installed under this contract may be inspected at the site for compliance with these specifications by the Architect. The cost of inspection of all pipe approved for this Contract, plus the cost of inspection of a reasonable amount of disapproved pipe, will be borne by the Owner.

1.06 QUALITY ASSURANCE

- A. All plastic pipe, fittings, and appurtenances shall be furnished by a single manufacturer who is fully experienced, reputable, and qualified in the manufacture of the items to be furnished. The pipe and fittings shall be designed, constructed, and installed in accordance with the best practices and methods and shall comply with these Specifications.

PART 2 PRODUCTS

2.01 POLYVINYL CHLORIDE PIPE AND FITTINGS

- A. Polyvinyl chloride (PVC) pipe shall be in accordance with ASTM D-3034-SDR35 and as manufactured by Celanese Piping Systems, Chemtrol Division, Cabot Company, Johns Manville or approved equal.

- B. The pipe shall be suitable for field cutting, welding, bending, and coupling, shall be suitable for use as a gravity sewer conduit, and shall be of the sizes shown on the drawings. Provisions must be made for contraction and expansion at each joint with a rubber ring. The bell shall consist of an integral wall section with a solid cross-section rubber ring, factory assembled, securely locked in place to prevent displacement during assembly.
- C. All pipe shall be bundled or packaged in such a manner as to provide adequate protection for the ends during transportation from the manufacturer.
- D. All fittings and accessories shall be as manufactured and furnished by the pipe supplier or approved equal and have bell and/or spigot configurations compatible with that of the pipe.

PART 3 EXECUTION

3.01 HANDLING PIPE AND FITTINGS

- A. Care shall be taken in loading, transporting and unloading to prevent injury to the pipe or coatings. Pipe or fittings shall not be dropped. All pipe for fittings shall be examined before laying, and no piece shall be installed which is found to be defective. Any damage to the pipe coatings shall be repaired as directed by the Architect.
- B. All pipe and fittings shall be subjected to a careful inspection and hammer test just prior to being laid or installed.
- C. If any defective pipe is discovered after it has been laid it shall be removed and replaced with a sound pipe in a satisfactory manner at no additional expense to the Owner. All pipe and fittings shall be thoroughly cleaned before laying, shall be kept clean until they are used in the work, and when installed or laid, shall conform to the lines and grades required.

3.02 POLYVINYL CHLORIDE PIPE INSTALLATION

- A. The installation of plastic pipe shall be strictly in accordance with the manufacturer's technical data and printed instructions.
- B. Joints for plastic pipe shall be constructed in accordance with the manufacturer's technical data and printed instructions. Pipe shall be laid in an upstream direction with the bell ends of the pipe facing upstream.
- C. Plastic piping shall be laid along the trench to provide for expansion and contraction at each joint with a rubber ring.
- D. The locations of all pipes shall conform to the locations indicated on the drawings. In most cases, a certain amount of flexibility in positioning of pipes will be allowed, especially where new pipes will connect to existing structures or piping.

3.03 TESTING:

- A. Leakage tests by exfiltration or infiltration, as described below, shall be made on all sewer pipe. Generally, if the groundwater table is above the top of the pipe, an infiltration test shall be used. If the groundwater table is below the top of the pipe an exfiltration test shall be used.
- B. Construct such weirs or other means of measurement as may be required; furnish water and do all the necessary pumping to enable the tests to be properly made.

- C. Exfiltration tests shall be made on the pipe after backfilling at the discretion of the Architect. The length of the sewer to be tested shall be such that the head over the upstream crown is not less than 2 feet and the head over the downstream crown is not more than 6 feet. The sewer shall be plugged by pneumatic bags or mechanical plugs in such a manner that the air can be released from the sewer while it is being filled with water. The test shall be continued for one (1) hour and provisions shall be made for measuring the amount of water required to maintain the water at a constant level during this period.
 - D. If any joint shows an appreciable amount of leakage, the jointing material shall be removed and the joint remade. If any pipe is defective, it shall be removed and replaced. If the quantity of water required to maintain a constant level in the sewer for one hour does not exceed 100 gallons per inch of diameter per day per mile of sewer and all the leakage is not confined to a few joints, the workmanship shall be considered satisfactory. If the amount of leakage indicates defective joints or broken pipes, they shall be corrected.
 - E. Pipe shall be tested for infiltration after the backfill has been placed. Infiltration tests shall be made under the supervision of the Owner's Representative. The allowable infiltration shall be 100 gallons per inch of diameter per day per mile of sewer.
 - F. Rates of infiltration shall be determined by means of V-notch weirs, pipe spigot or by plugs in the end of the pipe.
 - G. If an inspection of the completed sewer or any part thereof shows any manholes, pipes or joints which allow the infiltration of water in a noticeable stream or jet, the defective work or material shall be replaced or repaired as directed.
- 3.04 AIR TESTING:
- A. Air tests may be used in lieu of the exfiltration test as described above. If the Contractor elects to do this, he shall submit his proposed method for approval.
 - B. If the results of the air test are unsatisfactory, perform the exfiltration test as outlined above.
- 3.05 CLEANING:
- A. At the conclusion of the work thoroughly clean all of the pipe by flushing with water or other means to remove all dirt, stones, pieces of wood, or other material which may have entered during the construction period. Debris cleaned from the lines shall be removed from the lowest outlet.

END OF SECTION

SECTION 02624

COPPER PIPE AND FITTINGS FOR PRESSURE MAINS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall supply all labor, equipment, materials and incidentals necessary to install all piping and appurtenances located outside the buildings and structures and test as shown on the drawings and as specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02221: Trenching, Bedding and Backfilling for Pipe and Miscellaneous Structures.
- B. Section 02640: Valves and Appurtenances for Site Utilities
- C. Plumbing piping is included in Division 15.

1.03 DESCRIPTION OF SYSTEM

- A. Water Distribution Mains, less than 4 inches inside pipe diameter.
- B. Water Supply Lines

1.04 SUBMITTALS

- A. Submit shop drawings to the Architect for approval, showing the manufacturers' drawings and specifications indicating complete details of all items. The above shall be submitted to the Architect for approval before fabrication and shipment of these items.
- B. Test certificates in accordance with Section 13 of AWWA C504 shall be furnished to the Architect prior to shipment of valves to the job site.

1.05 INSPECTION

- A. All pipe and fittings to be installed under this contract may be inspected at the site for compliance with these Specifications by the Architect. The cost of inspection of all pipe approved for this Contract, plus the cost of inspection of a reasonable amount of disapproved pipe, will be borne by the Owner.

1.06 QUALITY ASSURANCE

- A. All copper pipe, fittings, and appurtenances shall be furnished by a single manufacturer who is fully experienced, reputable, and qualified in the manufacture of the items to be furnished. The pipe and fittings shall be designed, constructed, and installed in accordance with the best practices and methods and shall comply with these Specifications.

PART 2 PRODUCTS

2.01 COPPER PIPE AND FITTINGS

- A. Copper pipe and fittings shall conform to the following requirements:

- 1. Wall Thickness: Type K, soft-annealed temper, ANSI B-88.

2. Fittings: Cast bronze solder joints, ANSI B16.18.
 3. Fittings: Wrought copper solder joints, ANSI B16.22.
 4. Solder: Silver solder with compatible flux.
- B. All pipe shall be bundled or packaged in such a manner as to provide adequate protection for the ends during transportation from the manufacturer.
- C. Joints for pipe, fittings, and couplings for pipe shall be as specified for copper pipe. Joints connecting pipe of differing materials shall be made in accordance with the manufacturer's recommendation as approved by the Architect.

PART 3 EXECUTION

3.01 HANDLING PIPE AND FITTINGS

- A. Care shall be taken in loading, transporting and unloading to prevent injury to the pipe or coatings. Pipe or fittings shall not be dropped. All pipe for fittings shall be examined before laying, and no piece shall be installed which is found to be defective. Any damage to the pipe coatings shall be repaired as directed by the Project Engineer.
- B. All pipe and fittings shall be subjected to a careful inspection and hammer test just prior to being laid or installed.
- C. If any defective pipe is discovered after it has been laid it shall be removed and replaced with a sound pipe in a satisfactory manner at no additional expense to the Owner. All pipe and fittings shall be thoroughly cleaned before laying, shall be kept clean until they are used in the work, and when installed or laid, shall conform to the lines and grades required.

3.02 COPPER PIPE INSTALLATION

- A. The installation of copper pipe shall be strictly in accordance with the manufacturer's technical data and printed instructions.
- B. Joints for copper pipe shall be strictly in accordance with manufacturer's instructions.
- C. Installation of valves and fittings shall be strictly in accordance with manufacturer's instructions. Particular care shall be taken not to overstress connections at sleeves. In making solder connections, the solder shall not be spilled on valves if allowed to run from joints.
- D. The locations of all pipes shall conform to the locations indicated on the drawings. In most cases, a certain amount of flexibility in positioning of pipes will be allowed, especially where new pipes will connect to existing structures or piping.
- E. All copper pipe to metal pipe connections shall be made in accordance with the manufacturer's recommendations as approved by the Architect. Metal piping shall not be threaded into copper fittings, valves, or coupling, nor shall copper piping be threaded into metal valves, fittings, or couplings.
- F. Copper piping shall be laid along the trench to provide for expansion and contraction. The pipe shall be backfilled with selected fine excavated material and thoroughly compacted to one foot above the top of the pipe and thereafter backfilled as specified in Section 02221. All backfill for copper water piping shall be well-graded, clean sand for the full height of the trench excavation.

G. Placing and Laying:

1. Pipe and accessories shall be carefully lowered into the trench by means of derrick, ropes, belt slings, or other appropriate equipment. Under no circumstances shall any of the water line materials be dropped or dumped into the trench. Care shall be taken to avoid abrasion of the pipe coating. Except where necessary in making connections with other lines or as authorized by the Architect, pipe shall be laid with the bells facing in the direction of laying. The full length of each section of pipe shall rest solidly upon the pipe bed, with recesses excavated to accommodate bells, couplings, and joints. Pipe that has the grade or joint disturbed after laying shall be taken up and relaid. Pipe shall not be laid in water or when trench conditions are unsuitable for the work. Water shall be kept out of the trench until joining is completed. When work is not in progress, open ends of pipe, fittings, and valves shall be securely closed so that no trench water, earth, or other substance will enter the pipes or fittings. Where any part of the coating or lining is damaged, the repair shall be made by the Contractor at his expense in a satisfactory manner. Pipe ends left for future connections shall be valved, plugged, or capped, anchored, and marked, as shown.
2. Where connections are made between new work and existing mains, the connections shall be made by using specials and fittings to suit the actual conditions. Standard methods are available for making connections to various types of pipe, either under pressure or in the dewatered condition. Where made under pressure, these connections shall be installed as approved by the Architect.

3.03 ADJACENT FACILITIES

- A. Sewer Lines: Where the location of the water pipe is not clearly defined in dimensions on the drawings, the water pipe shall not be laid closer horizontally than 10 feet from a sewer except where the bottom of the water pipe will be at least 12 inches above the top of the sewer pipe, in which case the water pipe shall not be laid closer horizontally than 6 feet from the sewer. Where water lines cross under gravity-flow sewer lines, the sewer pipe for a distance of at least 10 feet each side of the crossing shall be fully encased in concrete or shall be made of pressure pipe with no joint located within 3 feet horizontally of the crossing. Water lines shall in all cases cross above sewer force mains or inverted siphons and shall be not less than 2 feet above the sewer main. Joints in the sewer main, closer horizontally than 3 feet to the crossing, shall be encased in concrete. The thickness of the concrete encasement, including that at the pipe joints, shall be not less than 4 inches.
- B. Water lines shall not be laid in the same trench with sewer lines, gas lines, fuel lines, or electric wiring.
- C. Structures: Where copper pipes are required to be installed within 3 feet of existing structures, the pipe shall be sleeved as required for roads and pavements. The rigid conduit sleeving shall extend a distance of at least 5 feet to each side of the crossing. Care shall be exercised and proper precautions taken during installation of the copper pipe and sleeve to assure that there will be no damage to the structures and no settlement or movement of foundations or footings. Any damage occurring as a result of the Contractor's operation shall be corrected and all costs connected therewith shall be borne by the Contractor.

3.04 JOINT DEFLECTION

- A. Maximum offset in alignment between adjacent pipe joints shall be as recommended by the manufacturer and approved by the Architect.

3.05 CLEANING

- A. At the conclusion of the work, the Contractor shall thoroughly clean the new pipe line by flushing with water or other means to remove all dirt, stones, pieces of wood or other material which may have entered during the construction period. If, after this cleaning, obstructions remain, they shall be removed.

3.06 TESTING

- A. Completed pipe shall be subjected to hydrostatic pressure and leakage tests in accordance with Section 02622 – Polyvinyl Chloride Pipe and Fittings for Pressure Mains - of these specifications.

3.07 DISINFECTION

- A. Refer to Section 02622 – Polyvinyl Chloride Pipe and Fittings for Pressure Mains - of these specifications for disinfection of water mains.

END OF SECTION

SECTION 02640

VALVES AND APPURTENANCES FOR SITE UTILITIES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals and install complete and ready for operation all valves and appurtenances as shown on the Drawings and as specified herein.
- B. The equipment shall include, but not be limited to, the following:
 - 1. Gate Valves and Appurtenances.
 - 2. Ball Valves for Sanitary Sewer Force Mains.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02221: Trenching, Bedding and Backfilling for Pipe and Miscellaneous Structures.
- B. Section 02622: Polyvinyl Chloride Pipe and Fittings for Pressure Mains.
- C. Section 02623: Polyvinyl Chloride Pipe and Fittings for Gravity Sewers.

1.03 DESCRIPTION OF SYSTEMS

- A. All of the equipment and materials specified herein are intended to be standard for use in controlling the flow of sewage, water, and other substances depending on the applications.

1.04 QUALIFICATION

- A. All of the types of valves and appurtenances shall be the products of firms fully experienced and qualified in the manufacture of the particular equipment to be furnished. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these specifications as applicable.

1.05 SUBMITTALS

- A. Submit within thirty (30) days after execution of the contract a list of materials to be furnished, the names of the suppliers and the date of delivery of materials to the site.
- B. Complete shop drawings of all valves and appurtenances shall be submitted for approval in accordance with the General Requirements.
- C. Test certificates in accordance with Section 13 of AWWA C504 shall be furnished prior to shipment of valves to the project site.

1.06 TOOLS

- A. Special tools, if required for normal operation and maintenance shall be supplied with the equipment.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. General

1. All valves and appurtenances shall be of the same size shown on the Drawings and as far as possible all equipment of the same type shall be from one manufacturer.
2. All valves and appurtenances shall have the name of the manufacturer, size, and the working pressure for which they are designed cast in raised letters upon some appropriate part of the body.

B. Gate Valves and Appurtenances

1. Gate valves shall be rated for a minimum 150 psi working pressure and a minimum 200 psi test pressure. Valves shall have a clear waterway equal to the full nominal diameter of the valve. Valves shall be double disc, parallel seat, non-rising stem type fitted with "O-Ring" seals. The operating nuts shall be 2" square. All valves shall open left, or counterclockwise. Stuffing boxes shall be the "O-Ring" type. Buried gate valves shall be mechanical joint, ANSI Standard 21.11 except where shown otherwise. Gate valves for hydrant branches shall be all bell or flange and bell. Flange joint shall be ANSI B16.1 standard. Bell joint shall be AWWA Class 150.
2. Valves smaller than 3 inches shall be all bronze and shall conform to MSS SP-80, Type 1, Class 150.
3. Valves 3 inches and larger shall be iron body, bronze mounted, and shall conform to AWWA C500. Flanges shall not be buried. An approved pit shall be provided for all flanged connections.
4. All buried valves shall have cast iron three piece valve boxes. Valve boxes shall be provided with suitable heavy bonnets and to extend to such elevation at or slightly above the finished grade. The barrel shall be two-piece, sliding type, having 5-1/4" shaft. The upper section shall have a flange at the bottom having sufficient bearing area to prevent settling and shall be complete with cast iron covers. Covers shall have "WATER" cast into the top for all potable water. All buried valves shall have extended actuation nuts terminating 6" below finished grade. Valve boxes shall be provided with concrete enclosures as shown in the Drawings.
5. Two (2) tee-handled gate wrenches of suitable length shall be furnished to operate all valves with valve boxes.

B. Ball Valves for Sanitary Sewer Force Mains

1. All thermoplastic ball valves shall be manufactured to ASTM F 1970 and constructed from PVC Type I, ASTM D 1784 Cell Classification 12454 or CPVC Type IV, ASTM D 1784 Cell classification 23447. All O-rings shall be EPDM or Viton. All valves shall have stem with O-ring stem seal. All handles shall be polypropylene. All valves shall be certified by NSF International for use with potable water. All 1/2" - 2" valves shall be pressure rated to 235 psi, for water @ 73°F, as manufactured by Spears Manufacturing, Asahi America, Hayward, or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All valves and appurtenances shall be installed in the locations shown, true to alignment and rigidly supported. Any damage to the above items shall be repaired before they are installed.
- B. Buried mechanical joints shall be made with cadmium plated bolts. All exposed bolts shall be made with cadmium plated bolts. All exposed bolts and nuts shall be heavily coated with two (2) coats of bituminous paint comparable to Inertol No. 66 Special Heavy.
- C. Prior to assembly of split couplings, the grooves as well as other parts shall be thoroughly cleaned. The ends of the pipes and outside of the gaskets shall be moderately coated with petroleum jelly, cup grease, soft soap or graphite paste, and the gasket shall be slipped over one pipe end. After the other pipe has been brought to the correct position, the gasket shall be centered properly over the pipe ends with the lips against the pipes. The housing sections then shall be placed. After the bolts have been inserted, the nuts shall be tightened until the housing sections are firmly in contact, metal-to-metal, without excessive bolt tension.
- D. Prior to the installation of sleeve-type couplings, the pipe ends shall be cleaned thoroughly for a distance of 8". Soapy water may be used as a gasket lubricant. A follower and gasket, in that order, shall be slipped over each pipe to a distance of about 6" from the end, and the middle ring shall be placed on the already laid pipe end until it is properly centered over the joint. The other pipe end shall be inserted into the middle ring and brought to proper position in relation to the pipe already laid. The gaskets and followers shall then be pressed evenly and firmly into the middle ring flares. After the bolts have been inserted and all nuts have been made up fingertight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint, preferable by use of a torque wrench of the appropriate size and torque for the bolts.
- E. Castings shall be of good quality, strong, tough, even grained, smooth, free from scale, lumps, blisters, sand holes, and defects of any kind which render them unfit for the service for which they are intended. Castings shall be thoroughly cleaned and will be subjected to a hammer inspection in the field. All finished surfaces shown on the drawings and/or specified shall be machined to a true plane surface and shall be true and seat at all points without rocking. Allowances shall be made in the patterns so that the thickness specified or shown shall not be reduced in obtaining finished surfaces. Castings will not be acceptable if the actual weight is less than 95% of the theoretical weight computed from the dimensions shown. Provide facilities for weighing castings showing true weights, certified by the supplier.
- F. All steel surfaces to come in contact with exposed concrete or masonry shall receive a protective coating of an approved heavy bituminous troweling mastic applied in accordance with the manufacturer's instructions prior to installation.

3.02 SHOP PAINTING

- A. Ferrous surfaces of valves and appurtenances shall receive a coating of rust-inhibitive primer. All pipe connection openings shall be capped to prevent the entry of foreign matter prior to installation.

3.03 INSPECTION AND TESTING

- A. Completed pipe system, including valves and appurtenances, shall be subjected to hydrostatic pressure and leakage test in accordance with Section 02622, "Polyvinyl Chloride Pipe and Fittings for Pressure Mains," of these specifications. All leaks shall be repaired and lines retested. Prior to testing, pipelines shall be supported in an approved manner to prevent movement during tests.

3.04 DISINFECTION

- A. Refer to Section 02622, "Polyvinyl Chloride Pipe and Fittings for Pressure Mains," of these Specifications for disinfection of water mains.

END OF SECTION

SECTION 02701

SEWAGE LIFT STATION

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish and install where shown on the Drawings, a lift station pumping system consisting of, but not limited to, submersible sewage pumps, NEMA 4X dead front control panel, cover mounted, and three(3) pole mercury float switches, stainless steel lifting cables, and necessary discharge piping, valves and fittings.
- B. Reinforced concrete sump and access cover.

1.02 QUALITY ASSURANCE

- A. Manufacturing firms shall be regularly engaged in the manufacture of sewage lift stations of the type and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.
- B. Provide electric motors and electrical components required as part of plumbing equipment, which have been listed and labeled by Underwriters Laboratories and comply with NEMA standards.
- C. Comply with National Electrical Code (ANSI/NFPA 70) as applicable to installation and electrical connections of ancillary electrical components of plumbing equipment.
- D. Test and rate storm and sewage pumps in accordance with Sump and Sewage Pump Manufacturers' Association (SSPMA) and provide certified rating seal.
- E. Design, manufacture and install pumps in accordance with HI "Hydraulic Institute Standards."
- F. Design, manufacture and install pumps in accordance with UL 778 "Motor Operated Water Pumps."
- G. Provide pumps whose performances, under specified operating conditions, are certified by manufacturer.

1.03 SUBMITTALS

- A. Submit manufacturer's pump equipment specifications, installation and start-up instructions, and capacity and ratings, with selection points clearly indicated.
- B. Submit assembly type shop drawings indicating dimensions, weights, required clearances, and methods of assembly of all components.
- C. Submit ladder-type wiring diagrams for all components, clearly indicating all required field electrical connections.
- D. Submit maintenance data and parts lists for each item of plumbing equipment. Include "trouble-shooting" maintenance guides. Include this data in maintenance manual.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Handle pumps and components carefully to prevent damage, breaking, denting and scoring. Do not install damaged plumbing pumps or components; replace with new.

- B. Store pumps and components in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.
- C. Comply with manufacturer's rigging and installation instructions for unloading pumps, and moving them to final location.

PART 2 PRODUCTS

2.01 SUBMERSIBLE STORM AND SEWAGE PUMPS

- A. Pumps shall be submersible type of the quantity as shown and noted on Drawings. Sewage pumps shall be designed for handling raw unscreened sewage. Pump motors shall be of the size and characteristics as scheduled on the Drawings and shall be of the oil filled submersible design. Motors shall be furnished with 30 ft. of neoprene jacketed power cable.
- B. The volute, seal plates, impeller and motor housing shall be constructed of high quality ASTM A-48 class 30 cast iron. The pump shall be painted with a water based air dry enamel of 2.0 mil minimum thickness. All exposed hardware shall be 300 series stainless steel. The pump construction shall contain no points of critical clearance nor require periodic adjustment or replacement to maintain operating efficiency. Discharge connection shall be a standard 3" NPT in the vertical position. All gaskets shall be of the compression square ring type eliminating critical slip fits and the possibility of damage during service associated with sliding o-ring sealing arrangements.
- C. The impeller shall be of the non-clog design with pump out vanes on the back side. The impeller shall be dynamically balanced to ISO G6.3 specifications. Pump shall be capable of passing a 2 inch spherical solid.
- D. The unit shall utilize a single mechanical shaft seal which will operate in an oil atmosphere. The materials of construction shall be carbon for the rotating face and ceramic for the stationary face, lapped and polished to a tolerance of one light band, 300 series stainless steel hardware, and all elastomer parts to be of Buna-N. The seal shall be commercially available and not a proprietary design of the manufacturer.
- E. The pump shall be designed to be non-overloading throughout the entire pump curve. The rotor and stator assembly shall be of the standard frame design and secured to the pump seal plate by four threaded fasteners allowing for easy serviceability. Motor designs incorporating shrink or press fit assembly between the stator and motor housing shall not be acceptable. The motor shall be constructed with the windings operating in a sealed environment containing clean dielectric oil, making it capable of operating in a totally, partially or non-submerged condition for extended periods of time without damage due to the heat being generated. Air-filled motors shall not be acceptable. The motor windings shall be of Class B insulation. The motor shall meet the standard NEMA design L for single phase and NEMA design B for three phase. The motor shaft shall be of 416 stainless steel. The lower bearing shall be of the single ball type to accept radial and thrust loads, and the upper bearing of the single ball design, for radial loads. Bearings shall operate in an oil bath atmosphere for superior life. Permanently lubricated bearings are not acceptable.
- F. Thermal sensor shall be used on three phase units to monitor stator temperatures. The stator shall be equipped with a thermal switch embedded in the end coil of the stator winding. This shall be used in conjunction with external motor overload protection and wired to the control panel. Single phase shall have an overload switch on the motor windings and do not require any external protection.

- G. The pump shall be equipped with 30 ft. of type SO power cable and connected to the motor via quick disconnect pin terminals. Threaded cord grip type cord entries are not acceptable. Pin receptacles shall be crimped and molded to the power cord in a PVC plug. The plug shall be secured with a stainless steel compression plate to prevent water from entering the housing and to provide strain relief at the point of cable entry. A stainless steel clamp shall compress the PVC molding against the cable jacket to prevent water from entering the jacket. A polybutylene terphthalate terminal block with brass pin inserts shall connect the power cord leads with the motor leads. The ground pin shall be longer than the other pins such that the ground connection is the first connection made and the last connection broken when the plug is inserted and removed, respectively. A Buna-N o-ring shall provide isolation sealing between the terminal block and the motor housing when the cord plug is removed.
- H. Pump manufacturer shall warrant pumps being supplied to Owner against defects in workmanship and materials for a period of five (5) years under normal use, operation and service.
- I. All repairs or replacement parts that may be needed will be made free of charge (f.o.b. factory) during the first sixteen (16) months after shipment from the factory.
- J. The warranty shall be in published form.
- K. Subject to compliance with the requirements, provide submersible sewage ejectors from one of the following:
 - 1. Myers Pumps
 - 2. KSB
 - 3. Barnes Pumps
 - 4. Flygt Corporation
 - 5. PACO Pumps, Inc
 - 6. Goulds Pumps
 - 7. Gorman-Rupp
 - 8. Weil Pumps

2.02 VALVES AND FITTINGS

- A. The installing Contractor shall furnish all pipe, valves, and fittings within the wet well.
- B. The Contractor shall furnish and install the discharge line of each pump a check valve and gate valve specifically recommended for sewage pump service.

2.03 CONTROL PANEL

- A. There shall be furnished a control panel as shown on Drawings, for remote mounting, and each panel shall be furnished in a NEMA 4X fiberglass or stainless steel enclosure containing: individual magnetic across-the-line starters with adjustable overload relays for each pump, fusible disconnect switches with handles lockable in "ON" or "OFF" position for each pump, one (1) electrical alternator; Green-Run pilot lights, H-O-A selector switches, amber seal leak detection lights, and Red motor overtemp lights for each pump. Provide each control panel with one (1) terminal trip, one (1) high water alarm contact with 4" alarm bell, 110V light, and silence switch, control circuit transformers (460/115V) with circuit breakers accessible thru inner door and one (1) hasp for locking panel door. Elapsed time meters shall be provided for each pump.

2.04 LIQUID LEVEL CONTROLS

- A. A complete automatic liquid level control shall be furnished for each lift station and shall consist of three (3) two pole mercury switches and one (1) single pole mercury switch (high water alarm switch). Each switch shall be sealed in a corrosion-resistant polypropylene float.
- B. Float switches shall be suspended via a stainless steel hanger attached to the wetwell or as shown on the Drawings.

2.05 LIFT STATION SUMP AND COVER

- A. The lift station wet well basin shall be constructed of reinforced concrete, precast concrete sections, masonry, or precast fiberglass as shown and detailed on Drawings. Masonry construction must be parged with a minimum of 1" of mortar inside and out.
- B. The cover shall be a heavy-duty cast iron 30" diameter manhole lid, Neenah R-1743, or Engineer approved equal for concrete/masonry manholes, or 3/8" steel cover as shown on Drawings for fiberglass basin.

PART 3 EXECUTION

3.01 GENERAL

- A. Install lift stations as indicated, in accordance with manufacturer's installation instructions, and in compliance with applicable codes.
- B. Install pumps in wet well. Connect discharge piping as shown on Drawings with check valve and union.
- C. Start-up test, and adjust all pumps in accordance with manufacturer's start-up instructions. Check and adjust controls for proper operation.

3.02 ADJUSTING AND CLEANING

- A. Check alignment, and where necessary, realign shafts of motors and pumps within recommended tolerances by manufacturer, and in presence of manufacturer's service representative.
- B. Lubricate pumps before start-up. Start-up in accordance with manufacturer's instructions.
- C. Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION

SECTION 02776 CONCRETE CURBS AND SIDEWALKS

PART 1 GENERAL

- 1.01 SECTION INCLUDES: Concrete walks, paving and curbs.
- 1.02 RELATED SECTIONS: Prepared sub-base is specified in Section 02315. Concrete and related materials are specified in Division 3. Joint fillers and sealers are specified in Section 07920.
- 1.03 QUALITY ASSURANCE: 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: Welded plain cold-drawn steel wire fabric, ASTM A 185. Furnish in flat sheets, not rolls, unless otherwise acceptable to the MDOT Architect.
- 2.03 REINFORCING BARS: Deformed steel bars, ASTM A 615, Grade 40, unless otherwise indicated.
- 2.04 JOINT DOWEL BARS: Plain steel bars, ASTM A 615, Grade 40 unless otherwise indicated. Cut bars true to length with ends square and free of burrs.
- 2.05 METAL EXPANSION CAPS: 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: 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: 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: Comply with requirements of Section 07920 for performed expansion joint fillers and sealers.

- 2.09 CONCRETE MIX DESIGN: All concrete shall have 3000-psi minimum compressive strengths at 28 days, unless noted otherwise. Maximum slump for normal weight concrete shall be 4 inches.

PART 3 EXECUTION

- 3.01 INSPECTION: 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: 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 FORM CONSTRUCTION: 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.
- A. 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.
- B. Clean forms after each use, and coat with form release agent as often as required to ensure separation from concrete without damage.
- 3.04 REINFORCEMENT: Locate, place and support reinforcement as specified in Division 3 sections, unless otherwise indicated.
- 3.05 CONCRETE PLACEMENT: Comply with the requirements of Division 3 sections for mixing and placing concrete, and as herein specified.
- A. 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.
- B. 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.
- 3.06 JOINTS: 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.

- A. 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.
 - B. 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.
 - C. 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.
 - D. Fillers and Sealants: Comply with the requirements of Section 07920 for preparation of joints, materials, installation, and performance and as herein specified.
- 3.07 CONCRETE FINISHING: 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.
- A. 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.
 - B. 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 MDOT Architect.
 - C. 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.
- 3.08 CURING: Protect and cure finished concrete paving, complying with applicable requirements of Division 3 Sections. Use moist-curing methods for initial curing whenever possible.
- 3.09 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 03100 CONCRETE FORMWORK

PART 1 GENERAL

1.01 RELATED SECTIONS

- A. Division 1 Sections
- B. Section 03200 - Concrete Reinforcement.
- C. Section 03300 - Cast-in-Place Concrete.
- D. Section 07260 - Vapor Retarders.

1.02 REFERENCES

- A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
- B. ACI 301 - Standard Specifications for Structural Concrete.
- C. ACI 318 - Building Code Requirements for Structural Concrete.
- D. ACI 347 - Recommended Practice for Concrete Formwork.
- E. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- F. ASTM E154 - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

1.03 SUBMITTALS

- A. Submit locations of construction joints for approval.
- B. Submit manufacturer's data for waterstops.

1.04 DESIGN OF FORMWORK

- A. Design of formwork, shoring, and reshoring and its removal is the Contractor's responsibility.
- B. Design of formwork, shoring, and reshoring shall conform to ACI 117, ACI 301, ACI 318, and ACI 347.
- C. Design formwork in a manner such that existing or new construction is not overloaded.
- D. Do not remove shores or reshores earlier than recommended by ACI 301 and ACI 347.

PART 2 PRODUCTS

2.01 FORM MATERIALS

- A. Forms material: Wood, plywood, metal, fiberglass or a combination of these, with sufficient strength to prevent distortion.

2.02 FORMWORK ACCESSORIES

- A. Formwork accessories: Commercially manufactured products, including ties and hangers. Do not use nonfabricated wire form ties.

2.03 FORM RELEASE AGENT

- A. Form release agent shall not bond with, stain, nor adversely affect concrete surfaces.

2.04 WATERSTOPS

- A. Waterstops at construction joints and control joints indicated by the Drawings shall be sized to suit the joints.
- B. Waterstops: Preformed plastic adhesive waterstops as manufactured by SYNKO-FLEX Products or approved equal.

2.05 VAPOR RETARDER

- A. Vapor Retarder:
 - 1. Typical: Use Full Vapor Retarder System in all areas under slabs, footings and grade beams providing a complete moisture barrier between the subsurface ground and the concrete structure. Refer to Section 07260 – Vapor Retarders.

2.06 JOINT FILLER

- A. Joint filler: ASTM D1751, asphalt impregnated premolded fiberboard, 1/4-inch thick by full thickness of slab or joint, unless indicated otherwise on the Drawings.

2.07 CONSTRUCTION JOINTS

- A. Construction joint: Key type steel forms by Vulcan screed joints, Burke Keyed Kold joint form or approved equal.

PART 3 EXECUTION

3.01 GENERAL

- A. Erect formwork in accordance with ACI 301, ACI 318, and ACI 347.
- B. Maintain formwork and shoring to support loads until such loads can be supported by concrete structure.

3.02 TOLERANCES

- A. Finished work shall comply with ACI 117 tolerances.

3.03 CAMBER

- A. Not Used

3.04 SURFACE PREPARATION

- A. For concrete exposed to view, seal form joints to prevent leakage.
- B. Before reinforcement is placed, coat contact surfaces of form with form release agent in accordance with manufacturer's recommendations. Do not allow excess form release agent to accumulate in forms or come in contact with concrete surfaces against which fresh concrete will be placed.

3.05 CHAMFERS

- A. Provide 3/4-inch chamfer at all corners.

3.06 FOUNDATION ELEMENTS

- A. Form foundation elements if soil or other conditions are such that earth trench forms are unsuitable.
- B. Sides of exterior foundation walls, and turned-down slabs shall be formed.
- C. Maintain minimum coverage of reinforcing steel as indicated on Structural Drawings.

3.07 INSERTS

- A. Install and secure in position required inserts, hangers, sleeves, anchors, and nailers.
- B. Locate anchor bolts by using templates with two nuts to secure in position.

3.08 EMBEDS

- A. Set and secure embedded plates, bearing plates, and anchor bolts in accordance with approved setting drawings and in such a manner to prevent displacement during placement of concrete.

3.09 MOISTURE BARRIER / VAPOR RETARDER

- A. Where indicated on Drawings, use BARRIER / RETARDER system in all areas under slabs, footings and grade beams providing a complete moisture barrier between the subsurface ground and the concrete structure. Place moisture barrier over sewer, piping, conduits, and ducts, and granular subbase, and behind insulation and expansion joints at sidewalls.
- B. Lap and seal moisture barrier per manufacturers requirements splices.
- C. Do not puncture moisture barrier.

3.10 FORM REMOVAL

- A. Remove forms carefully in such manner and at such time as to ensure complete safety of structure. Do not remove forms or shoring until members have acquired sufficient strength to support their weight and the load thereon safely.

3.11 PROVISIONS FOR OTHER TRADES

- A. Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings and recesses from trades providing such items.
- B. Accurately place and securely support items built into forms. Obtain approval for openings not shown on Drawings.

3.12 CLEANING

- A. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed.

3.13 FORM SURFACES

- A. Coat contact surfaces of forms with a formcoating compound before reinforcement is placed. Apply in accordance with manufacturer's recommendations. Rust-stained steel formwork is not acceptable.

3.14 CONSTRUCTION JOINTS

- A. Provide construction joints in accordance with ACI 318.
- B. Obtain Architect/Structural Engineer's prior approval for use and location of joints.
- C. Provide 1-1/2 inch deep key type construction joints at end of each placement for slabs, beams, walls, and footings. Bevel forms for easy removal.
- D. Remove loose particles and latency from surface prior to placing the next lift. Chip the surface to a depth sufficient to expose sound concrete.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 RELATED SECTIONS

- A. Division 1 Sections
- B. Section 03100 - Concrete Formwork.
- C. Section 03300 - Cast-in-Place Concrete.

1.02 REFERENCES

- A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
- B. ACI 301 - Standard Specifications for Structural Concrete.
- C. ACI 315 - Details and Detailing of Concrete Reinforcement.
- D. ACI 318 - Building Code Requirements for Structural Concrete.
- E. ASTM A185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete Reinforcement.
- F. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- G. ASTM A706 - Standard Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement.
- H. AWS D12.1 - Recommended Practices for Welding Reinforcing Steel Metal Inserts, and Connections in Reinforced Concrete Construction.
- I. AWS D1.4 - Structural Weld Code - Reinforcing Steel.
- J. CRSI - Manual of Practice, and Documents 63 and 65.

1.03 SUBMITTALS

- A. Submit shop drawings as follows:
 - 1. Contact Structural Engineer's Construction Administrator prior to detailing reinforcing steel shop drawings.
 - 2. Shop drawings shall include complete placing plans with location of control joints and details showing dimensions with clearance. Indicate size, spacings, locations and quantities of reinforcing steel and wire fabric, bending and cutting schedules, splice lengths, stirrup spacing, supporting and spacing devices. Detail reinforcing steel in accordance with ACI 315, CRSI Standard and requirements of this Specification.
 - 3. Written description of reinforcement without adequate sections, elevations, and details is **Not Acceptable**.

4. Reproduction of Structural Drawings for shop drawings is not permitted. Electronic drawing files will not be provided to the Contractor.
 - B. Upon request, submit a certification from each manufacturer or supplier stating that materials meet the requirements of the ASTM and ACI standards referenced.
 - C. Submit 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
 - D. Submit manufacturer's data for tensile and compressive splicers.
- 1.04 STORAGE AND PROTECTING
- A. Store reinforcing steel above ground so that it remains clean. Maintain steel surfaces free from materials and coatings which might impair bond.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Deformed reinforcing steel: ASTM A615, refer to Structural Drawings for grade (Grade 60 minimum) of domestic manufacture. Bars shall be new; free from rust, scale, oil, or other coatings that will prevent bond
- B. Welded steel wire fabric: ASTM A185.

2.02 ACCESSORY MATERIALS

- A. Annealed steel tie wire: 16-1/2 gage minimum.
- B. Bar supports: Plastic-tipped steel Class I bar supports conforming to CRSI Specifications. Concrete brick may be used to support reinforcement to obtain proper clearance from earth.

2.03 SPLICERS

- A. Tensile splicers: Capable of developing 125% of the reinforcing steel ASTM specified minimum yield strength.

2.04 DOWEL ADHESIVE

- A. Dowel adhesive: EPCON System Ceramic 6 Epoxy adhesive supplied by ITW Ramset/Red Head, HIT HY150 injection adhesive supplied by Hilti Fastening Systems, Foil-Fast epoxy injection gel supplied by the Rawlplug Company, or approved equal.

PART 3 EXECUTION

3.01 FABRICATION

- A. Fabricate steel in accordance with ACI 318 and CRSI standards.

- B. Bend bars cold. Do not heat or flame cut bars. No field bending of bars partially embedded in concrete is permitted, unless specifically approved Structural Engineer and checked by Testing and Inspection Agency for cracks.
- C. Weld only as indicated. Perform welding in accordance with AWS D12.1 and or AWS D1.4.
- D. Tag reinforcing steel for easy identification.

3.02 INSTALLATION

- A. Before placing concrete, clean reinforcement of foreign particles and coatings.
- B. Place, support, and secure reinforcement against displacement in accordance with ACI 318 and CRSI standards. Do not deviate from alignment or measurement.
- C. Place concrete beam reinforcement support parallel to main reinforcement.
- D. Locate welded wire reinforcement in the top third of slabs. Overlap mesh one lap plus two inches at side and end joints.
- E. Furnish and install dowels or mechanical splices at intersections of walls, columns and piers to permit continuous reinforcement or development lengths at such intersections.
- F. Maintain cover and tolerances in accordance with ACI and CRSI Specifications, unless indicated otherwise on Structural Drawings.

3.03 SPLICES

- A. Do not splice reinforcement except as indicated on Structural Drawings.
- B. Tension couplers may be used and installed in accordance with manufacturer's specifications.

3.04 DOWELS IN EXISTING CONCRETE

- A. Install dowels and dowel adhesive in accordance with manufacturer's recommendations.
- B. Minimum embedment length shall be 12 bar diameters, unless noted otherwise.

END OF SECTION

SECTION 03300 CAST-IN-PLACE CONCRETE

PART 1 GENERAL

- 1.01 SECTION INCLUDES: 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 03100 – Concrete Forms and Accessories.
 - B. Section 03200 – Concrete Reinforcement.
 - C. Section 07260 – Vapor Retarders
 - D. Section 09900 – Paints and Coatings
- 1.03 SUBMITTALS: 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: The Owner will provide testing as specified in Section 01455.
- 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 01455 – 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 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 approvals from the floor-covering installer and the floor-coating applicator are required for slab finish receiving floor covering and floor coating/sealer.

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 01455.
- B. All concrete shall have 3,500-psi minimum compressive strengths at 28 days, unless noted otherwise.
- C. Maximum slump for normal weight concrete shall be 4 inches. Sump may be increased to 6 inches with an approved mid-range water reducer and up to 8 inches with an approved high-range water reducer.

2.02 CONCRETE MATERIALS

- A. Portland Cement: ASTM C-150, Type I.
- B. Water: From an approved source.
- C. Structural Concrete Aggregate: Nominal maximum aggregate size 67 shall be used and shall meet the requirements of MDOT Standard Specifications, 2004 Edition.
- D. Admixtures: Admixtures shall be from the MDOT Approved List. Non-uniform addition of mixtures that result in erratic setting of the concrete will cause rejection of the concrete with subsequent removal from the structure at the concrete producer's expense.

2.03 RELATED MATERIALS

- A. Preformed Expansion Joint Fillers: Provide pre-molded, asphalt impregnated board in widths and thickness required by conditions (1/2-inch minimum). Joint fillers shall conform to ASTM D994, D1751 or D1752.
- B. Chemical Hardener (Sealer): Colorless aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent containing not less than 2 pounds of fluosilicates per gallon. Sealer shall not interfere with floor finish.
- C. Curing Compound: Clear bond, manufactured by Guardian Chemical Co., Kure-N-Seal, manufactured by 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: 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: 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 Architect, 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 05120 STRUCTURAL STEEL

PART 1 GENERAL

- 1.01 SECTION INCLUDES: Structural steel framing members, support members, with required bracing, welds, fasteners, base plates, bearing plates, anchor bolts and other related items necessary to complete Project indicated by Contract Documents unless specifically excluded.
- 1.02 RELATED SECTIONS
- A. Section 09050 – Color Design.
 - B. Section 09900 – Paints and Coatings.
- 1.03 SUBMITTALS
- A. Shop drawings shall conform to requirements of current AISC Specifications. Indicate sizes, spacing, connections, and location of structural members. Indicate net weld lengths and welded connections with AWS welding symbols.
 - B. Mill Test Reports shall be furnished; certifying that each shipment meets specified structural strength.
 - C. Welders' Certificates indicating that all welders employed on the Work are qualified operators, verifying AWS qualifications within the previous 12 months.
- 1.04 QUALITY ASSURANCE
- A. Structural steel shall be furnished in accordance with current edition of the American Institute of Steel Construction "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings".
 - B. Qualification of Welders: All welding shall be in accordance with the "Code of Arc and Gas Welding in Building Construction" of the American Welding Society. Certification that each welder is qualified in accordance with American Welding Society Code D1.1 shall be provided.

PART 2 PRODUCTS

- 2.01 STRUCTURAL STEEL MATERIALS: All structural steel shall conform to ASTM A-36, domestic manufacture, except tube sections, which shall conform to ASTM A-501. Unless shown otherwise on Drawings, all bolts shall conform to ASTM Specification A307. Where indicated on Drawings, high strength bolts shall conform to ASTM Specification A 325.
- A. Welds shall be E70XX Series electrodes for manual arc welding and grade SAW-1 for submerged arc process.
 - B. All bolts not indicated otherwise on the plans are 3/4 inch. All connections not noted otherwise on the Drawings shall be framed connections.

- C. Grout for base plates shall be precision, premixed, non-shrink and non-metallic in conformance with ASTM C827. Grout shall be easily workable as well as being made flowable with an initial setting time of not less than 45 minutes and shall meet the requirements of ASTM C191. Grout shall have a 14-day compressive strength of 6000 psi when mixed to its flowable state.
- 2.02 PAINT MATERIALS: Shop coat paint, ICI Devflex 4020, Rustoleum 769, Tnemec 99, Southern Coatings 476, or approved equal. Shop coat shall be compatible with finish coats specified in Section 09900 Paints and Coatings.

PART 3 EXECUTION

- 3.01 FABRICATION AND ERECTION: Fabricate and erect steel in accordance with the latest requirements of the American Institute of Steel Construction and the approved shop drawings. Fabrication shall not proceed until Project Architect's approval is obtained.
- A. Shop connections shall be welded. Field connections shall be bolted, unless welded connections are detailed. Welded connections shall be detailed consistent with requirements of the American Welding Society. Bolted connections shall be proportioned as shown in AISC Manual, using 3/4 inch unfinished bolts (A307), unless shown otherwise on Drawings.
 - 1. Shop and field welders shall have been recently certified as qualified structural welder according to requirements of the American Welding Society.
 - 2. Any splices not shown on the drawings shall be indicated clearly on the shop drawings and shall be made only with the Project Architect's approval.
 - B. Members shall be straight, plumb, and level so that the error does not exceed 1 to 1,000. During erection provide guys, stays, and braces to hold steel in position until the frame is permanently secured.
 - C. Neatly miter joints, weld full and grind welds smooth where steel shapes are used as finish members.
- 3.02 PAINTING
- A. Apply one shop coat of paint to all structural steel. After erection, touch up joints and abraded areas with the same brand of paint.
 - B. Areas around welded joints and members to be encased in concrete shall not be painted in the shop. Thoroughly clean scale and loose rust from steel prior to painting. Steel shall be dry when painted and paint shall be allowed to dry before material is handled.
 - C. All steel exposed to view shall be painted additional coats as specified in Section 09900.

END OF SECTION

SECTION 05400

COLD-FORMED METAL FRAMING

PART 1 GENERAL

- 1.01 SECTION INCLUDES: Provide all labor, materials and equipment necessary to complete the furnishing and installation of all cold-formed metal framing as shown, detailed and otherwise required, including lightgauge framing and exterior non-load bearing wall framing.
- 1.02 WORK NOT INCLUDED: Steel studs for interior non-structural walls are specified in Section 09250.
- 1.03 QUALITY ASSURANCE
- A. Systems designed and manufactured by Dale/Incor Industries products establish a minimum of quality required. Framing system shall meet or exceed all the requirements of the Standard Building Code, latest edition, and shall be designed to withstand wind loading of 25 lbs. per sq. ft. inward or 100 mph wind with Importance Factor of 1.5 with Exposure C, whichever is greater, and 25 lbs. per sq. ft. outward. Structural design of the system shall be the responsibility of the manufacturer.
 - 1. The out-of-plane deflection for brick veneer walls shall not exceed the lightgauge framing members span length divided by 600 ($L/600$).
 - B. Installer qualifications: An experienced installer who has successfully completed cold-formed metal framing similar in material, design and extent to the indicated for this project.
 - C. Welding: Quality procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel," and AWS D1.3, "Structural Welding Code - Sheet Steel."
 - D. AISC Specifications: Comply with AISI's Specification for the Design of Cold-Formed Steel Structural Members" for calculating structural characteristics of cold formed metal framing. Comply with CCFSS Technical Bulletin: AISI Specification Provisions for Screw Connections.
- 1.04 DELIVERY, STORAGE AND HANDLING
- A. Protect cold formed metal framing from corrosion, deformation or other damage during deliver, storage and handling.
 - B. Store cold-formed metal framing protected with a weatherproof covering and ventilate to avoid condensation.
- 1.05 SUBMITTALS
- A. Prior to the commencement of fabrication and erection, the Contractor shall submit fabrication and erection drawings for review and approval.
 - 1. The Drawings shall show all erection procedures and accessories required and shall bear a certification stating that the system is designed to meet all governing codes and the loading requirements stated in paragraph 1.03. The Drawings shall be prepared and stamped by a registered professional engineer licensed in the State of Mississippi.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All stud and framing members shall be of the type and size as shown on the plans and shall be equal to products as manufactured by Dale/Incor Industries.
 - 1. Provide 8 inch studs with 2 inch Flanges, 12 Gage at 16 inches on center maximum at walls as indicated on the drawings and as required by manufacturer's design calculations.
 - 2. All runner and end tracks, bridging and non-load bearing studs shall be of the type and size required and shall be manufactured by Dale/Incor Industries.
 - 3. Track and bridging shall be formed from steel that corresponds to the requirements of the following Standards with a minimum yield of 33,000 psi: Painted Material - ASTM A570-75, grade C; Galvanized Material - ASTM A446-72, grade A.
 - 4. Steel studs and accessories shall be formed from steel that corresponds to the requirements of the following Standards with a minimum yield of 33,000 psi: Painted Material - ASTM A611-72, grade C; Galvanized Material - ASTM A446-72, grade A.
 - 5. All stud components shall be primed with paint meeting the performance requirements of TT-P-636C, or shall be formed from steel having a G-60 galvanized coating.
 - 6. The physical and structural properties listed by Dale/Incor Industries shall be considered the minimum permitted for all framing members.

2.02 FABRICATION

- A. Dale/Incor framing components may be prefabricated into panels prior to erection. Prefabricated panels shall be square with components attached by welding to prevent racking. Handling and lifting of panels shall be done in a manner as to not cause distortion in any member.
- B. All framing components shall be cut squarely for attachment to perpendicular members, or as required for an angular fit against abutting members. Members shall be held positively in place until properly fastened.
- C. Axial loaded bearing studs shall be installed in a manner which will assure that stud ends are positioned against the inside track web prior to stud and track attachment.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine condition of slab and other related surfaces prior to installation and do not proceed until any defects are corrected.

3.02 INSTALLATION

- A. Install lightgauge framing, fasteners, trim and accessories in conformance with approved drawings and manufacturer's specifications.
- B. Install all studs at 16 inches on center maximum spacing.

3.03 ERECTING FOR WINDLOAD MEMBERS

- A. Tracks shall be securely anchored to the supporting structure in a manner which will transfer imposed load.
- B. Studs shall be plumbed, aligned and securely attached to each side of the flange or web of the top and bottom tracks.
- C. At track butt joints, abutting pieces of track shall be securely anchored to common structural element, or they shall be butt welded or spliced together.
- D. Splices in wind loaded only studs shall be avoided if possible. When necessary, splice sections shall be of same or heavier size, a minimum of 18" long and attached in a manner to maintain original strength.
- E. Jack studs shall be installed below window sills, above window and door headers, at free standing stair rails, and elsewhere to furnish structural support and shall be securely attached to supporting members.
- F. Wall stud bridging shall be installed in accordance with Dale/Incor Industries recommendations.
- G. Provision for structure vertical movement shall be provided where required using the Dale//Incor Vertical Slide Clip or other means in accordance with Dale/Incor Industries recommendations.

3.04 ERECTING FOR AXIAL LOAD BEARING MEMBERS

- A. Tracks shall be securely anchored to the supporting structure to properly transfer imposed loads.
- B. Complete, uniform and level bearing support shall be provided for the bottom track at each bearing stud location. If not provided, install full size shims below bottom track at stud locations as needed or set bottom track in high strength grout.
- C. At intersection or abutting track joints, abutting pieces of track shall be securely anchored to a common structural element, or they shall be spliced together.
- D. Splices in axial loaded studs shall not be permitted.
- E. Framed wall openings shall include a properly designed header and multiple (or heavier) studs at each edge of the opening, to compensate for those removed.
- F. Diagonal bracing shall be installed at locations required to be "shear walls" for frame stability and to resist wind lateral loads. Bracing shall be securely anchored for uplift and horizontal shear. Additional stud(s) shall be positioned to resist the vertical component.
- G. Bridging for wall framing shall be installed in accordance with Dale/Incor Industries recommendations.

END OF SECTION

SECTION 05500 METAL FABRICATION

PART 1 GENERAL

- 1.01 SECTION INCLUDES: All miscellaneous metal work. The Work includes, but is not limited to, pipe railings, pipe bollards, steel lintels and miscellaneous framing & supports.
- 1.02 RELATED SECTIONS
- A. Section 09050 – Color Design.
 - B. Section 09900 - Paints and Coatings: Painting for all ferrous metal exposed to view.
- 1.03 SUBMITTALS: 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: 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.
- A. 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.
 - B. 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.
 - C. 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.
 - D. 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.
 - E. 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.
 - F. 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.

- G. 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.
 - H. 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 09900 – Paints and Coatings.
 - I. 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: 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: 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.
- A. Welded Connections: Cope intersections of rails and posts, weld joints and grind smooth. Butt weld end-to-end joints of railings or use welding connectors, at fabricator's option. At connections to steel supports, weld post directly to steel supports, unless otherwise indicated.
 - B. Anchorage: Use type of bracket with pre-drilled hole for exposed bolt anchorage. For stud partitions and framing use lag bolts set into wood backing between studs and framing members. Coordinate with stud installations for accurate location of backing members.
 - C. Expansion: Provide expansion joints at locations indicated, or if not indicated, at intervals not to exceed 40 feet. Provide slip joint with internal sleeve extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; locate joint within 6 inches of posts.
- 2.04 PIPE BOLLARDS: 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: 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: Provide miscellaneous steel framing and supports which are not a part of structural steel framework, as required to complete Work.

- A. 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.
- B. 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.
- 3.02 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 05513 ALTERNATING TREAD STEEL STAIRS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide all material, labor, equipment and services and perform all operations necessary or required for the work of this section, in accordance with the Drawings and Specifications, and including fabrication and installation of Alternating Tread Steel Stairs.
- B. Related work specified elsewhere includes but is not limited to:
 - 1. Metal Fabrications in another Division 5 section.
 - 2. Painting in Division 9

1.02 PERFORMANCE REQUIREMENTS:

- A. Stair Treads: shall be capable of withstanding a single concentrated 1000 pound load without permanent deformation; or 100 pounds per square foot or 300 pounds on an area of 4 square inches without exceeding the allowable working stress of the material.
- B. Handrail: shall be capable of withstanding a single concentrated load of 200 pounds or a uniform load of 50 pounds per linear foot applied in any direction at any point on the rail without exceeding the allowable working stress of the material.
- C. Stair Stringers: shall be capable of withstanding a single concentrated load of 1000 pounds at any point on the stair without permanent deformation; or a uniform live loading of 100 pounds per square foot applied in a downward direction to all tread surfaces or a 300 pound load on an area of 4 square inches without exceeding the allowable working stress of the material.

1.03 CONSTRUCTION REQUIREMENTS:

- A. Landings, Treads, and Mounting Base: shall be stamped and formed from single piece material. Stock shapes, hand forming, or welded remnants shall not be permitted. All stamped parts shall have integrally formed rigidizing bends and shall be spot welded to stringers of like material.
- B. Welds: shall be a minimum of 8 welds per tread, and 12 welds each on the landing and mounting base. Each weld shall be quality controlled and be capable of withstanding a minimum of 2800 lbs. in shear.
- C. Pedestrian Surfaces: shall be punched through with upset non-skid openings.
- D. Riser Spacing: shall be equally spaced to within 3/16" for adjacent risers and to within 3/8" for any two non-adjacent risers on a stair.
- E. Handrails: shall be contoured for body guidance and underarm support and shall be attached to the outside stringers and landings by bolting.
- F. Landing Reinforcement: shall be with 1/4" steel angle notched and punched and factory welded to the landing at the points of a handrail attachment.
- G. Rubber Foot Divider: shall be affixed to the central portion of the landing. A rubber bumper strip shall be attached or will be provided for field attaching to the central stringer.

1.04 DIMENSIONS

- A. Stair Angle: 56 degrees from horizontal as indicated in the drawings.
- B. Vertical Drop: the change in elevation, as shown in the drawings, between the upper finished floor surface where the top landing will be attached and the lower finished floor surface where the base of the stair will be secured.

1.05 SUBMITTALS

- A. Dimensional Prints: shall be submitted for approval prior to fabrication.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Equal to Lapeyre Stair, Inc., 220 Laitram Lane, Harahan, LA. 70123. Tel. (800)-535-7631.
- B. Substitutions shall fully comply with specified requirements and Section 01630-Product Options and Substitution Procedures

2.02 MATERIALS:

- A. Carbon Steel:
 - 1. Treads: 13 Gauge 1010/15 HRPO per ASTM A569
 - 2. Landing & Foot Stampings: 11 Gauge 1010/15 per ASTM A569
 - 3. Stringers: 2 inches by 1-3/4 inches by 11 Gauge 1010/15 per ASTM A569 for 56 degree stairs under 10 vertical feet.
 - 4. Handrails: 1 1/2" OD x 0.083" 1010/15 CS per ASTM A569 cold drawn, fully annealed tube per ASTM 513.
- B. Miscellaneous Material:
 - 1. Rubber Spine: Hollow neoprene
 - 2. Rubber Foot Divider: Solid neoprene

2.03 FINISHES: Carbon Steel: Safety Yellow Paint, Powder Coat Baked Enamel.

2.04 FABRICATION

- A. General: Fabricate alternating tread steel stairs to conform with performance and construction requirements, and in accordance with approved shop drawings or dimensional prints. Fabricate and shop-assemble to greatest extent possible.
- B. Carbon Steel: gas metal arc welded with treads spot welded to stringers and bolt-on handrails with included bolts using the specified materials.

PART 3 - EXECUTION:

3.01 PREPARATIONS:

- A. Coordination: Coordinate start and installation of steel alternating treads with all other related and adjacent work. Installation shall not start until the construction has progressed to the point that weather conditions and remaining construction operations will not damage stair installation.
- B. Verification: Verify that dimensions and angle are correct and that substrate is in proper condition for stair installation. Do not proceed to install until all necessary corrections have been made.

3.02 INSTALLATION:

- A. If bumper has not been installed at the factory, install the bumper in accordance with the manufacturer's instructions using glue supplied with the stair.
- B. Prepare mounting holes.
- C. Position stair with top tread at same elevation as upper finished floor or roof surface.
- D. Secure stair with not less than 2 bolts or studs at top and with not less than 2 at bottom of stair.
- E. Touch up with matching paint any chipped or abraded damage to factory finish.

3.03 CLEAN: Leave work area clean and free of debris.

END OF SECTION

SECTION 06105

MISCELLANEOUS CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES: Concealed wood grounds and blocking to frame openings, form terminations, to provide anchorage and / or support of other interior and exterior locations; Wood I-Joists, standing and running trim, plywood, particleboard, furring channels and rough hardware.

1.02 RELATED SECTIONS

- A. Section 03100 - Concrete Forms and Accessories.
- B. Section 08710 - Door Hardware.

1.03 REFERENCES

- A. AFPA – National Design Specification for Wood Construction.
- B. ALSC – American Lumber Standards Committee: Softwood Lumber Standards.
- C. ANSI A208.1 – Mat-Formed Wood Particleboard.
- D. ANSI/AHA A135.4 – Basic Hardboard.
- E. APA – American Plywood Association.
- F. ASTM D2559 – Standard Specification for Adhesive for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions.
- G. ASTM D3498 – Standard Specification for Adhesives For Field-Gluing Plywood to Lumber Framing for Floor Systems.
- H. AWPA C1 – All Timber Products Preservative Treatment by Pressure Process.
- I. AWPA C2 – Lumber, Timber, Bridge Ties and Mine Ties – Preservative Treatment by Pressure Process.
- J. AWPA C9 – Plywood - Preservative Treatment by Pressure Process.
- K. AWPA C20 - Structural Lumber Fire-Retardant Treatment by Pressure Process.
- L. AWPA C27 – Plywood – Fire-Retardant Treatment by Pressure Process.
- M. PS 2 – Performance Standard for Wood-Based Structural-Use Panels.
- N. PS 20 – American Softwood Lumber Standard
- O. SPIB – Southern Pine Inspection Bureau.
- P. WCLIB – West Coast Lumber Inspection Bureau.
- Q. WWPA – Western Wood Products Association.

R. AWI Section 300 – Standing and Running Trim

1.04 SUBMITTALS

- A. For treated materials, submit certification by treating plant stating chemicals and process used, net amount of preservative retained and conformance with applicable standards.
- B. For all dimensioned lumber, submit letters of certificate stating the species and grade of lumber used.
- C. For wood I-joists, submit shop drawings with manufacturers catalog indicating compliance of wood I-joists for required superimposed loads and bearing conditions indicated in the Drawings.
- D. For all structural sheathing, submit letters of certificate stating the structural panels meet specified requirements.
- E. Submit product data for metal framing anchors, connectors, and construction adhesives.

1.05 COORDINATION: 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.

1.06 QUALITY CONTROL: 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.

1.07 DELIVERY, STORAGE AND PROTECTION: 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.

1.08 PROJECT CONDITIONS: 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: 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 STANDING AND RUNNING TRIM
- A. 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 MDOT Architect's prior approval.
- 2.05 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 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 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
- 2.06 ENGINEERED WOOD PRODUCTS
- A. Laminated Veneer Lumber (LVL): Meet the properties specified on the Drawings.

2.07 WOOD I-JOISTS

- A. Wood I-Joists: Manufactured by Truss Joist McMillan as noted on Drawings or approved equal. Capacities of wood I-joists shall be determined in accordance with ASTM D5055.

2.08 ANCHORAGE AND FASTENING MATERIALS: 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.

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

2.10 TREATED WOOD: 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.

- A. 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.

- B. Fire-Retardant Treatment: Where "PR-S" lumber or plywood is shown or scheduled, comply with the AWPI Specification C-208 for pressure impregnation with fire-retardant chemicals to achieve a flame-spread rating of not more than 25 when tested in accordance with UL Test 723, ASTM E A4, or NFPA Test 355. Where treated items are indicated to receive a transparent or paint finish, use a fire-retardant treatment that will not bleed through or adversely affect bond of finish.

PART 3 EXECUTION

3.01 INSTALLATION: 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.

- A. 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.
- B. 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 Subfloor: Fasten to supporting members using combination of glue and wood screws. Mastic construction adhesives shall comply with the APA Glued Floor System and ASTM standard D3498, Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems (based on APA Specification AFG-01). Fasten screws at 6 inches on center along all edges and 10 inches on center at intermediate supports.
- D. 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.
- E. 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: 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.

- A. 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.
- B. 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: Install plumb and level with closure strips at all edges and openings. Shim with wood as required.

- A. 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 07210 BUILDING INSULATION

PART 1 GENERAL

- 1.01 SECTION INCLUDES: Building insulation for exterior walls, interior walls, and ceilings as shown on the Drawings and specified herein.
- 1.02 RELATED SECTIONS: Other types of insulation are specified in Roof Insulation under Section 13122 Metal Building System Specifications.
- 1.03 SUBMITTALS: Submit manufacturer's product and technical data for each type of insulation describing location, extent, material and method of fastening prior to installation for Project Engineer / MDOT Architect's approval.
- 1.04 PRODUCT HANDLING: 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.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Equivalent products by the following manufacturers are acceptable:
 - 1. Celotex Building Products, Tampa, FL, Tel. (813) 873-4000.
 - 2. Dow Chemical Company, Midland, MI, Tel. (800) 441-4369.
 - 3. Johns Manville Corp, Denver, CO, Tel. (303) 978-2531.
 - 4. Owens Corning, Toledo, OH, Tel. (800) 438-7465.
 - 5. UC Industries, Inc., Tallmadge, OH, Tel. (330) 630-6134.
 - 6. United States Gypsum Company, Chicago, IL, Tel. (800) 874-4968.
- B. Substitutions shall fully comply with specified requirements and Section 01630-Product Options and Substitution Procedures.

2.02 BATT INSULATION: Provide glass fibers and resinous binders formed into flexible batts conforming to ASTM C 665, Type III, Class B with density not less than 1.5 lbs. Per cubic foot and an R value of 3.17 per inch of thickness at 75 degrees F. mean temperature, with aluminum foil and asphalt vapor barrier laminated to one face. Thickness of insulation shall be as shown on the Drawings.

2.03 SOUND ATTENUATION INSULATION: Similar to above specified insulation except manufacturer's standard unfaced batt insulation manufactured for sound attenuation.

2.04 ACCESSORIES

- A. Tape: Bright aluminum, self-adhering type, mesh reinforced, two inches wide.

PART 3 EXECUTION

- 3.01 INSPECTION: Examine the areas and conditions where building insulation is to be installed and notify the Project Engineer / MDOT Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the Project Engineer / MDOT Architect.
- 3.02 INSTALLATION: 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.
- A. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections, which interfere with placement.
 - B. Apply a single layer of insulation to the required thickness, unless a double layer is required, to make up the total thickness shown.
 - C. Set vapor barrier faced units with vapor barrier to inside of construction, except as otherwise shown. Do not obstruct ventilation spaces. All joints at vapor barriers shall be sealed with 4 inches wide, foil faced duct tape to prevent vapor and air migration.
 - D. Tape joints and ruptures in vapor barriers, using tape specified above, and seal each continuous area of insulation to surrounding construction so as to ensure vapor tight installation of the units.
 - E. Where insulation is impaled on stick clips, provide clips not less than 3 inches from corners or edges and not more than 12 inches on center.
 - F. Adhesive Application - per manufacturer's printed directions. Apply adhesive over entire back of insulation and on edges of insulation, except as noted below.
 - G. Fastener Installation - per manufacturer's printed directions. Install fasteners 12 inches on center each way. Use adhesive as specified herein per fastener manufacturer's recommendations.
- 3.03 BATT INSULATION: Install blanket fiberglass insulation with edges closely butted. Cut and fit insulation to closely fit intersecting or penetrating surfaces.
- A. Walls: Install sound batt insulation between the studs at all interior partitions. Attach to studs with staples, adhesive or method as recommended by manufacturer. Tape and seal small joints and punctures and replace insulation where large tears occur.
 - B. Ceilings: Install above ceilings continuous with vapor barrier down. Lay above gypsum board at bottom chord of wood trusses in method recommended by manufacturer. Tape and seal small joints and punctures and replace insulation where large tears occur.

END OF SECTION

SECTION 07260

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. Weather-resistive barrier on exterior face of wall sheathing.
- D. Floor protection paper used for positive protection of finished floors.

1.02 RELATED SECTIONS: Section 07650 - Flexible Flashing.

1.03 SUBMITTALS: 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 01630-Product Options and Substitution Procedures.

2.02 VAPOR RETARDER: Membrane shall be a 15 mil polyolefin film meeting ASTM E-1745-97 Class A Test Method, equal to Moistop® Ultra™ "A".

2.03 CONCRETE CURING PAPER: 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 WEATHER-RESISTIVE BARRIER: Membrane shall be a single ply, asphalt saturated kraft 60 minute Grade D breather type sheathing paper, meeting ASTM E-1677-95 Type I Test Method, equal to "Fortify®".

2.05 FLOOR PROTECTION PAPER: 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. The underslab vapor retarder shall be unrolled over the thoroughly compacted subgrade and turned down at the inside perimeter of grade beams. Joints shall be sealed, watertight, with a pressure sensitive tape as recommended by the manufacturer, allowing a minimum overlap of 6 inches. Apply tape evenly over seams and rub out any wrinkles formed during application. Where pipes and conduits pass through the membrane, it shall be sealed with Moistop boot and tape. Inspect the 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. The concrete curing paper shall be unrolled over the entire surface once the concrete has set sufficiently hard to permit application without marring the surface. All joints shall be lapped 4 inches and sealed with a pressure sensitive tape. Apply tape evenly over seams and rub out any wrinkles formed during application. Ensure that all tears or penetrations are repaired.
 - C. The weather-resistive barrier shall be installed in weather-board fashion over approved exterior sheathing, lapping horizontal joints a minimum of 2 inches and lapping vertical joints a minimum of 6 inches. Lapped joints shall be taped with Fortify Tape. Tears and punctures shall be sealed with Fortify Tape and/or Moistop Sealant.
 - D. The floor protection paper shall be applied immediately after the floor covering is installed and until final completion and acceptance by the Project Architect. The paper shall be laid in the widest practical width with 6-inch laps to provide complete coverage of flooring. Joints shall be sealed with minimum 2 inch wide pressure sensitive tape
- 3.03 CLEANING: Inspect vapor barrier membrane thoroughly and keep clean. Remove any dirt, oils, mud, debris, etc. prior to placing concrete.

END OF SECTION

SECTION 07650

FLEXIBLE FLASHING

PART 1 GENERAL

1.01 SECTION INCLUDES:

- A. Self-adhesive flashing used to seal around exterior windows, doors, and where required to weatherproof the building.
- B. Waterproof membrane flashing used to seal around exterior door and window heads and sills, brick ledges, copings at masonry walls, common through-wall penetrations such as hose bibbs, vents, electrical boxes, exterior lights, and where required to waterproof the building.

1.02 SUBMITTALS: Submit manufacturer's technical product data, installation instructions and recommendations for product specified.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and specifications are based on product 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.
- C. Substitutions shall fully comply with specified requirements and Section 01630-Product Options and Substitution Procedures.

2.02 SELF-ADHESIVE FLASHING: Membrane shall be a multi-layer composite employing polyethylene, fiberglass membrane and self-adhesive backing, meeting ASTM E-96 (Method B), ASTM F-1249, ASTM D-779 and ASTM D-828 Test Methods, equal to "Moistop E-Z Seal".

2.03 WATERPROOF MEMBRANE FLASHING: Membrane shall be a self-sealing SBS modified asphalt waterproof membrane laminated to high density, cross-laminated polyethylene film reinforcement and self-adhesive backing, meeting ASTM E-96, ASTM D-779, ASTM D-903-98, ASTM D-412 Test Methods, equal to "FortiFlash".

PART 3 EXECUTION

3.01 PREPARATION

- A. Ensure items that pass through membrane are properly and rigidly installed, substrate is free of projections and irregularities that may be detrimental to proper installation of membrane.
- B. Prior to installation, window, door flanges, brick ledges and base materials shall be dry and cleaned free of any dirt or other substances that may interfere with adhesion.

3.02 INSTALLATION

- A. The self-adhesive flashing shall first be applied at the sill of window openings. Moistop Sealant is then applied to the back of the window flanges and windows are installed. E-Z Seal flashing is next applied over the window flanges at jambs and then the head, completing the installation. Flashing around door openings is similar to window application. To apply, peel away the release paper and place E-Z Seal over the substrate or window and door flanges. Apply firm pressure along the entire adhesive strip to ensure a continuous seal.
- B. To apply FortiFlash flashing, peel away the release paper and press membrane firmly over substrate, applying sufficient pressure along the entire membrane to ensure a continuous seal. If adhesion is inadequate, prime the surface with a polymer-emulsion-based primer designed specifically for SBS self-adhered membranes, in accordance with the manufacturer's instructions.

3.03 CLEANING: Inspect membrane and substrate thoroughly and keep clean. Remove any dirt, oils, mud, debris, etc. prior to installation.

END OF SECTION

SECTION 07920

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 07840-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: Section 01330 – Submittal Procedures and Section 09050 – Color Design.

1.03 DEFINITIONS: 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: 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: 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, Hudson River Rd. 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 01630-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 864 (one-part Architectural Silicone Sealant). Color(s) to be selected by the MDOT Architect from manufacturer's full range of standard Architectural colors plus 32 special Color-Flex Designer 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: 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.
- 3.05 CURE AND PROTECTION: 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. 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 08100

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 06100- Rough Carpentry.
- B. Section 08710- Door Hardware.
- C. Section 09050-Color Design.
- D. Section 09900- Paints and Coatings.

1.03 QUALITY ASSURANCE: 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".

- A. 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.
- B. 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 and location of cut-outs for hardware.

- 1.05 PRODUCT IDENTIFICATION: 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 Co., 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 01630-Product Options and Substitution Procedures.

2.02 FABRICATION: 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.

- A. 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".
- B. Locate finish hardware in accordance with approved shop drawings.

2.03 FRAMES: 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.

- A. 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.
- B. 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: 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
- A. 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.

- B. 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.
 - C. 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.
 - D. 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.
 - E. 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. 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.
 - H. Flatness: Doors shall maintain a flatness tolerance of 1/16 inch maximum in any direction, including a diagonal direction.
- 1.05 HOLLOW METAL PANELS: Hollow metal panels shall be made of the same materials and constructed and finished in the same way as specified for hollow metal doors.
- 1.06 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.

1.07 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.

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.

F. Push-pull bars – 3'-1" to centerline of bar.

G. Arm pulls – 3'-11" to centerline.

H. Push plates – 4'- 0" to centerline of plate.

I. Roller latches – 3'-9" to centerline.

J. All of the above dimensions from paragraph 2.07(B) through 2.07(I) are from finished floor.

1.08 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: 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: 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 08335

OVERHEAD COILING DOORS

PART I GENERAL

- 1.01 SUMMARY: 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.
- 1.02 RELATED SECTIONS
- A. Section 09050 – Color Design.
 - B. Section 16100 – Basic Materials and Methods (Wiring).
- 1.03 SUBMITTALS
- A. Product Data: Submit manufacturer's product data, roughing-in diagrams, and installation instructions for each type and size of overhead coiling 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.
 - B. Shop Drawings: Submit shop drawings for approval prior to fabrication. Include detailed plans, elevations, and details of framing members, required clearances, anchors, and accessories. Include relationship with adjacent materials.
- 1.04 QUALITY ASSURANCE
- A. Furnish each overhead coiling door as a complete unit produced by one manufacturer, including hardware, accessories, mounting and installation components. Unless otherwise acceptable to MDOT Architect, furnish overhead coiling door units by one manufacturer for entire project.
 - B. Insert and Anchorage: Furnish inserts and anchoring devices that must be set into walls for the installation of the overhead coiling door units. Provide setting drawings, templates, instructions and directions for installation of anchorage devices. Coordinate delivery with other Work to avoid delay.
 - C. Wind Loading: Design and reinforce overhead coiling doors to withstand a 20 PSF (87 MPH) wind loading pressure in the fully closed position unless otherwise indicated.
- 1.05 DELIVERY, STORAGE, AND HANDLING: Deliver materials and products in labeled protective packages. Store and handle in strict compliance with manufacturers' instructions and recommendations. Protect from damage from weather, excessive temperatures and construction operations.
- 1.06 WARRANTY: 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.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by Overhead Door Corp., 6750 LBJ Freeway, Suite 1200, Dallas, TX 75240. Tel. (800) 887-3667.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Raynor Garage Doors, Dixon, IL. Tel. (800) 472-9667.
 - 2. Windsor Door, Little Rock, AR. Tel. (800) 946-3767.
- C. Substitutions shall fully comply with specified requirements and Section 01630-Product Options and Substitution Procedures

2.02 OVERHEAD COILING DOOR: Equal to 625 Series with F-265I slats, face-of-wall mounted, Insulated Service Doors by Overhead Door Corporation.

2.03 DOOR CURTAIN MATERIALS AND CONSTRUCTION

- A. Curtain: Interlocking roll-formed slats as specified following. Endlocks shall be attached to each end of alternate slats to prevent lateral movement.
- B. Slats: Flat profile type F-265I for doors up to 40 feet wide. The front slat shall be fabricated of 22-gage galvanized steel. The back slat shall be 24-gage galvanized steel. Slat cavity shall be filled with CFC-free foamed-in-place, polyurethane insulation.
- C. Finish: Slats and hood shall be galvanized steel in accordance with ASTM A 525 and receive rust-inhibitive, roll coating process, including bonderizing, 0.2 mils thick baked-on prime paint, and 0.6 mils thick baked-on polyester top coat. Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer.
- D. Color: Polyester topcoat in color as selected by MDOT Architect from manufacturer's standard colors.
- E. Weather seals: Vinyl bottom seal, exterior guide and internal hood seals.
- F. Bottom Bar: Two prime painted galvanized steel angles, minimum thickness of 1/8 inch, bolted back to back to reinforce curtain in the guides.
- G. Guides: Three galvanized structural steel angles with minimum thickness of 3/16 inch. Guides shall be weatherstripped with a vinyl weather seal at each jamb, on the exterior curtain side and interior curtain side.
- H. Brackets: Hot rolled galvanized steel to support counterbalance, curtain and hood.

2.04 COUNTERBALANCE MECHANISM: Helical torsion spring type designed for standard 50,000 cycle life design. Counterbalance shall be housed in a steel tube or pipe barrel, supporting the curtain with deflection limited to 0.03 inch per foot of span. Counterbalance shall be adjustable by means of an adjusting tension wheel.

2.05 HOOD: Galvanized steel, 24 gage hood with intermediate supports as required. Provide with internal hood baffle weatherseal.

2.06 ELECTRIC DOOR OPERATOR

- A. Operator: Provide UL listed electric operator Model RDB, 1 Hp to move door in either direction at not less than 2/3 foot nor more than 1 foot per second. Operator is to be front-of-hood mounted.
- B. Sensing Edge Protection; Pneumatic sensing edge.
- C. Operator Controls: Push-button operated control stations with open, close, and stop buttons for surface mounting, for interior location.
- D. Coordinate electrical wiring requirements and characteristics with current electrical supply.

2.07 LOCKING: Cylinder lock for electric operation with interlock switch.

PART 3 EXECUTION

3.01 EXAMINATION: 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.

3.02 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. Instruct Owners personnel in proper operating procedures and maintenance.

3.03 ADJUSTING AND CLEANING

- A. Upon completion of installation including work by other trades, lubricate, test and adjust doors to operate easily, free from warp, twist, binding or distortion and fitting weathertight for entire perimeter.
- B. Touch-up damaged coatings and finishes and repair minor damage. Clean exposed surfaces using non-abrasive materials and methods recommended by manufacturer of material or products being cleaned.

END OF SECTION

SECTION 08365

SECTIONAL OVERHEAD DOORS

PART 1 GENERAL

- 1.01 SECTION INCLUDES: Electric operated overhead sectional doors of steel panels.
- 1.02 SYSTEM DESCRIPTION: Electric operation with chain hoist operation requiring a maximum exertion of 25-lbs. force. Provide electric operation unless manually operated doors are designated on Drawings.
- 1.03 RELATED SECTIONS
- A. Section 09050 – Color Design.
 - B. Section 16100 – Basic Materials and Methods (Wiring).
- 1.04 SUBMITTALS
- A. 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.
 - B. Shop Drawings: Submit shop drawings for approval prior to fabrication. Include detailed plans, elevations, and details of framing members, required clearances, anchors, and accessories. Include relationship with adjacent materials.
- 1.05 QUALITY ASSURANCE
- A. Furnish each sectional overhead door as a complete unit produced by one manufacturer, including hardware, accessories, mounting and installation components. Unless otherwise acceptable to MDOT Architect, furnish sectional overhead door units by one manufacturer for entire project.
 - B. Insert and Anchorage: Furnish inserts and anchoring devices that must be set into walls for the installation of the sectional overhead door units. Provide setting drawings, templates, instructions and directions for installation of anchorage devices. Coordinate delivery with other Work to avoid delay.
 - C. Wind Loading: Design and reinforce sectional overhead doors to withstand a 20 PSF (87 MPH) wind loading pressure in the fully closed position unless otherwise indicated.
- 1.06 DELIVERY, STORAGE, AND HANDLING: Deliver materials and products in labeled protective packages. Store and handle in strict compliance with manufacturers' instructions and recommendations. Protect from damage from weather, excessive temperatures and construction operations.
- 1.07 WARRANTY: 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.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and specifications are based on products manufactured by Overhead Door Corp., 6750 LBJ Freeway, Suite 1200, Dallas, TX 75240. Tel. (800) 887-3667.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Raynor Garage Doors, Dixon, IL. Tel. (800) 472-9667.
 - 2. Windsor Door, Little Rock, AR. Tel. (800) 946-3767.
- C. Substitutions shall fully comply with specified requirements and Section 01630-Product Options and Substitution Procedures

2.02 SECTIONAL OVERHEAD DOOR: Steel door assembly with rabbeted meeting rails to form weathertight joints and provide full-width interlocking structural rigidity. Equal to 430 Series Steel Doors by Overhead Door Corporation.

2.03 SECTIONAL DOOR ASSEMBLY

- A. Panels: Two-inch thick flush steel construction; outer sheet of 24-gage galvanized steel, v-grooved profile.
- B. Track: Provide track as recommended by manufacturer to suit loading required and clearances available. Lift track in “**Low Headroom**” configuration.
- C. Hardware: Heavy duty galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.
- D. Door Panel Weatherstripping: Fitted to bottom of door panel, full length; double contact resilient.
- E. Jamb Weatherstripping: Formed metal retainer fitted full height of jamb with integral resilient weatherstripping in moderate contact with door panels.
- F. Electric Motor Operator: Provide UL listed electric operator, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than one foot per second.
 - 1. Entrapment Protection: Electric sensing edge.
 - 2. Operation Controls: Push-button operated control station with open, close, and stop buttons for surface mounting, for interior location.
- G. Finish: Galvanized steel in accordance with ASTM A 525 and receive rust-inhibitive, roll coating process, including bonderizing, 0.2 mils thick baked-on prime paint, and 0.6 mils thick baked-on polyester top coat. Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer.
- H. Color: Polyester topcoat in color as selected by MDOT Architect from manufacturer's standard colors.

PART 3 EXECUTION

- 3.01 EXAMINATION: 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.
- 3.02 PREPARATION: Prepare door opening components to permit installation of door unit and preserve continuity of wall air and vapor barrier seal.
- 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 AND CLEANING
- A. Upon completion of installation including work by other trades, lubricate, test and adjust doors to operate easily, free from warp, twist, binding or distortion and fitting weathertight for entire perimeter.
 - B. Touch-up damaged coatings and finishes and repair minor damage. Clean exposed surfaces using non-abrasive materials and methods recommended by manufacturer of material or products being cleaned.
- 3.05 TOLERANCES
- A. Variation from Plumb: 1/8 inch maximum.
 - B. Variation from Level: 1/8 inch.
 - C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10-foot straight edge.

END OF SECTION

SECTION 08520

ALUMINUM WINDOWS

PART 1 GENERAL

- 1.01 SECTION INCLUDES: Extent of aluminum windows is shown on Drawings and in Schedules. Types of aluminum windows required include fixed exterior window units.
- 1.02 RELATED SECTIONS
- A. Section 08800 – Glazing for glazing requirements of aluminum windows, including windows specified herein shall be factory pre-glazed.
 - B. Section 09050 – Color Design.
 - C. Section 12495 – 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: 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.
- A. 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.
 - B. 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.

- C. Uniform Load Structural Test: Test unit in accordance with ASTM E 330 at a positive and negative static air pressure difference of 105 psf. There shall be no glass breakage or permanent damage.
 - D. Air Infiltration Test: The window shall be subjected to an air infiltration test in accordance with ASTM E 283 at a static air pressure difference of 6.24 psf. Air infiltration shall not exceed 0.1 cfm per square foot of crack.
 - E. Water Resistance Test: Test unit in accordance with ASTM E 331 & ASTM E 547 at a static air pressure difference of 12 psf. There shall be no uncontrolled water leakage
 - F. Condensation Resistance Factor: The window shall be tested in accordance with AAMA 1503-98 standards and tests of thermal performance and shall have a Condensation Resistance Factor (CRF) not be less than 64 frame and 56 glass.
 - G. 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: 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 4170 Thermal F-AW 70 Fixed windows as manufactured by Peerless Products, Inc., 15500 College Blvd., Lenexa, KS 66219. Tel. (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 01630 - 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. Glass and Glazing Materials: Provide glass and glazing materials that comply with requirements of Section 08800 of these Specifications.

2.04 FABRICATION: 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.

- A. Prefabrication: To greatest extent possible, complete fabrication assembly, finishing, and other work before shipment to project site. Disassemble components only as necessary for shipment and installation.
- B. 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".
- C. Welding: Comply with AWS recommendations to avoid discoloration; grind exposed welds smooth and restore mechanical finish.
- D. Reinforcing: Install reinforcing as necessary for performance requirements; separate dissimilar metals with bituminous paint or other separator that will prevent corrosion.
- E. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.
- F. Fasteners: Conceal fasteners wherever possible.

2.05 SILLS: Provide extruded sills equal to those manufactured by Peerless. Sizes shown on Drawings.

- 2.06 FINISHES: Kynar 500 (70% PVDF), AAMA 2605, finish to be selected by 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: 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.
- A. 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 07920 for caulking and sealant.
 - B. Refer Section 08800 - Glazing for installation of glass to be glazed into windows.
- 3.02 CLEANING
- A. 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.
 - B. 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 08710

DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Commercial door hardware for the following:
 - a. Swinging doors.
 - b. Other doors to the extent indicated.
 - 2. Cylinders for doors specified in other Sections.
- B. Related Sections include the following:
 - 1. Division 8 Section "Steel Doors and Frames" for door silencers provided as part of the frame.
- C. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.

1.02 SUBMITTALS

- A. Product Data: Include installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of door hardware indicated.
- C. Samples: For exposed door hardware of each type indicated below, in specified finish, full size. Tag with full description for coordination with the Door Hardware Schedule. Submit samples before, or concurrent with, submission of the final Door Hardware Schedule if requested by architect.
 - 1. Door Hardware: As follows:
 - a. Hinges.
 - b. Locks and latches.
 - c. Exit devices.
 - d. Cylinders and keys.
 - e. Closers.
 - f. Door gasketing.
 - 2. Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.

- D. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening.
 - a. Organize door hardware sets in same order as in the Door Hardware Schedule at the end of Part 3.
 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- E. Keying Schedule: Prepared by or under the supervision of supplier, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.
- F. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
1. Include lists of completed projects with project names and addresses of architects and owners, and other information specified.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, indicating current products comply with requirements.
- H. Maintenance Data: For each type of door hardware to include in maintenance manuals specified in Division 1.
- I. Warranties: Special warranties specified in this Section.
- 1.03 QUALITY ASSURANCE
- A. Installer Qualifications: An experienced installer who has completed door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

- B. Supplier Qualifications: Door hardware supplier with warehousing facilities in Project's vicinity and who is or employs a qualified Architectural Hardware Consultant, available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying. Supplier must be approved by Architect.
1. Scheduling Responsibility: Preparation of door hardware and keying schedules.
- C. Architectural Hardware Consultant Qualifications: A person who is currently certified by the Door and Hardware Institute as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.
- D. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.
- E. Regulatory Requirements: Comply with provisions of the following:
1. Comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1, FED-STD-795, "Uniform Federal Accessibility Standards," as follows:
 - a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
 - b. Door Closers: Comply with the following maximum opening-force requirements indicated:
 - 1) Interior Hinged Doors: 5 lbf applied perpendicular to door.
 - 2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 - c. Thresholds: Not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.
 2. NFPA 101: Comply with the following for means of egress doors:
 - a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
 - b. Delayed-Egress Locks: Lock releases within 15 seconds after applying a force not more than 15 lbf for not more than 3 seconds.
 - c. Door Closers: Not more than 30 lbf to set door in motion and not more than 15 lbf to open door to minimum required width.
 - d. Thresholds: Not more than 1/2 inch high.
- F. Keying Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings." Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:
1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 2. Preliminary key system schematic diagram.
 3. Requirements for key control system.
 4. Address for delivery of keys.

- G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."
- 1.04 DELIVERY, STORAGE, AND HANDLING
- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
 - B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
 - C. Deliver keys to manufacturer of key control system.
- 1.05 COORDINATION
- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- 1.06 WARRANTY
- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
 - B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of operators and door hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - C. Warranty Period: Five (5) years from date of Final Completion, unless otherwise indicated.
- 1.07 MAINTENANCE SERVICE
- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
 - B. Maintenance Service: Beginning at Final Completion, provide six months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door hardware operation. Provide parts and supplies as used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.01 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in this Section and as provided via schedule at the end of this section.
 - 1. Door Hardware Sets: Requirements for quantity, item, design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Schedule at the end of Part 3. Products are identified by descriptive titles corresponding to requirements specified in Part 2.

2.02 HINGES, GENERAL

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Hinges:
 - a. Hager Companies.
 - b. McKinney Products Company; Div. of ESSEX Industries, Inc.
 - c. Stanley Commercial Hardware; Div. of The Stanley Works.
 - 2. Continuous Geared Hinges:
 - a. Hager Companies.
 - b. McKinney Products Company; Div. of ESSEX Industries, Inc.
 - c. Pemko Manufacturing Co., Inc.
- B. Standards: Comply with the following:
 - 1. Butts and Hinges: BHMA A156.1.
 - 2. Template Hinge Dimensions: BHMA A156.7.
 - 3. Self-Closing Hinges and Pivots: BHMA A156.17.
- C. Quantity: Provide the following, unless otherwise indicated:
 - 1. Three Hinges: For doors with heights 90 inches
 - 2. Four Hinges: For doors with heights 91 to 120 inches
 - 3. For doors with heights more than 120 inches provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
- D. Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

Maximum Door Size (inches)	Hinge Height (inches)	Metal Thickness (inches)	
		Standard Weight	Heavy Weight
32 by 84 by 1-3/8	3-1/2	0.123	-
36 by 84 by 1-3/8	4	0.130	-
36 by 84 by 1-3/4	4-1/2	0.134	0.180
42 by 90 by 1-3/4	4-1/2	0.134	0.180
48 by 120 by 1-3/4	5	0.146	0.190

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Door Hardware

- E. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.
- F. Hinge Applications: Unless otherwise indicated, provide the following:
 - 1. Entrance Doors: Heavy-weight hinges.
 - 2. Doors with Closers: Antifriction-bearing hinges.
 - 3. Interior Doors: Standard-weight hinges.
- G. Hinge Base Metal: Unless otherwise indicated, provide the following:
 - 1. Exterior Hinges: Brass, with stainless-steel pin body and brass protruding heads.
 - 2. Interior Hinges: Brass, with stainless-steel pin body and brass protruding heads.
 - 3. Hinges for Fire-Rated Assemblies: Stainless steel, with stainless-steel pin.
- H. Fasteners: Comply with the following:
 - 1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
 - 2. Wood Screws: For wood doors and frames.
 - 3. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
 - 4. Screws: Phillips flat-head screws; machine screws (drilled and tapped holes) for metal doors] [wood screws for wood doors and frames. Finish screw heads to match surface of hinges.

2.03 LOCKS AND LATCHES, GENERAL

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Mechanical Locks and Latches:
 - a. Best Lock Corporation.
 - b. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc.
 - c. Yale Security Inc.; Div. of Williams Holdings.
- B. Standards: Comply with the following:
 - 1. Bored Locks and Latches: BHMA A156.2.
 - 2. Mortise Locks and Latches: BHMA A156.13.
 - 3. Interconnected Locks and Latches: BHMA A156.12.
 - 4. Auxiliary Locks: BHMA A156.5.
 - 5. Push-Button Combination Locks: BHMA A156.2.
 - 6. Exit Locks: BHMA A156.5.

2.04 EXIT DEVICES, GENERAL

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Precision Hardware, Inc.
 - 2. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc.
 - 3. Von Duprin; an Ingersoll-Rand Company.

- B. Certified Products: Provide exit devices listed in BHMA's "Directory of Certified Exit Devices."
- C. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
- D. Fire Exit Devices: Complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.
- E. Through Bolts: For exit devices and trim on metal doors, non-fire-rated wood doors, fire-rated wood doors.

2.05 CYLINDERS AND KEYING

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Cylinders: Same manufacturer as for locks and latches.
 - 2. Cylinders:
 - a. Best Lock Corporation.
 - b. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc.
 - c. Yale Security Inc.; Div. of Williams Holdings.
- B. Standards: Comply with the following:
 - 1. Cylinders: BHMA A156.5.

2.06 CLOSERS, GENERAL

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Surface-Mounted Closers:
 - a. LCN Closers; an Ingersoll-Rand Company.
 - b. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc.
 - c. Yale Security Inc.; Div. of Williams Holdings.
- B. Certified Products: Provide door closers listed in BHMA's "Directory of Certified Door Closers."
- C. Hold-Open Closers/Detectors: Coordinate and interface integral smoke detector and closer device with fire alarm system.

2.07 THRESHOLDS, GENERAL

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Hager Companies.
 2. National Guard Products, Inc.
 3. Pemko Manufacturing Co., Inc.
- B. Standard: Comply with BHMA A156.21.

2.08 FABRICATION

- A. Manufacturer's Nameplate: Do not provide manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise approved by Architect.
1. Manufacturer's identification will be permitted on rim of lock cylinders only.
- B. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18 for finishes. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.
- C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
 2. Steel Machine or Wood Screws: For the following fire-rated applications:
 - a. Mortise hinges to doors.
 - b. Strike plates to frames.
 - c. Closers to doors and frames.
 3. Steel Through Bolts: For the following fire-rated applications, unless door blocking is provided:
 - a. Surface hinges to doors.
 - b. Closers to doors and frames.
 - c. Surface-mounted exit devices.
 4. Spacers or Sex Bolts: For through bolting of hollow metal doors.
 5. Fasteners for Wood Doors: Comply with requirements of DHI WDHS.2, "Recommended Fasteners for Wood Doors."

2.09 FINISHES

- A. Standard: Comply with BHMA A156.18.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. BHMA Designations: Comply with base material and finish requirements indicated by the following:
 - 1. BHMA 626: Satin chromium plated over nickel, over brass or bronze base metal.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance of door hardware.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Steel Doors and Frames: Comply with DHI A115 series.
 - 1. Surface-Applied Door Hardware: Drill and tap doors and frames according to SDI 107.

3.03 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. Custom Steel Doors and Frames: DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."

- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and re-installation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Key Control System: Place keys on markers and hooks in key control system cabinet, as determined by final keying schedule.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

3.04 FIELD QUALITY CONTROL

- A. Independent Architectural Hardware Consultant: Supplier will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
 - 1. Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.05 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
 - 2. Door Closers: Adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.
- B. Six-Month Adjustment: Approximately six months after date of Substantial Completion, Installer shall perform the following:
 - 1. Examine and readjust each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.
 - 2. Consult with and instruct Owner's personnel on recommended maintenance procedures.
 - 3. Replace door hardware items that have deteriorated or failed due to faulty design, materials, or installation of door hardware units.

3.06 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.07 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

3.8 DOOR HARDWARE SET SCHEDULE

- A. Finish: Generally shall be dull chrome (US26D)
- B. Keying: Best Removable core, permanent cores keyed per Owner's instructions. Furnish six master keys and two keys per cylinder.

C. Hardware Sets

1. No. 1: H1 Door 100A, 103A, 105B

3	HINGES	MCKINNEY TA2314NRP 32D 4 ½ X 4 ½
1	LOCKSET	BEST 45H7T14J
1	CLOSER	SARGENT EN1431PSH
1	KICK PLATE	ROCKWOOD 8 X 2" LDW 32D
1	THRESHOLD	PEMKO 2005AV
1	WEATHERSTRIP	PEMKO 303AV
1	DRIP	PEMKO 346C

2. No. 2: H2 DOOR 101A 102A

3	HINGES	MCKINNEY TA2714 4 ½ X 4 ½
1	LOCKSET	BEST 45H7T14J
1	CLOSER	SARGENT EN1431
1	KICK PLATE	ROCKWOOD 8 X 2" LDW 32D
1	THRESHOLD	PEMKO 271A
1	WEATHERSTRIP	PEMKO 303AV
1	SWEEP	PEMKO 18061CNB
1	STOP	ROCKWOOD 440

3. No. 3: H3 DOOR 104A

6	HINGES	MCKINNEY TA2314 NRP 32D 4 ½ X 4 ½
2	FLUSH BOLTS	ROCKWOOD 555
1	LOCKSET	BEST 45H7T14J
2	HOLDERS	GJ704H
1	THRESHOLD	PEMKO 2005AV
1	WEATHERSTRIP	PEMKO 303AV
1	DRIP	PEMKO 346C

4. No. 4: H4 DOOR 105C 107A

3	HINGES	MCKINNEY TA2714 4 ½ X 4 ½
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- 1 LOCKSET BEST 93K7AB14D-S3
- 1 STOP ROCKWOOD 440
- 3 SILENCERS GJ64

5. No. 5: H5 DOOR 106A 105D

- 3 HINGES MCKINNEY TA2714 4 ½ X 4 ½
- 1 PRIV. LOCK BEST 93K0L14D-S3
- 1 STOP ROCKWOOD 440
- 3 SILENCERS GJ64
- 1 BOLT SCHLAGE B180 – DR 106A

6. No. 6: H6 DOOR 108B

- 3 HINGES MCKINNEY TA2714 4 ½ X 4 ½
- 1 LOCKSET BEST 45H7T14J
- 1 STOP ROCKWOOD 440
- 1 THRESHOLD PEMKO 271A
- 1 WEATHERSTRIP PEMKO 303AV
- 1 SWEEP PEMKO 18061CNB

END OF SECTION

SECTION 08800 GLAZING

PART 1 GENERAL

- 1.01 SECTION INCLUDES: Glass and glazing for doors, windows and other glazed openings, interior and exterior locations.
- 1.02 RELATED SECTIONS
- A. Section 08520-Aluminum Windows.
- 1.03 QUALITY ASSURANCE: 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.
- A. Prime Glass Standard: FS DD-G-45I.
- B. Heat-Treated Glass Standard: FS DD-G-I403.
- C. Safety Glass Standard: CPSC I6 CFR I20I.
- 1.04 DELIVERY, STORAGE, AND HANDLING: Protect glass during transit, storage and handling to prevent scratching or breakage of glass. Replace all broken glass.
- 1.05 PROJECT CONDITIONS: 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. AFGD, Inc., Atlanta, GA. Tel. (800) 766-2343.
 2. Guardian Industries Corp., Carleton, MI. Tel. (800) 521-9040.
 3. Pilkington Libbey-Owens-Ford, Toledo, OH. Tel. (419) 246-6078.
 4. PPG Industries, Inc., Pittsburgh, PA. Tel. (800) 377-5267.
 5. Visteon Float Glass Operations, Allen Park, MI. Tel. (800) 521-6345.
- B. Substitutions shall fully comply with specified requirements and Section 01630-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.
 4. Spacer Material: Manufacturer's standard metal.
 5. Desiccant: Manufacturer's standard, either molecular sieve or silica gel.
 6. Corner Construction: Manufacturer's standard.
 7. Exterior Pane: Gray tinted.
 8. Interior Pane: Clear.
- 2.03 LAMINATED CLEAR SAFETY GLASS: 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: 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 Substantial Completion in each area of Project. Comply with glass product manufacturer's recommendations for final cleaning.
- B. The General Contractor shall be responsible for removal of protective materials and cleaning with plain water, or water with soap or household detergent as approved by the glass manufacturer. The General Contractor shall be held responsible for damages resulting from the use of other cleaning material.

END OF SECTION

SECTION 09050 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 01330 – 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 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
• 03300 – Concrete Floor Stain	H&C HC#157 Sandstone	(dark tan)
• 05500 - Met Bollards & Stair Steel	S/W#6103 Tea Chest	(brown)
• 06100 - Plywood Wainscot	S/W #6099 Sand Dollar	(light tan)
• 06400 - Architectural Woodwork	S/W #6101 Practical Beige	(tan)
• 07920 - Joint Sealants	Pecora (Match adjacent material inside & outside)	
• 08100 - Metal Dr & Frames	S/W #6103 Tea Chest	(dark brown)
• 08335 - Overhead Coiling Doors	Raynor-Tan	(tan)
• 08365 - Sectional Overhead Dr	Raynor-Dark Brown	(brown)
• 08520 - Aluminum Windows	Peerless-Dark Bronze	(dark brown)
• 08710 - Door Hardware	Satin Chrome	(silver)
• 09250 - Gypsum (Walls)	S/W #6098 Paces white	(light tan)
• 09250 - Gypsum (Ceilings)	S/W #7007 Ceiling Bright White	(white)
• 09310 - Ceramic Tile Floor 'A'	Floor Gres-Gabbro Grigio	(tan)

- 09310 - Ceramic Tile Floor 'B' Floor Gres-Vancouver (beige)
(Checkered Pattern)
- 09310 - Ceramic Tile Wall 'A' US Ceramic-U-078 Bone (beige)
- 09310 - Ceramic Tile Wall 'B' US Ceramic-U-788 Fawn Beige (tan)
- 09310 - Grout (Floors) Laticrete-Sand Beige 30 (tan)
- 09310 - Grout (Walls) Laticrete-Almond 85 (off white)
- 09650 - Resilient Floor (VCT #1) Mannington 717 Venetian Silk (tan)
- 09650 - Resilient Floor (VCT#2) Mannington 727 Deep Ochre (light brown)
- 09650 - Rubber Base Johnsonite-Sandalwood 45 (brown)

- 10200 - Louvers & Vents C/S Group Dark Bronze (dark brown)
- 10400 - Specialty Signs (Int-border) Mohawk-105 Black (black)
- 10400 - Specialty Signs (Int-background) Mohawk-287 Sand (tan)
- 10400 - Specialty Signs (Int-copy) Mohawk-226 Beige (beige)
- 10535 - Canopies Mapes-#20-8021HY Designer Beige (beige)
- 10670 - Storage Shelving Penco-Tawny Tan (tan)

- 12495 - Window Blinds Hunter Douglas #C270-Linen (off white)

- 13122 - Metal Building Main Roof Ceco-Match Existing
- 13122 - Wall Panel Ceco-(Match exist)
- 13122 - Roof Fascia & Rake Ceco- (Match exist)
- 13122 - Gutter, Downspout & Trim Ceco- (Match Existing)
- 13122 - Soffit Panel Ceco-Almond (tan)
- 13122 - Structural Framing (Bld'g) S/W #6101 Sands of Time (tan)

- 13124 - Metal Shed Roof Ceco-Galvalume (silver/gray)
- 13124 - Roof Fascia & Rake (Shed) Ceco- Burnished Slate (brown)
- 13124 - Gutter, Downspout & Trim Ceco-Burnished Slate (brown)
- 13124 - Structural Framing (Shed) S/W #6101 Sands of Time (tan)
- 13124 - All exposed Steel S/W #6101 Sands of Time (tan)

PART 3 EXECUTION

3.01 EXECUTION: 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 MDOT Architect upon written notification and subsequent submittals by the Contractor.

END OF SECTION

SECTION 09250

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: 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: 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 GYPSUM BOARD PRODUCTS

- A. 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 where indicated; 5/8 inch thick.
 - 5. Cement Board: Provide water-resistant cement based backer board, 5/8 inch thick Durock, as a base for ceramic tile.

2.02 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.

2.03 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.

- 2.04 MISCELLANEOUS MATERIALS: 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, comply with manufacturer's instructions and requirements for fire resistance ratings (if any), whichever is most stringent.
- B. Install wall / partition boards vertically to avoid end- butt joints wherever possible. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs. Form control joints and expansion joints with space between edges of boards, prepared to receive trim accessories.
- C. Install sound attenuation blankets and insulation as indicated, prior to gypsum board unless readily installed after board has been installed.
- D. Floating construction: Where feasible, including where recommended by manufacturer, install gypsum board with "floating" internal corner construction, unless isolation of the intersecting boards is indicated or unless control or expansion joints are indicated.
- E. Space fasteners in gypsum boards in accordance with manufacturer's recommendations.

3.03 SPECIAL GYPSUM BOARD APPLICATIONS: Where drywall is base for thin set ceramic tile and similar rigid applied wall finishes, install cement based backing board. At toilets, showers, labs, janitor closets, and similar "wet" areas, install water-resistant gypsum board. 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.
- 3.06 PROTECTION OF WORK: 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 09310

CERAMIC TILE

PART 1 GENERAL

- 1.01 SECTION INCLUDES: Thin set ceramic floor tile, glazed cove base, wall tile and accessories.
- 1.02 RELATED SECTIONS
- A. Section 07260 – Vapor Retarders (Floor protection paper).
 - B. Section 09050 – Color Design.
- 1.03 SUBMITTALS
- A. Submit manufacturer's product data and written instructions for recommended installation and maintenance practices for each product specified.
 - B. Submit 2 samples of types and colors of tile and grout required in similar pattern of tile shown on Drawings, mounted on not less than 12 inches square plywood or hardboard and grouted as required.
 - C. Submit one full size sample of each tile accessory and marble threshold. Submit samples of trim and other units if requested by the 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: 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: 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 01630-Product Options and Substitution Procedures.

2.02 CERAMIC FLOOR TILE: 8 inches by 8 inches by 5/16 inch, cushioned edge, unglazed, color to be selected from standard colors available.

2.03 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.

2.04 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.

2.05 TRIM AND SPECIAL SHAPES

A. Provide necessary units with rounded internal and external corners, and rounded internal and external corner units of same material and finish as field tile, and as follows:

1. Base: Sanitary cove units.
2. External Corners: Bullnose shapes, with a radius of not less than 3/4 inch, unless otherwise shown.
3. Internal Corners: Field-butted square, except use square corner, combination angle and stretcher type cap.

2.06 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 MDOT Architect from manufacturer's full range of standard colors.

2.07 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.

2.08 GROUT: ANSI A 118.3, with Tile Contractor's Association certification of conformance. Equal to Laticrete Type SpectraLOCK Pro Grout. 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: 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. 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: 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 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 09650 RESILIENT FLOORING

PART 1 GENERAL

- 1.01 SECTION INCLUDES: Vinyl Composition Tile (V.C.T.) Flooring, Vinyl Base, and Accessories.
- 1.02 RELATED SECTIONS
- A. Section 07260 – Vapor Retarders (Floor protection paper).
 - B. Section 09050 – 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: 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
 - C. Substitutions shall fully comply with specified requirements and Section 01630-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 MDOT Architect from manufacturer's full range of Premium colors. Refer to Section 09050 – 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: 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.
- 3.04 PATTERN: 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 09900

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, Project Engineer / MDOT Architect will select these from standard colors available for the materials system specified.

1.02 PAINTING NOT INCLUDED: 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.

- A. 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.
- B. 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.
- C. 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.
- D. 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.
- E. 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: 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 Project Engineer / MDOT Architect from manufacturer's full range of colors. Indicate submitted manufacturer's closest **standard** colors that match colors specified in Section 09 05 15.
- 1.05 QUALITY ASSURANCE: 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. Anvil Paints & Coatings, Inc., Largo, FL. Tel. (800) 822-6776.
 - 2. Devoe Cleveland, OH. Tel. (888) 265-6753.
 - 3. Benjamin Moore & Company, Montvale, NJ. Tel. (800) 344-0400.
 - 4. Farrell-Calhoun Paint, Memphis, TN. Tel. (901) 526-2211.
 - 5. ICI Dulux Paints, Cleveland, OH. Tel. (800) 984-5444.
 - 6. PPG Architectural Finishes, Inc., Pittsburgh, PA. Tel. (800) 441-9695.
- C. Substitutions shall fully comply with specified requirements and Section 01 62 14-Product Options and Substitution Procedures

2.02 COLORS AND FINISHES

- A. Paint colors, surface treatments, and finishes will be selected from color chips submitted by contractor. Prior to beginning Work, the MDOT 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 Project Engineer / MDOT Architect in writing of any anticipated problems using specified coating systems with substrates primed by others.

2.03 MATERIAL QUALITY

- A. Provide the best quality grade of the various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying the manufacturer's identification as a standard, best grade product will not be acceptable. Proprietary names used to designate colors or materials are not intended to imply that products of the named manufacturers are required to the exclusion of equivalent products of other manufacturers.
- B. Provide undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer, and use only within recommended limits.

2.04 PAINT SYSTEMS: Provide the following paint systems for the various substrates, as indicated.

A. Exterior Paint Systems are as follows:

1. Ferrous and Zinc Coated Metal
 - 1st Coat – S-W DTM Acrylic Primer/Finish, B66W1
(6 mils wet, 3 mils dry)
 - 2nd Coat – S-W DTM Acrylic Semi-Gloss Coating, B66-200 Series
 - 3rd Coat – S-W DTM Acrylic Semi-Gloss Coating, B66-200 Series
(2-4 mils dry per coat)
 - (First coat may not be required on items that are shop primed.)
 - Not less than 8.0 Mils dry film thickness.

B. Interior Paint Systems are as follows:

1. Gypsum Drywall
 - 1st Coat – S-W PrepRite® 200 Latex Primer, B28W200
(4 mils wet, 1.2 mils dry)
 - 2nd Coat – S-W ProMar® 200 Alkyd Semi-Gloss, B34W200 Series
 - 3rd Coat – S-W ProMar® 200 Alkyd Semi-Gloss, B34W200 Series
(4 mils wet, 1.7 mils dry per coat)
 - Not less than 4.6 mils dry film thickness.
2. Gypsum Drywall (in wet areas)
 - 1st Coat – S-W PrepRite® 200 Latex Primer, B28W200
(4 mils wet, 1.2 mils dry)
 - 2nd Coat – S-W Tile-Clad® HS Epoxy, B62WZ100 Series
 - 3rd Coat – S-W Tile-Clad® HS Epoxy, B62WZ100 Series
(2.5-4 mils dry per coat)
 - Not less than 6.5 mils dry film thickness.
3. Ferrous and Zinc Coated Metal
 - 1st Coat – S-W DTM Acrylic Primer/Finish, B66W1
(6 mils wet, 3 mils dry)
 - 2nd Coat – S-W DTM Acrylic Semi-Gloss Coating, B66-200 Series
 - 3rd Coat – S-W DTM Acrylic Semi-Gloss Coating, B66-200 Series
(2-4 mils dry per coat)
 - Not less than 8.0 mils dry film thickness.
5. Painted Woodwork
 - 1st Coat – S-W PrepRite® Wall & Wood Oil Primer/Undercoater, B49
(4 mils wet, 2 mils dry)
 - 2nd Coat – S-W ProMar® 200 Alkyd Semi-Gloss, B34W200 Series
 - 3rd Coat – S-W ProMar® 200 Alkyd Semi-Gloss, B34W200 Series
(4 mils wet, 1.7 mils dry per coat)
 - Not less than 5.5 mils dry film thickness.
6. Concrete Floor Stain & Sealer
 - 1st Coat – H&C Silicone Acrylic Concrete Sealer Clear
 - 2nd Coat – H&C Silicone Acrylic Concrete Sealer Clear
(75-250 sq ft/gal)

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: 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.

- A. 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.
- B. Galvanized Surfaces: Clean free of oil and surface contaminants with acceptable non-petroleum based solvent.
- C. 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, immediately 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 spar varnish for backpriming. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or equivalent sealer immediately upon delivery to project.

3.03 MATERIALS PREPARATION: 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 is limited to those items exposed in mechanical equipment rooms and in occupied spaces.
 - 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 10200

LOUVERS AND VENTS

PART 1 GENERAL

- 1.01 SECTION INCLUDES: Extruded aluminum louvers and vents with insect/bird screens as indicated on the Drawings including indications of sizes and locations.
- 1.02 RELATED SECTION
- A. Section 09050 – Color Design.
 - B. Division 15 and 16 for operable dampers behind louver where scheduled.
- 1.03 SUBMITTALS
- A. Product Data: Submit manufacturer's specifications; certified test data, where applicable; and installation instructions for required products, including finishes.
 - B. Shop Drawings: Submit Shop Drawings for the fabrication and erection of louver units and accessories. Include plans, elevations and details of sections and connections to adjoining Work. Indicate materials, finishes, fasteners, joinery and other information to determine compliance with specified requirements.
 - C. Samples: Submit 6-inch square samples of each required finish. Prepare samples on metal of same gage and alloy to be used in Work. Where normal color and texture variations are to be expected, include two or more units in each sample showing limits of such variations.
- 1.04 QUALITY ASSURANCE
- A. Performance Requirements: Where louvers are indicated to comply with specific performance requirements, provide units whose performance ratings have been determined in compliance with Air Movement and Control Association (AMCA) Standard 500.
 - B. SMACNA Recommendations: Comply with SMACNA "Architectural Sheet Metal Manual" recommendations for fabrication, construction details and installation procedures, except as otherwise indicated.
 - C. Field Measurements: Verify size, location and placement of louver units prior to fabrication, wherever possible.
 - D. Shop Assembly: Coordinate field measurements and Shop Drawings with fabrication and shop assembly to minimize field adjustments, splicing, mechanical joints and field assembly of units. Pre-assemble units in shop to greatest extent possible and disassemble as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation.
- 1.05 DELIVERY, STORAGE, AND HANDLING: Deliver materials and products in labeled protective packages. Store and handle in strict compliance with manufacturers' instructions and recommendations. Protect from damage from weather, excessive temperatures and construction operations

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on products manufactured by Construction Specialties, Inc., 49 Meeker Ave., Cranford, NJ 07016. Tel. (908) 272-5200
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. All-Lite Louvers, Mineral Wells, WV. Tel. (304) 489-8113.
 - 2. Ruskin Manufacturing, Kansas City, MO. Tel. (816) 761-7476.
- C. Substitutions shall fully comply with specified requirements and Section 01630-Product Options and Substitution Procedures

2.02 WALL LOUVERS

- A. Drainable Blade Fixed Louver: 4 inch deep extruded aluminum louver equal to C/S Model A4097. Free area to be 50.44 percent minimum for 48 inches square. Pressure drop to be no more than 0.14-inch of water gage at 872 FPM in intake direction.
- B. Standard Brick Vent: 4 inch deep vent equal to C/S Model M23EX with aluminum through wall duct extension. Free area to be 60.20 Sq. inches. Fabricated from extruded aluminum alloy, minimum 0.125 inch thick, with 1/4-inch structural ribs. A die-formed 7 by 7 mesh, 0.028-inch diameter, wire insect screen is to be mechanically secured on interior face of vent. Size to be 15 5/8 inches wide by 8 1/16 inches high by 4 inches deep.

2.03 MATERIALS

- A. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming or as otherwise recommended by metal producer to provide required finish.
- B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T52. Blade and frame thickness shall be 0.081 inch minimum.
- C. Fastenings: Use same material as items fastened, unless otherwise indicated. Fasteners for exterior applications may be hot-dip galvanized, stainless steel or aluminum. Provide types, gages, and lengths to suit unit installation conditions. Use Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.
- D. Anchors and Inserts: Use non-ferrous metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.
- E. Bituminous Paint: SSPC-Paint 12 (cold-applied asphalt mastic).

2.04 FABRICATION, GENERAL

- A. Provide louvers and accessories of design, materials, sizes, depth, arrangement, and metal thickness indicated, or if not indicated, as required for optimum performance with respect to airflow; water penetration; air leakage; strength; durability; and uniform appearance.
- B. Fabricate frames including integral sills to suit adjacent construction with tolerances for installation, including application of sealant in joints between louvers and adjoining Work.

- C. Include supports, anchorage, and accessories required for complete assembly.
- D. Provide hidden vertical mullions of type and at spacing indicated but not further apart than recommended by manufacturer or 72 inches on center, whichever is less. At horizontal joints between louver units provide horizontal mullions except where continuous vertical assemblies are indicated.
- E. Provide sill extensions and loose sills made of same material as louvers, where indicated, or required for drainage to exterior and to prevent water penetrating to interior. Setback dimension is 3-3/4 inches to 6 inches.
- F. Join frame members to one another and to stationary louver blades. Maintain equal blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.
- G. Finish: Kynar 500 (70% PVDF) finish to be selected by MDOT Architect from full range of standard and premium colors. Refer to Section 09050 for color.

2.05 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, operable dampers or fans.

PART 3 EXECUTION

3.01 PREPARATION: 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.

END OF SECTION

SECTION 10400 IDENTIFICATION DEVICES

PART 1 GENERAL

- 1.01 SECTION INCLUDES: Signage for room identification and informational system.
- 1.02 RELATED SECTIONS: Section 09050 – Color Design.
- 1.03 SUBMITTALS: Submit manufacturer's technical data and installation instructions for each type of sign required.
 - A. Samples: Submit samples of each color and finish of exposed materials and accessories required for specialty signs. MDOT Architect's review of samples will be for color and texture only. When requested, furnish full-size samples of specialty sign materials.
 - B. 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: 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: Deliver components correctly packed to prevent damage. Store in secure area out of weather. Handle per manufacturer's instructions.
- 1.06 WARRANTY: 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. Mohawk Sign Systems, Inc., Schenectady, NY. Tel. (518) 370-3433.
 - 3. Scott Sign Systems, Inc., Sarasota, FL. Tel. (800) 237-9447.
 - C. Substitutions shall fully comply with specified requirements and Section 01630-Product Options and Substitution Procedures
- 2.02 SIGN SYSTEM
 - A. Interior signage: Wall mounted WS Series with rounded corners. Design so that paper insert can be installed from each end.

2.03 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.

2.04 BRAILLE AND TACTILE COPY: 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.

2.05 FINISHES – INTERIOR SIGNAGE

- A. Colors: Selected from manufacturer's standard.
- B. Surface Texture: Matte.

2.06 FONT: Shall be Helvetica Medium, unless noted otherwise.

PART 3 EXECUTION

3.01 EXAMINATION: 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. 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 & Storage
- B. Sign Type 2: Toilet

END OF SECTION

SECTION 10525 FIRE EXTINGUISHERS

PART 1 GENERAL

- 1.01 SECTION INCLUDES: Portable, multi-purpose, and dry-chemical fire extinguishers including accessories and mounting brackets.
- 1.02 SUBMITTALS: Submit manufacturer's technical data and installation instructions for all portable fire extinguishers required.
- 1.03 QUALITY ASSURANCE: 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
- C. Substitutions shall fully comply with specified requirements and Section 01630-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 Wall Mounting: Equal to J.L. Industries Cosmic 10E, UL rated 4A-60BC, 10 lb. nominal capacity.

- 2.03 MOUNTING BRACKETS: Provide manufacturer's bracket designed to prevent accidental dislodgment of extinguisher, of proper size for type and capacity of extinguisher indicated, in manufacturer's standard plated finish.

PART 3 EXECUTION

- 3.01 INSTALLATION: Install items included in this section in locations and at mounting heights indicated, or if not indicated, at heights and locations to comply with applicable regulations of governing authorities.
 - A. Securely fasten mounting brackets to structure, square and plumb, to comply with manufacturer's instructions.
 - B. 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 five units are required unless additional units are indicated on Drawings.

END OF SECTION

SECTION 10535 CANOPIES

PART 1 GENERAL

- 1.01 SECTION INCLUDES: Extruded aluminum wall-supported canopies as shown on the Drawings and specified herein.
- 1.02 RELATED SECTIONS
- A. Section 07920 – Joint Sealants.
 - B. Section 09050 – Color Design.
 - C. Section 13122 – Metal Building System
- 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: 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. Tel. (318) 636-2722.
 - 2. Dittmer Arch. Alum., Winter Springs, FL. Tel (800) 822-1755.
 - 3. Mason – Florida, LLC, Leesburg, FL Tel. (877) 577-0300.
 - C. Substitutions shall fully comply with specified requirements and Section 01630-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: Lumishade all weather aluminum hangar rod canopy with roll-formed interlocking deck members and style "J", 1/8 inch thick by 8 inches high heavy extruded aluminum, fascia.
- 2.04 FINISHES: Manufacturer's standard **Powder Coated Finish**. Color to be selected by the MDOT Architect from manufacturer's complete selection of standard colors.

PART 3 EXECUTION

- 3.01 FIELD MEASUREMENTS: Take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of metalwork. Do not delay job progress; allow for adjustments and fitting where taking of field measurements before fabrication might delay work.
- 3.02 ERECTION: Shall be performed by the manufacturer or his approved installer.
- 3.03 INSTALLATION: Installation shall be in accordance with manufacturer's instructions.
- 3.04 CARE: Extreme care shall be taken to prevent damage or scratching. All workmanship must be of the very best with neat miters and fitted joints.
- 3.05 REPAIR AND PROTECTION: Protect exiting materials from damage during the installation process. When installation is complete, repair or replace any items damaged. Replacement items are to match the original.
- 3.06 CLEAN-UP: After work is complete, remove all waste materials and dispose of it off the owner's property.

END OF SECTION

SECTION 10670 STORAGE SHELVING

PART 1 GENERAL

- 1.01 SECTION INCLUDES: Metal pallet storage system and work benches as shown on the Drawings.
- 1.02 RELATED SECTIONS: Section 09050 – Color Design.
- 1.03 SUBMITTALS: Submit manufacturer’s technical product data and installation instructions.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS – PALLET STORAGE SYSTEM

- A. Drawings and Specifications are based on products manufactured by Interlake Material Handling and Nashville Wire Products. Local supplier is MSC Industrial Supply Co., Jackson, MS. Tel. (800) 844-3971.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Penco Products, Oaks, PA. Tel. (610) 666-0500.
 - 2. Wireway / Husky, Denver, NC. Tel. (800) 438-5629.
 - 3. C&H Distributors, LLC, Milwaukee, WI Tel. (800) 558-9966.
- C. Substitutions shall fully comply with specified requirements and Section 01630 – Product Options and Substitution Procedures.

2.02 PALLET STORAGE SYSTEM

- A. Pallet Rack Upright: Pre-finished metal columns and braces complete with required accessories and hardware, 16,700 lb capacity, 120 inches high x 42 inches deep.
- B. Pallet Rack Beam: Pre-finished metal beams complete with required accessories and hardware, 5600 lb capacity, 4 inches x 96 inches.
- C. Welded Wire Decking: Galvanized metal welded wire decking complete with required accessories and hardware, 3100 lb capacity, 42 inches x 46 inches.
- D. Color: Pre-finished colors to be selected from standard color chart by MDOT Architect.

2.03 ACCEPTABLE MANUFACTURERS – WORK BENCHES AND WALL CABINETS

- A. Drawings and Specifications are based on products manufactured by Penco Products Inc., P.O. Box 378, Oaks, PA 19456. Tel. (610) 666-0500.
- B. Equivalent products by the following manufacturers are acceptable:
 - 4. Lyon Metal Products, Aurora, IL. Tel. (603) 892-8941.
 - 5. Stanley Storage Systems, Allentown, PA. Tel. (800) 523-9462.
- C. Substitutions shall fully comply with specified requirements and Section 01630 – Product Options and Substitution Procedures.

2.04 MODULAR & OPEN WORK BENCHES AND WALL CABINETS

- A. Modular Work Bench: 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.
- B. Open Work Bench: Model No. 34532, Tuff Top™ (Resin Board) top fixed bench, 72 inches wide, 28 inches deep, and 34 inches high.
- C. Metal Wall Cabinet: Clipper Shelving with side panels, backs, tops, 2 adjustable shelves, and bottom attached to plywood wall, 36 inches wide, 36 inches high, and 18 inches deep.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install units plumb and level, in locations and with mountings as shown or as directed by the Project Engineer.
- B. Securely attach all components together in accordance with manufacturer's installation instructions.
- C. Securely attach units to adjacent units and to wall or floor as required to not move or fall.

- 3.02 CLEANING AND PROTECTION: At completion of installation, clean surfaces in accordance with manufacturer's instructions. Protect units from damage until acceptance by Owner.

END OF SECTION

SECTION 10810

TOILET ACCESSORIES

PART 1 GENERAL

- 1.01 SECTION INCLUDES: The extent of each type of toilet accessory is shown on the Drawings and Schedules, unless otherwise indicated. The types of toilet accessories required include the following:
1. Mirrors
 2. Toilet Paper Dispenser
 3. Grab Bars
 4. Soap Dispensers
 5. Paper Towel Dispenser
 6. Clothes Hook
- 1.02 SUBMITTALS: 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: 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: 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.
- C. Substitutions shall fully comply with specified requirements and Section 01630-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 6542 or 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.

PART 3 EXECUTION

2.01 EXAMINATION: 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.

2.02 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 12495 WINDOW BLINDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Horizontal blinds at exterior windows.

1.02 RELATED SECTIONS

- A. Section 09050 – Color Design.

1.03 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.

1.04 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 01630-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 manufacturer's full line of standard colors.

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.
- B. 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.
- C. 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.
- D. 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.
- E. 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.
- F. 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: 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: 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 13124

PRE-ENGINEERED BUILDINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Building Type: The buildings are single-story, single-span, rigid-frame-type pre-engineered metal buildings of the nominal length, width eave height, and roof pitch indicated.
- B. Roof system: Standard metal building ribbed-type roof system with exposed fasteners and field installed mastic.
- C. 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. Section 09050 – Color Design.
- B. Section 09900 – Paints and Coatings (Painting for ferrous metal exposed to view.)

1.03 STRUCTURAL FRAMING AND ROOF PANELS

- A. Design Loads: Design anchor bolts, structural members, and exterior covering for applicable loads and combinations of loads in accordance with the MBMA's "Design Practices Manual."
- B. Structural Steel: Comply with AISC's "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings" for design requirements and allowable stresses.
- C. Light Gage Steel: Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members" and "Design of Light Gage Steel Diaphragms" for design requirements and allowable stresses.
- D. Welded Connections: Comply with AWS's "Standard Code for Arc and Gas Welding in Building Construction" for welding procedures.
- E. Metal Roofing: Comply with SMACNA Architectural Sheet Metal Manual.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's sample warranties and product information for building components, accessories and color chart.
- B. Shop Drawings: Submit shop drawings for anchor bolts, structural framing system, roofing components and accessories not fully detailed or dimensioned in manufacturer's product data.
 - 1. Structural Framing: Submit erection drawings. Include fabrication and assembly details. Show anchor bolts settings and sidewall, end-wall, and roof framing.
 - 2. Sheet Metal Accessories and Roofing: Submit 1/4 inch scale layouts and 1-1/2 inch scale details of accessories; show profiles, methods of joining to system components and dissimilar building materials, flashing of each condition for roof penetrations, and anchorage.

- C. Certification: Submit certification prepared, signed, and sealed by a Professional Engineer registered in the State of Mississippi, verifying that anchor bolts, structural framing and covering panels meet loading requirements and codes, 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.
- 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 AISC Certified (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. Installer: The Installer shall provide a 5 year watertight warranty on the roof system.
- B. Manufacturer:
 - 1. The manufacturer shall provide a three- year warranty against failures caused by faulty or substandard materials.
 - 2. The manufacturer shall provide a twenty-year Premium Paint warranty.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and specifications are based on products manufactured by Ceko Buildings Division, P. O. Box 6500, Columbus, MS 39703, Tel. (662) 328-6722.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Butler Mfg. Co., Inc., Kansas City, MO. Tel. (816) 968-3000.
 - 2. Gulf States, Starkville, MS, Tel.: (662) 323-8021.
 - 3. Nucor, Terrell, TX, (972) 524-5407.
 - 4. Ruffin, , Oak Grove, LA. Tel. (800) 421-4232.
 - 5. VP Buildings, Memphis, TN. Tel. (800) 238-3246.
- C. Substitutions shall fully comply with specified requirements and Section 01630-Product Options and Substitution Procedures

2.02 METAL MATERIALS

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

2.03 PAINT MATERIALS

- A. Shop Primer for Ferrous Metal: Fast-curing, lead-free, universal primer. Comply with FS TT-P-645.
- B. Shop Primer for Galvanized Metal Surfaces: Zinc dust- zinc oxide primer. Comply with FS TT-P-641.
- C. Painted Trim Sheet Metal Surfaces:
 - 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 1.00 mil. The reverse coat shall consist of a primer .20 - 0.25 mil thick and a wash coat backer 0.30 - 0.40 mil thick, for a total film thickness of 0.50 - 0.65 mil.
 - 2. Finish system shall conform to all tests for adhesion, flexibility, and longevity as specified by the finish supplier.

2.04 STRUCTURAL FRAMING

- A. Rigid Frames: Factory welded, shop painted, built-up "I-beam" shape or open-web type consisting of tapered or parallel flange beams and tapered columns with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide length of span and spacing indicated.
- B. Primary Endwall Framing: Provide the following frame members fabricated for field-bolted assembly.
 - 1. Endwall Columns: Shop-painted, built-up factory-welded "I"-shape or cold-formed "C" sections, fabricated from 14 gage (0.0747-inch) steel.

2. Endwall Beams: Shop-painted "C"-shape roll-formed sections fabricated from 14 gage (0.0747 inch) steel.
- B. Secondary Framing: Provide the following:
1. Roof Purlins: 16 gage (0.598 inch) shop-painted roll-formed steel "C" or "Z" sections. Fabricate purlin spacers from 14 gage (0.0747-inch) cold-formed galvanized steel sections. Purlins to be 8 inches deep.
 2. Eave Struts: Unequal flanges 16 gage (0.0598 inch) shop-painted roll-formed steel "C" sections formed to provide adequate backup for roof panels.
 3. Flange and Sag Bracing: 1-5/8 inch by 1-5/8 inch angles fabricated from 16 gage (0.0598 inch) shop painted roll formed steel.
- D. Wind Bracing: Provide portal beam wind bracing at rigid frame members. Use manufacturer's standard detail.
- E. Bolts: Provide zinc- or cadmium-plated bolts when structural framing components are in direct contact with roofing panels. In other cases provide shop-painted bolts.
- F. Extra Materials: Furnish 5 percent excess over required amount of nuts, bolts, screws, washers, and other required fasteners for each building. Pack in cartons labeled to identify contents and store on site where directed.
- G. Shop Painting: Clean surfaces of loose mill scale, rust, dirt, oil, grease, and other matter. Follow procedures of SSPC-SP3 for power-tool cleaning, SSPC-SP7 for brush-off blast cleaning, and SSPC-SP1 for solvent cleaning. Prime framing members with rust-inhibitive primer.
- 2.05 ROOFING PANELS: MAP Ribbed-type panel, 1-1/2 inches high with 36 inches wide coverage and rib spacing at 12 inches on center, 26 gage Galvalume without color coating. Panels, 40 feet and less, shall be in one continuous length.
- 2.06 FLASHING AND TRIM: Flashing and trim shall be furnished at eaves, rake, corners, base, framed openings, and wherever necessary to seal against the weather and provide a finished appearance. Flashing and trim shall be formed in maximum lengths to minimize joints, from 26 gage, galvanized steel, ASTM A653 with G90 coating with Kynar 500 (70% PVDF) color. Standard colors from manufacturer's full range of colors to be selected by Project Architect.
- 2.07 SHEET METAL ACCESSORIES
- A. Gutters shall be formed in sections not less than 20 feet in length complete with any special pieces that may be required. Join sections with riveted and soldered or sealed joints. Provide expansion joints with cover plate where required. Furnish gutter supports spaced at maximum 48 inches 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. Gutters are box-shaped with face profile shaped to match rake trim. Finish to match roof fascia and rake.
- B. Downspouts shall be formed full length complete with any special pieces that may be required. Downspouts shall be, 26 gage, roll formed, galvanized steel, ASTM A653 with G90 coating. Downspouts are rectangular-shaped and shall have a 45-degree elbow at the bottom. Straps shall be spaced 6 feet on center maximum (minimum of 3 required per downspout) and be the same material as downspout. Strap edges shall be rolled or smooth.

PART 3 EXECUTION

3.01 ERECTION

- A. Primary Framing: Erect framing required true to line, plumb, level, rigid, and secure. Level base plates to true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use non-shrinking grout to obtain uniform bearing and maintain level baseline elevation. Moist-cure grout for 7 days after placement.
- B. Purlins: Use rake or gable purlins with tight-fitting closure channels and fascias. Secure purlins to structural framing and hold rigidly to straight line by sag rods.
- C. Bracing: Use diagonal angle bracing in roof. Use movement-resisting frames in lieu of sidewall rod bracing.
- D. Framed Openings: Provide shapes of design and size to reinforce openings and carry loads imposed, including equipment furnished under electrical Work. Securely attach to building structural frame.
- E. Sheet Metal Accessories: Install gutters, downspouts, and other accessories for positive anchorage to building. Minimums of 3 straps are required at each downspout, with maximum spacing at 6 feet on center.
- F. Roofing Panels: Comply with manufacturers standard instructions and conform to standards set forth in the Architectural Sheet Metal Manual published by SMACNA, in order to achieve a watertight installation.
 - 1. Install panels in such a manner that horizontal lines are true and level and vertical lines are plumb. Coordinate with electrical so that all penetrations through roof occur in flat portion of panel with sufficient space adjacent to penetration to be properly flashed and waterproofed.
 - 2. Attach panels using manufacturer's standard fasteners, spaced in accordance with approved Shop Drawings.
 - 3. Provide weatherseal under ridge cap. Flash and seal roof panels at eave and rake with rubber, neoprene, or other closures to exclude weather.
 - 4. Install sealant for preformed roofing panels as specified on approved Shop Drawings.
 - 5. Do not allow traffic on completed roof. If required, provide cushioned walk boards.
 - 6. Protect installed roof panels and trim from damage caused by adjacent construction until completion of installation.
 - 7. Remove and replace panels or components that are damaged beyond successful repair.

- 3.02 CLEANING AND TOUCH-UP: 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 13125

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: Plywood wainscot is specified in Section 06100. Personnel doors and frames and finish hardware are specified in Sections 08100 and 08710. Overhead service doors, including operators, are specified in Sections 08335 and 08365. Colors are specified in Section 09050 - Color Design. Painting for ferrous metal exposed to view is specified in Section 09900 - Paints and Coatings. Canopies are specified in Section 10535

1.03 STRUCTURAL FRAMING AND ROOF AND SIDING PANELS: Design anchor bolts, structural members, and exterior covering for applicable loads and combinations of loads in accordance with the MBMA's "Design Practices Manual."

- A. Structural Steel: Comply with AISC's "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings" for design requirements and allowable stresses.
- B. 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.
- C. Welded Connections: Comply with AWS's "Standard Code for Arc and Gas Welding in Building Construction" for welding procedures.
- D. 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, 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 AISC Certified (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. Butler Mfg. Co., Inc., Kansas City, MO. Tel. (816) 968-3000.
 2. Gulf States, Starkville, MS. Tel. (800) 844-4853.
 3. Ruffin, Oak Grove, LA. Tel. (800) 421-4232.
 4. VP Buildings, Memphis, TN. Tel. (800) 238-3246.

- C. Substitutions shall fully comply with specified requirements and Section 01630-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: Comply with performance requirements of federal specifications indicated.

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

- C. Unpainted Galvalume: Unpainted Galvalume shall conform to ASTM A792-89 with a coating class of AZ- 55, chemically treated and lightly oiled. All 24 gage unpainted Galvalume used for roof applications shall be grade 80, except when used for trim it shall be grade 50B. All unpainted Galvalume 24 gage and thicker shall be grade 50B.
- D. Painted Galvalume: Galvalume used as a substrate for factory applied baked on paint shall conform to ASTM A792-89 with a coating class of AZ-50 or heavier, minimum spangle, chemically treated and lightly oiled, as specified by the coater. All painted Galvalume shall be grade 50B.
 - 1. The paint system shall be applied as follows: Topcoat shall consist of a primer 0.20 - 0.25 mil thick and a top coat 0.70 - 0.80 mil thick, for total film thickness of 1.0 mil. The reverse coat shall consist of a primer 0.20 - 0.25 mil thick and a wash coat backer 0.30 - 0.40 mil thick, for a total film thickness of 0.50 - 0.65 mil.
 - 2. Finish system shall conform to all tests for adhesion, flexibility, and longevity as specified by the finish supplier.
 - 3. Wall panels to be painted with Kynar 500 (70% PVDF) fluorocarbon coating.

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 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. Main roof shall be without color coating. Roof at front porch 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) color coating finish. Standard colors from manufacturer's full range of colors to be selected by Project Engineer / MDOT Architect.
 - C. Soffit Panel: MIP ribbed-type panel with reversed ribs to be 3/4 inch deep by 36 inches wide and full span on ceiling with no splices or laps, 26 gage, Galvalume, with Kynar 500 (70% PVDF) color coating finish. Standard colors from manufacturer's full range of colors to be selected by Project Engineer / MDOT Architect.
- 2.07 STRUCTURAL FRAMING: 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.
- A. Shop Connections: Power-riveted, bolted, or welded shop connections.
 - B. Field Connections: Provide bolted field connections.
- 2.08 FLASHING AND TRIM: 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. Gutters shall be formed in sections not less than 20 feet in length complete with any special pieces that may be required. Join sections with riveted and soldered or sealed joints. Provide expansion joints with cover plate where required. Furnish 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. Gutters are box-shaped with face profile shaped to match rake trim. Finish shall match roof fascia and rake.

- B. Downspouts shall be formed in full-length sections complete with any special pieces that may be required. Downspouts shall be, 26 gage, roll formed, galvanized steel, ASTM A653 with G90 coating. Finish 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 as downspout. Strap edges shall be rolled or smooth.

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: 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 15010

MECHANICAL GENERAL

PART 1 GENERAL

1.01 DESCRIPTION

- A. This Division and the accompanying Drawings cover furnishing of all labor, equipment, appliances, and materials and performing all operations in connection with the installation of complete air conditioning, ventilating, heating, plumbing and fire protection systems as specified herein and as shown on the Drawings.
- B. The general provisions of the Contract including the Conditions of the Contract (General, Supplementary and other conditions) and other divisions as appropriate, apply to work specified in this division.

1.02 CODES AND REGULATIONS

- A. All heating, ventilating and air conditioning materials and workmanship shall comply with the following codes and standards as applicable:
 - 1. International Building Code (2003)
 - 2. International Mechanical Code (2003)
 - 3. State Mechanical Code
 - 4. State Energy Code
- B. All plumbing materials and workmanship shall comply with the following codes and standards as applicable:
 - 1. International Building Code (2003)
 - 2. International Plumbing Code (2003)
 - 3. Mississippi State Plumbing Code
 - 4. City Plumbing Code
 - 5. City Gas Code
- C. All fire protection materials and workmanship shall comply with the following codes and standards as applicable:
 - 1. International Building Code (2003)
 - 2. The National Fire Protection Association Codes and Standards (latest edition)
- D. 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. (AGA)
 - 5. American Society of Mechanical Engineers Code (ASME)
 - 6. Factory Mutual Underwriters (FM)
 - 7. National Fire Protection Association Standards (latest edition)
 - 8. Sheet Metal and Air Conditioning Contractors' National Association Inc. (SMACNA)
 - 9. Underwriters Laboratories, Inc. (UL)

- E. All work done under this Contract shall comply with all state and local codes having jurisdiction and with the requirements of the Utility Companies whose services may be used. All modifications required by these codes shall be made by the Contractor without additional charges. Any conflict between these documents and the governing codes shall be immediately brought to the attention of the Engineer of Record. Where code requirements are less than those shown on the Plans or in the Specifications, the Plans and Specifications shall be followed.
- F. The Contractor shall obtain all permits, inspections, and approvals as required by all authorities having jurisdiction, and deliver certificates of approval to the Architect. All fees and costs of any nature whatsoever incidental to these permits, inspections and approvals must be assumed and paid by the Contractor.
- G. The Contractor shall comply with all applicable provisions of the William-Steiger Occupational Safety and Health Act (O.S.H.A.).

PART 2 PRODUCTS

2.01 COORDINATION

- A. The products of particular manufacturers have been used as the basis of design in preparation of these documents. Any modifications to the mechanical systems and their components, the electrical systems, the building structure and architecture, or any other portion of the building that result from the use of any other than the basis of design equipment shall be coordinated with all other trades. Such coordination shall occur before delivery of products from the manufacturer (before shop drawing submittals) and shall be clearly indicated on the shop drawings. All related modifications shall be borne by the Contractor and performed without any additional cost to the Contract.

2.02 DESCRIPTION

- A. All products shall be new and bear the Underwriter's Laboratories, Inc. (UL) label unless specifically indicated otherwise.

PART 3 EXECUTION

3.01 GENERAL

- A. The Mechanical, Plumbing and Fire Protection plans do not give exact elevations or locations of lines, nor do they show all the offsets, control lines, or installation details. The Contractor shall carefully lay out his work at the site to conform to the structural conditions, to provide proper grading of lines, to avoid all obstructions, to conform to details of installation supplied by the manufacturers of the equipment to be installed, and to thereby provide an integrated and coordinated installation operating at optimum performance.
- B. If the Contractor proposes to install equipment, including piping and ductwork, requiring space conditions other than those shown, or to rearrange the equipment, he shall assume full responsibility for the rearrangement of the space and shall have the Architect review the change before proceeding with the work. The request for such changes shall be accomplished by Shop Drawings of the space in question. All related costs incurred shall be borne by the Contractor and performed without any additional cost to the contract.
- C. The Contractor shall be responsible for the proper location and size of all slots, holes or openings in the building structure pertaining to his work, and for the correct location of sleeves, inserts and cores.

- D. The Contractor shall coordinate the work of the several various trades so that it may be installed in the most direct and workmanlike manner without hindering or handicapping the other trades. Piping interferences shall be handled by giving precedence to pipe lines which require a stated grade for proper operation. For example, sewer lines and condensate piping shall take precedence over water lines in determination of elevations. Where there is interference between sewer lines and condensate lines, the sewer lines shall have precedence and provisions shall be made in the condensate lines for looping them around the sewer lines. In all cases, lines requiring a stated grade for their proper operation shall have precedence over electrical conduit and ductwork.
- E. All piping and ductwork in finished areas, shall be installed in chases, furred spaces, or above ceilings. Pipes and ducts shall be installed as high as possible. Valves in piping systems shall be offset down to within one (1) foot of access point. Runs of piping shall be grouped whenever it is feasible to do so.
- F. Piping, equipment, or ductwork shall not be installed in electrical equipment rooms, elevator machine rooms or computer rooms except as serving only those rooms. In electrical equipment rooms, do not run piping or ductwork, or locate equipment with respect to switchboards, panelboards, 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.
- Clearances apply vertically from floor to structure.
- G. Provide access to equipment and apparatus requiring operation, service or maintenance within the life of the system. Devices include but are not limited to are: motors, valves, filters, dampers, and shock absorbers. Equipment located above lay-in type ceilings is considered accessible.
- H. Locate required terminal boxes, valves and dampers in areas accessible for maintenance. Note that no access panels are permitted in public spaces unless specifically noted on Contract Documents.

3.02 ELECTRICAL WORK

- A. All electrical equipment provided under this Division shall comply with the electrical system characteristics indicated on the Electrical Drawings and specified in Division 16.
- B. Air handling unit motor speed controls, system controls starters for packaged rooftop units, pilot lights and push buttons, 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 Code and Division 16. Motor starters for all other equipment shall be furnished under Division 16.
- C. All power wiring and final power connections to the system shall be provided under Division 16.
- D. Control wiring (120V and less) shall be provided under Division 15 and extended from the 120 volt power circuits indicated in the Electrical Drawings. All wiring for voltages higher than 30 volts shall be done by a licensed electrician.
- E. All electrical characteristics shall be taken from the Electrical Drawings and Specifications and coordinated with the Electrical Contractor before equipment is ordered or shop drawings submitted.

3.03 MOTORS

- A. Unless specifically noted otherwise in other sections of this Specification, all motors and motor controllers shall meet the requirements specified in this Section. All motors shall be built in accordance with the current applicable IEEE, and NEMA standards, and shall have voltage, phase, frequency and service as scheduled.
- B. Each motor shall be of the high efficiency type - Reliance. They shall be suitable for the required brake horsepower of the driven unit, rated with 1.15 minimum service factor, and shall be NEMA design B. The minimum ambient temperature rating that the motor shall be suitable for operation in shall not be less than 40 degrees C for drip proof and totally enclosed fan cooled motors. The motor shall be capable of operating continuously at such temperature with minimum deterioration, and shall be capable of withstanding momentary overloads of 10 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, and shaft capacities.
- E. Motors larger than one-half (1/2) horsepower shall have bearings with pressure grease lubrication fittings.
- F. Motors connected to drive equipment by belt shall be furnished with screw adjustable slide rail or pivoting type bases except that fractional horsepower motors may have slotted bases. Motor leads shall be permanently identified and supplied with connectors.
- G. Each motor to be installed outdoors shall be of the totally enclosed fan cooled type, or housed in a weatherproof housing that is an integral part of the driven equipment.
- H. Unless otherwise indicated, motors smaller than one-half (1/2) horsepower shall be capacitor start or split phase type designed for 120 volt, single phase, 60 cycle alternating current. Shaded pole motors are not acceptable except 35 watts and smaller. Motors one-half (1/2) horsepower and larger shall be squirrel cage induction type, 3 phase, 60 cycle alternating current.
- I. Multi-speed motors shall, except as noted, be consequent pole, variable torque, single winding. When the speed ratios or the load characteristic dictates, the multi-speed motors shall be separate winding types. 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 by clearly identifying it on the shop drawing or submittal and shall then coordinate the change with all associated parties and shall bear all additional charges in connection with the change.
- K. Minimum motor efficiencies shall be as listed in the table below.

3.04 PROTECTION OF EQUIPMENT

- A. Store all equipment, including pipe and valves, off the ground and under cover. For storage outdoors, minimum four (4) mil thick plastic sheets shall be securely fitted to withstand splattering, ground water, precipitation and wind.

- B. Protect rooftop unit coils by use of protective sheet metal panels or plywood.
- C. Plug ends of pipe when work is stopped and close ends of ducts with four (4) mil thick plastic sheets taped in place until work resumes. Duct tape without plastic sheets is not an acceptable substitute.
- D. Damaged equipment shall be repaired or replaced at the option of the Engineer.

3.05 PAINTING

- A. Factory painted equipment that has been scratched or marred shall be repainted to match original factory color.
- B. All uninsulated black ferrous metal items exposed to sight inside the building, (such as condenser water piping, standpipes, equipment hangers and supports) shall be cleaned and painted with one (1) coat of zinc chromate primer. In addition, such items in finished spaces shall also be painted with two (2) coats of finish paint in a color to match adjacent surfaces or as otherwise selected by the Architect.
- C. In lieu of painting hanger rods, cadmium plated or galvanized rods may be furnished.
- D. 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.
- E. Galvanizing broken during construction shall be re-coated with cold galvanizing compound.
- F. All ductwork, piping, insulation, conduit or other appurtenances visible through grilles and diffusers shall be painted flat black.

3.06 PROTECTION OF EXISTING UTILITIES

- A. The Contractor shall use extreme caution during excavation operations not to damage or otherwise interrupt the operations of existing utilities. The Contractor shall be responsible for the continuous operation of these lines and shall provide bypasses or install such shoring, bracing, or underpinning as may be required for proper protection.
- B. Work shall be scheduled and coordinated so that existing systems of all types will not be interrupted when they are required for normal usage [of the existing building]. The Owner's Representative and the Architect shall be informed, and approval obtained from the Utility Authority involved at least seven (7) days prior to any utility interruption or connection.

3.07 CUTTING AND PATCHING

- A. The Contractor shall assume all cost of, and be responsible for, arranging for all cutting and patching required to complete the installation of his portion of the Work. All cutting shall be carefully and neatly done so as not to damage or cut away more than is necessary of any existing portions of the structure. Cutting of or welding on any portion of the building structure shall be done only with the express consent of the structural engineer.
- B. All affected surfaces shall be reinstated to the condition of the adjacent surfaces.
- C. The Contractor shall make suitable provisions for adequately water-proofing any floor or roof penetrations necessary for the installation of the mechanical, plumbing and fire suppression systems. This shall include, but not be limited to, floor drains, floor sinks, open sight drains, hub drains, cleanouts, and sleeves for the various piping and ductwork systems.

3.08 SLEEVES, FLOOR AND CEILING PLATES

- A. The Contractor shall install in concrete, carpentry or masonry construction, all necessary hangers, sleeves, expansion bolts, inserts and other fixtures and appurtenances necessary for the support of all pipe, duct, equipment and devices furnished under each section of the Specification.
- B. Cutting of openings, and installation of sleeves or frames through walls and surfaces shall be done in a neat workmanlike manner. Openings shall be cut only as large as required for the installation; sleeves, and/or frames shall be installed flush with finished surfaces and grouted in place unless otherwise indicated. Surfaces around openings shall be left smooth and finished to match surrounding surface.
- C. Where pipes pass through floor slabs, sleeves shall be standard weight black steel pipe with top of sleeve three (3") inches above finished floor. Where pipes pass through walls, sleeves shall be standard weight black steel pipe or 20-gauge galvanized sheet metal with ends flush with wall surfaces.
- D. Each pipe or duct passing through walls, floors, ceilings or partitions shall be provided with sleeves having internal diameters one (1") inch larger than the outside dimensions of insulated pipes or ducts.
- E. All pipe sleeves through existing floors, roofs and masonry walls shall be built in place as the affected walls, floors and roof are constructed.
- F. All penetrations through rated floors and walls shall be packed with mineral wool and capped off with a silicon caulk. As an alternate an approved, fire rated sealant as manufactured by Hilti, 3M or Dow may be used. Materials shall meet or exceed UL 1479 or ASTM E814 requirements.
- G. Sleeves through exterior walls shall be steel or cast iron pipe, flush with the exterior surfaces, and with the space between the pipe and the sleeves caulked watertight in an approved manner.
- H. Inserts shall be individual type cast iron or galvanized steel, with accommodations for removable nuts and threaded rods up to 3/4 inch diameter, and permitting lateral adjustment.

3.09 ESCUTCHEONS

- A. Escutcheons shall be installed on all pipes where they pass through floors, ceilings, walls, or partitions in [finished] [exposed construction] areas.
- B. The interior of closets, adjacent to finished areas, shall be considered as finished for the intent of these specifications.
- C. Escutcheons shall be split, hinged, chrome plated, stamped brass type, designed to fit the pipe, and to cover the terminating pipe sleeve. Escutcheons shall have a positive securing device to hold the escutcheon tight to the pipe and the wall or floor.
- D. Sufficient spacing between parallel pipe runs shall be allowed to insure that the installation of the escutcheons can be done without modification to or overlapping of the escutcheons is necessary. The escutcheons shall not be altered or overlapped in any manner to allow for their installation.

3.10 CLEANING

- A. Flush new water piping systems until water runs clear. Mild chemical cleaning may be required. If so, flush all cleaning chemicals out of the piping system before recharging with water.
- B. Remove all stickers, rust, stains, labels, and temporary covers from all items of mechanical, plumbing and fire suppression equipment and appurtenances before final acceptance.
- C. The exterior surfaces of all mechanical equipment, piping, and ducts, shall be cleaned of all grease, oil, paint, dust and other construction debris.
- D. The interior of all air handling units, fans, fan coils, blowers, ducts, plenums and casings shall be cleaned of all debris and blown free of all particles of rubbish and dust before installing any air distribution devices.
- E. Bearings that require lubrication shall be lubricated in accordance with the manufacturer's recommendations. Provide two (2) copies of the certification of lubrication.
- F. Equipment rooms shall be left broom clean.
- G. Any fans operated during construction shall have temporary filters. Temporary filters shall be changed regularly to prevent contamination of the equipment and duct systems. New and unused permanent filters shall be installed one (1) week or less prior to final inspection.
- H. Ends of open ducts and pipes shall be covered during construction except when working directly on such end prohibits covering. Cover with minimum four (4) mil thick polyethylene taped, tied or wired in place.
- I. Clean and polish identification plates.
- J. Sterilize the domestic water supply and distribution system in accordance with the local codes having jurisdiction. Furnish three (3) copies of a Certificate of Performance of Complete Sterilization to the Architect before final inspection of the work, all work shall be certified by a State approved testing laboratory.

3.11 EQUIPMENT, MATERIALS AND BID BASIS

- A. It is the intention of these Specifications to indicate a standard of quality for all material and equipment that will be incorporated into this project. Manufacturer's names are used to designate the item of equipment or material as a means of establishing grade and quality. Where several manufacturers are named, only these manufacturers' products will be considered and the Contractor's bid shall be based on their products. Other unnamed manufacturers, although acceptable as manufacturers, must prove their product will perform satisfactorily and will meet space requirements, and shall obtain pre-approval of their equipment, **Before** submitting shop drawings. Comply with Section 01630.
- B. Where only one manufacturer is named, manufacturers of similar quality products will not be considered unless the specifications state otherwise. When stated otherwise, such unnamed manufacturer's products will, however, be considered as substitutions but shall not be used as a basis for bidding. In the event the Contractor wishes to submit substitutions to the Architect for review after the bid, he shall furnish descriptive catalog material, test data, and samples, as well as any other pertinent data necessary to demonstrate that the proposed substitutions are acceptable to the specified product. No substitutions shall be made without the written consent of the Project Engineer.

- C. The use of one named manufacturer in the schedules on the Drawings is for guide purposes. The provisions of the previous paragraph will govern in the selection of products to be used.

3.12 WARRANTY:

- A. All systems and components shall be provided with a one (1) year warranty from the time of final acceptance unless otherwise noted in the Contract Documents. The warranty shall cover all materials and workmanship. During this warranty period, all defects in materials and workmanship shall be corrected by repair or replacement without incurring any additional cost to the Contract.
- B. All reciprocating air conditioning compressors shall be warranted for an additional four years. This additional warranty shall include parts only.

3.13 FOUNDATIONS:

- A. Concrete foundations are required for all equipment furnished under Division 15. Unless otherwise noted, foundations shall be four inches (4") high. All concrete work performed shall conform entirely to the requirements of the General Specifications which describe this class of work. They shall be constructed in conformance with the recommendations of the manufacturer of the respective equipment that will actually be supplied, and with the approval of the Architect. All corners of the foundations shall be neatly chamfered. 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 and re-aligned, if necessary. After removal of the forms, the surface of the foundation shall be rubbed.

3.14 RECORDS AND INSTRUCTIONS FOR OWNER:

- A. The Contractor shall accumulate during the job's progress the following data in triplicate prepared in neat brochures or pocket folders and turned over to the Architect/Engineer for checking and subsequent delivery to the Owner:
 - 1. All warranties, guarantees and manufacturer's directions on equipment and material covered by the Contractor.
 - 2. Approved fixture brochures, wiring diagrams, and control diagrams.
 - 3. Copies of approved shop drawings.
 - 4. Four (4) sets of operating instructions for heating, cooling and other mechanical systems. Operating instructions shall also include recommended periodic maintenance and seasonal changeover procedures, and suggested procedures in the operation of all systems in this particular building to promote energy conservation. These instructions must be written expressly for this project and shall refer to equipment, valves and devices by mark and number from the project schedules. Operating instructions and procedures shall be submitted in draft form, for approval, prior to final issue of complete brochures. Manufacturer's advertising literature or catalogs will not be acceptable for operating and maintenance instructions.
 - 5. Any and all other data and/or drawings required during construction.
 - 6. Repair parts lists of all major items and equipment including name, address, and telephone number of local supplier or agent.
- 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 inspection prior to the final inspection, but in no case, less than two (2) weeks before final inspection.

- C. The Contractor shall also give not less than three (3) days of operating instructions, during the adjustment and testing period, to the Owner's operating personnel in order to familiarize them with the proper care and operation of the equipment. The twenty-four (24) hours shall be broken into a series of six (6), four (4) hou] sessions. The written operating instructions referred to in the paragraph above shall be used as a basis for this on-the-job instruction.
- D. A competent technician employed by the Temperature Control Subcontractor will be required to instruct the Owner's personnel in the proper operating procedures and shall explain the significance of the temperature control literature filed in the maintenance manual over a period of two (2) days while the system is in continuous operation.
- E. Contractor shall submit the name and qualifications of the temperature controls instructor(s) with a list of five (5) previous projects and client contacts for reference. The Owner reserves the right to change instructor(s) upon verification of references.

3.15 RECORD DRAWINGS:

- A. The Contractor shall maintain on a daily basis at the project site a complete set of "Record Drawings", reflecting an accurate dimensional record of all new [and existing] buried or concealed work. The "Record Drawings" shall be marked to show the precise location of concealed work and equipment, including concealed or embedded piping and valves and all changes and deviations in the Mechanical work from that shown on the Contract Documents. This requirement shall not be construed as authorization for the Contractor to make changes in the layout or work without definite instructions from the Architect.
- B. The "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".
- C. Record dimensions shall clearly and accurately delineate the work as installed; locations shall be suitably identified by at least two (2) dimensions to structural column lines or a permanent accessible structure or datum.
- D. 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 Dimensional Data Only". (5/16" high letters)

3.16 INSTALLATION:

- A. All equipment shall be installed in strict conformance with the manufacturer's recommendations, as specified herein and as shown on the drawings. If any conflict arises between these instructions, notify the Engineer immediately for guidance.

3.17 EQUIPMENT LABELS:

- A. Each item of equipment shall be permanently labeled with a nameplate of sufficient size to clearly indicate the identification designation (i.e., equipment number) appearing on the Contract Document. Nameplates may be 1/16" thick bakelite laminate (engraved with letters through black), or aluminum with black enameled surface, with engraved letters. Handwritten marker identifications are not acceptable.

- B. The installation of any product, finish or surface in the "public space" which has a readily observable exposed name, trademark, insignia, logo or any other identification mark, symbol or embossment (intended to identify manufacturer, model, or vendor) is not acceptable. This prohibition applies but is not limited to fire alarm devices, dimmers, light fixtures, plumbing fixtures, temperature sensors, thermostats, air conditioners, floor drains, and cleanouts.

3.18 ACCESS DOORS:

- A. Furnish and install access doors at each point required to provide access to concealed valves, cleanouts, fire dampers and other devices requiring operation, adjustment, or maintenance. Access doors shall be prime coat finished 16 gauge steel, with mounting straps, concealed hinges and screwdriver locks, designed for the doors to open 180 degrees.
- B. Access doors installed in fire walls or partitions shall be U.L. Labeled to maintain the fire rating of the wall or partition.

3.19 FLAME SPREAD AND SMOKE DEVELOPED PROPERTIES OF MATERIALS:

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

3.20 EQUIPMENT FURNISHED BY OWNER:

- A. The Contractor shall unload, uncrate, assemble, and make final connection to any and all equipment shown on the Drawings or called out in the Specifications to be furnished by the Owner for installation by the Contractor.
- B. The Contractor shall take full charge of such equipment from the time the items are delivered to the job. The Contractor shall be responsible for such items until they are set in place, connected, tested, adjusted, and placed into operation as if the Contractor were the original purchaser.

3.21 HAZARDOUS MATERIALS:

- A. No products shall be used that contain any known hazardous or carcinogenic materials. Products with asbestos or radioactive content shall not be used.
- B. Handling of any hazardous material is not covered in this Specification Division. Any requirements for such are beyond the scope of this Contract and shall be done only by those persons contracted to do so.

3.22 BELT DRIVES:

- A. Provide guards for all belt drives not totally enclosed within equipment housings. Belt guards for fans shall be expanded metal with heavy gauge sheet metal sides. Provide an opening in the guards at the center of the driving and driven sheaves to facilitate the use of a tachometer or revolution counter to determine rotational speed.

3.23 FREEZE PROTECTION:

- A. During construction, the Contractor shall assure that no portion of his work is subjected to freeze damage. The Contractor shall take all steps necessary such as temporary heat, draining of systems, heat tape, antifreeze solutions or other means to prevent damage. No antifreeze solutions shall be used in potable water systems. Any resultant damages from freezing shall be the responsibility of the Contractor to repair at no additional cost to the contract.
- B. Prior to start up of any air handling unit supplied with water coils, when the ambient temperature is below 40°F, the Contractor shall make certain the incoming volume of outside air is not sufficient to drive the mixed air temperature below 35°F.

END OF SECTION 15010

SECTION 15011

SCHEDULE OF SUBMITTAL DATA

PART 1 GENERAL

1.01 RELATED DOCUMENTS:

- A. The requirements of the General Conditions, Supplementary Conditions, and Section 15010 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. All drawing submittals shall be made in sepia form and only one (1) copy shall be submitted.
- B. Before submitting Shop Drawings to the Architect for review, the Contractor shall examine them and satisfy himself that they are correctly representative of the material or equipment to which they pertain. The Contractor shall so note these Drawings before submitting them. The Contractor's review of the Shop Drawings is not intended to take the place, in any way, of the official review of the Architect, and Shop Drawings which have not been reviewed by the Architect shall not be used in fabricating or installing any work.
- C. The review of Shop Drawings or catalog data by the Architect shall not relieve the Contractor from responsibility for deviations from the Plans and Specifications unless he has, in writing, specifically called attention to such deviations at the time of submission and has obtained the permission of the Architect thereon; nor shall it relieve him from responsibility for error of any kind in Shop Drawings. When the Contractor does call such deviations to the attention of the Architect, he shall state in his letter whether or not such deviations involve any extra cost. If no additional costs to the Contract are specifically noted, it will be assumed that no extra cost is involved for making the change.
- D. Verification and assignment of dimensions, quantities, and construction means, methods, sequences or procedures, the correctness of which is set forth in the Contract Documents or submittal, shall be the sole responsibility of the Contractor.
- E. Reproduction of design documents in any portion for use in a submittal is not acceptable.
- F. The Engineer or Architect reserves the right to require a sample of any equipment to be submitted for approval and to retain its possession.
- G. The shop drawing and product data review stamp notation requirements are defined as follows:
 - 1. "NO EXCEPTIONS TAKEN": The reviewer did not observe any items which were not in compliance with the Contract Documents. All dimensions, details and coordination with other trades is the responsibility of the Contractor. The submittal is not required to be resubmitted and is ready for distribution to the field and shall be included in the "Record Drawings".

2. "MAKE CORRECTIONS NOTED": The reviewer indicated items observed which were not in compliance with the Contract Documents. The Contractor shall not resubmit, but shall make corrections, and provide corrected document with the "Record Drawings". All dimensions, details and coordination with the other trades is the responsibility of the Contractor.
 3. "AMEND AND RESUBMIT": The reviewer indicated items observed which were not in compliance with the Contract Documents. The Contractor shall resubmit showing corrections of all noted items. Delays for resubmittal does not relieve the Contractor from meeting project schedules.
 4. "REJECTED - SEE REMARKS": The submission does not comply with the contract requirements. The Contractor shall resubmit the correct drawing or piece of equipment for review. Delays for resubmittal does not relieve the Contractor from meeting project schedules.
 5. "SUBMIT SPECIFIED ITEM": The submission does not comply with the contract requirements. The Contractor shall resubmit the correct drawing or piece of equipment for review. Delays for resubmittal does not relieve the Contractor from meeting project schedules.
- H. If resubmittals are necessary, they shall be made as specified herein for submittals. Resubmittals shall highlight all revisions made and cover shall include the phrase "RESUBMITTAL NO. __."

PART 2 PRODUCTS

2.01 GENERAL:

- A. All product samples shall be new and bear all labels which are identified by the applicable specification section and Contract Documents.

PART 3 EXECUTION

3.01 SUBMITTAL DATA:

A. General

1. The submittal data to be furnished for this project shall comply with the Specifications and Contract Documents in their entirety. Any submittals herein scheduled are as a minimum only and shall not be construed to limit the submittal data required within the individual Sections of these Specifications.
2. HVAC, Plumbing and Fire Protection submittal data shall be bound into separate HVAC, Plumbing and Fire Protection volumes, with each volume containing one (1) copy of all specified equipment shop drawings. The binders shall be clearly noted with an identification tab for each Specification Section that requires submittals. Each item in each tabbed section shall be identified with the paragraph number relating to the item submitted by the use of a cover sheet or by highlighting the paragraph on the first page concerning the item. If necessary, binders shall be submitted with the original submittal data and will address and resolve all comments thereon. All submittals shall include identification tabs and sufficient space for all submittal data. FAILURE to provide complete bound and identified submittals will result in the automatic rejection of the submittal data with no exception.

3. Shop Drawings will be returned unchecked unless the following information is included: Reference to all pertinent data in the Specifications or on the Drawings, such as sound power levels of motor driven equipment where called for in the Specifications, electrical characteristics and horse power, capacities, construction material of equipment, UL labels and ASME stamps where required, accessories specified, manufacturer, make and model number, weights where specified, starters where required by Division 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 same "Mark Numbers" as identified on Drawings or in Specifications. All pertinent data such as accessories shall also be marked. Any deviation from any part of the Contract Documents shall be clearly and completely highlighted.
4. The bound submittals are to be submitted for review within thirty (30) days after the Contract is awarded. No submittal will be checked until all required submittals have been submitted in one complete binder. Only Automatic Temperature Controls, ductwork and piping fabrication drawings may be submitted after the complete and bound submittal is reviewed and accepted by the Architect/ Engineer.
5. 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 have 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 borne by the Contractor and performed without any additions to the Contract Sum. Shop Drawings shall be submitted for each of the following:
 - a. HVAC Submittals:
 - Split Air Conditioning System
 - Air Cooled Condensing Units
 - Gas-Fired Infrared Heater
 - Ductwork Layout, Accessories and Details (min. 1/4"=1'0"scale)
 - Fans With Sound Data and Performance Curves
 - Test, Adjusting and Balancing Reports and Forms
 - b. Plumbing Submittals:
 - Backflow Preventors
 - Plumbing Fixtures and Trim
 - Submit all attachment and fastening methods for piping and equipment to the Structural Engineer for approval.
 - c. Fire Protection Submittals:
 - Backflow Preventor (Fire System)
 - Fire Protection Shop Drawings with complete Hydraulic Calculations
 - Siamese Connection
 - Sprinkler Heads and Escutcheons
 - Submit all attachment and fastening methods for piping and equipment to The Structural Engineer for approval.
6. The Contractor shall submit preliminary sprinkler head layout for approval prior to design and layout of piping. The submittal shall consist of reproducible vellum or mylar dimensioned sprinkler head layout for all areas with ceilings for approval prior to design and layout of piping. All lights, diffusers, detectors, speakers, soffits and other ceiling components shall be indicated on all drawings.

Following approval of the sprinkler head layout submittal, the Contractor shall prepare one eighth (1/8") scale vellum or mylar shop drawings for fire protection systems indicating pipe and fittings, cutting lengths, hydraulic calculations and node points, pipe sizes, locations, elevations, hangers, wall and floor penetrations and connections as well as all ceiling components noted previously. Include all information as required by NFPA 13, Item 6-1.1.1.

Upon completion of fire protection work, submit to Owners' Underwriter/Insurance Agency and to the local authority having jurisdiction a certificate signed by an Officer of the Company which indicates that work has been tested in accordance with NFPA 13 and NFPA 14 and also that the system is operational, complete, and has no defects. At project closeout, submit record drawings of installed fire protection piping and products; in accordance with requirements of Section 15010. Submit maintenance data and parts list for fire protection materials and products. Include this data, product data, shop drawings, approved installation drawings, approved calculations, certificate of installation, and record drawings in maintenance manual; in accordance with requirements of Section 15010.

7. The Contractor shall submit two (2) copies of a letter, signed by an officer of the company, that the items listed below meet or exceed criteria of the Plans and Specifications. The letter is to include a list of each item to be used on the project along with the manufacturer.

- a. HVAC Submittals:
 - Flexible Duct
 - Ductwork Access Doors and Panels
 - Filters
 - Vibration Isolators
 - Ductwork Accessories
 - Grilles, Registers and Diffusers
 - Thermal Insulation
 - Dampers
 - Pipe Hangers and Supports
- b. Plumbing Submittals:
 - Access Doors
 - Cleanouts
 - Drains and Drainage Accessories
 - Fire Stopping Sealant
 - Fixture Carriers
 - Flexible Pipe Connectors
 - Flow Switches
 - Gauge Cocks and Snubbers
 - Hose Bibbs
 - Pipe and Fittings
 - Pipe Hangers and Supports
 - Piping Expansion Devices
 - Piping Identification Markers
 - Pressure and Temperature Gauges
 - Shock Absorbers
 - Strainers
 - Test Wells
 - Thermal Insulation
 - Thermometers
 - Trap Primers
 - Vacuum Breakers
 - Valve Tags
 - Valves
 - Vibration Isolators
 - Wall Hydrants

- c. Fire Protection Submittals:
 - Fire Stopping Sealant
 - Flow Switches
 - Pipe and Fittings
 - Pipe Hangers and Supports
 - Piping Identification Markers
 - Tamper Switches
 - Valve Tags

3.02 OPERATING AND MAINTENANCE INSTRUCTIONS:

A. Description

1. Complete bound operating and maintenance instructions shall be provided to the Owner. Four (4) separate copies (three (3) for the Owner, one (1) for the Architect) shall be provided, and each copy shall be bound in a separate 3-ring, loose leaf notebook. Operating instructions shall be provided for each system, and shall include a brief system description, a simple schematic and a sequence of operation. Operating and maintenance instructions and all warranties shall be included for each piece of equipment. Manufacturers' Standard literature is acceptable for each piece of equipment. However, the Contractor shall prepare a SYSTEM O&M manual including overall system descriptions, operating and energy conservation techniques.
2. A system wiring and control diagram shall be included in the operating and maintenance instructions.

3.03 OTHER SUBMITTALS:

A. Submit or provide the following at project closeout prior to occupancy of the project by the Owner:

1. "As-built" record drawings for ductwork, HVAC piping, plumbing and fire protection systems.
2. Provide a combination pressure and temperature test plug kit to Owner.
3. Submit two (2) copies of welder's certificate.
4. Submit two (2) copies of the vibration isolation manufacturer's certified letter of approval.
5. Submit two (2) copies of the certification of the disinfection of domestic water service.
6. Manufacturer's representative shall certify that HVAC equipment is installed in accordance with their recommendations.

END OF SECTION

SECTION 15080

TEST AND BALANCE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. All work specified in this Section is subject to the provisions of General Conditions, Supplementary General Conditions and Section 15010.

1.02 SCOPE OF WORK:

- A. The Contractor shall procure the services of an independent Test and Balance Agency that is independent of any contractor or manufacturer to perform the testing and balancing and prepare reports to the General Contractor and to the Architects and Engineers. The independent Test and Balance Agency shall be a certified member of the Associated Air Balance Council (AABC) or National Environmental Balancing Bureau (NEBB). 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 5th edition of the AABC National Standards, 1989 for Total System Balance, and in accordance with the scope of work defined by the Contract Documents.
- C. One (1) agency shall be responsible for all phases of Total System Balance.
- D. Testing and balancing shall not begin until all systems have been completed and are in full working order. The Mechanical Contractor shall put all heating ventilating, and air conditioning equipment into full operation and shall continue the operation of same during each working day of testing and balancing.
- E. Upon the completion of the test and balance work, the Agency shall compile the test data and submit four (4) copies of the complete report to the Architect for his evaluation and approval.
- F. 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 Owner acknowledging these two (2) trips and subsequent adjustments. Submit statements to Architect.

1.03 LEAKAGE TESTS, LOW PRESSURE DUCTS:

- A. The Test and Balance Agency shall witness and certify to duct leakage tests for representative sections of the low-pressure ducts specified to be performed by the Contractor under the Air Distribution (or Air Conditioning) Section. The Test and Balance Agency shall furnish test instruments, confirm the readings, make the calculations for percentage of leakage in accordance with AABC standard methods and submit test report total. Leakage is specified to be not over 5% of the design CFM at the normal operating pressure of the duct system.

1.04 LEAKAGE TESTS, (MEDIUM AND HIGH) PRESSURE DUCTS:

- A. Medium (and high) pressure duct leakage tests performed by the Contractor as specified under the Air Distribution Section shall be witnessed and certified by the Test and Balance Agency.

PART 2 PRODUCTS

2.01 MATERIALS:

- A. Provide all required instrumentation, equipment, tools, devices and utility services to perform the operations as specified herein.
- B. Instruments used for testing and balancing of system shall have been calibrated within six (6) months preceding tests and checked for accuracy prior to start of work.
- C. Instruments shall be of a type normally recognized as adequate and accurate for the test contemplated. List type of instrument, manufacturer, serial number and latest calibration date as a part of the submitted test data.

2.02 PATCHING MATERIALS:

- A. Except as other 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 General Contractor shall provide the following, in a timely fashion, to the Test and Balance Agency:
 - 1. Contract drawings (complete set).
 - 2. Applicable specifications (Division 15, 16 and 17 as a minimum)
 - 3. Related addenda
 - 4. Related change orders
 - 5. Related reviewed shop drawings
 - 6. Related reviewed equipment manufacturer's submittal data
 - 7. Reviewed temperature control drawings

3.02 COOPERATION:

- A. The General 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 system 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 as specified in the AIR HANDLING Section.

3.04 OPERATING TEST:

- A. A complete system operating test shall be made for a period of eight (8) hours with controls set in their various positions to insure proper operation under the design conditions. All tests and final adjustments shall be made to the complete satisfaction of the Owner and the Architect.
- B. Operating test shall be scheduled four (4) weeks prior to published completion date.

3.05 CONTROL PERFORMANCE CHECK:

- A. The results produced by the operation of automatic 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 specified under the Temperature Control Section. The Test and Balance Agency is responsible only for final settings; the Contractor is responsible for completeness and correctness of all the control systems.

3.06 SETTINGS:

- A. The Test and Balance Agency shall permanently mark the settings of all valves, dampers, 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.

3.07 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 fan manufacturer, model numbers and serial numbers.
 - 2. Test, adjust and record required and measured total CFM for each fan system. 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, coil differential, and fan total static pressure.
 - 5. Record all installed fan drive assemblies; fan sheaves, motor sheaves, and belts.
 - 6. Record each installed motor manufacturer.
 - 7. Record each installed motor horse power.
 - 8. Test and record each motor name plate and measured voltage.
 - 9. Test, adjust, and record each motor name plate and full load amperage.
 - 10. Test, adjust, and record each blower RPM.
 - 11. Test and adjust the CFM delivery of each diffuser, grille, and register.
 - 12. Identify the location of each diffuser, grille, and register.
 - 13. Record the size, type, and manufacturer of each grille, register and diffuser.
 - 14. 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.
 - 15. All diffusers, grilles, and registers shall be adjusted to minimize drafts.
 - 16. All tests shall be made with supply, return, and exhaust systems operating, and all doors, windows, or other openings closed or in their normal operating condition.
 - 17. All damper positions shall be permanently marked after air balancing is complete.
 - 18. The final balanced condition of each area shall include the testing and adjusting of pressure conditions. Front doors, exits, elevator shafts, or other openings should be checked for air flow so that exterior conditions do not cause excessive abnormal pressure conditions.

19. Domestic Hot Water System:
 - a. Prepare the domestic hot water recirculation system for balancing in the following manner:
 - (1) Flush and bleed air from all portions of the system.
 - (2) Set all balancing valves at intersections of recirculation branches for the initial estimate of total GPM flow.
 - b. Furnish typewritten data tabulating the following:
 - (1) Water temperatures, pressure and flow on the discharge side of each balancing valve.
 - (2) Flow in GPM of water calculated in each branch, riser, and intersection of branches.

END OF SECTION

SECTION 15180

THERMAL INSULATION FOR MECHANICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. All work specified in this Section is subject to the provisions of Section 15010.

1.02 DESCRIPTION:

- A. All insulation products shall meet NFPA requirements for Flame Spread Rating 25, Smoke Developed Rating 50, and Fuel Contributed 50.
- B. Staples shall not be used for securing insulation. Insulation and vapor barrier shall be continuous through wall, ceiling, floor and roof openings and sleeves, except at fire/smoke dampers.
- C. Supports for insulated piping shall be outside the insulation. Inserts shall be provided at hangers. Inserts shall be Foamlite Insulation, Calcium Silicate or Perlite and shall be two (2") inches longer than the pipe shields. Pipe shoes welded to the pipe shall be used for roll type hangers.
- D. All tests shall be completed before insulation is applied.
- E. Do not store materials in building until it is enclosed and dry. Wet insulation shall not be installed.
- F. Insulation products with self-sealing type jacket shall not be applied at temperatures below 40°F.
- G. Items not to be insulated:
 - 1. Chromium plated brass connections to plumbing fixtures.
 - 2. Underground domestic cold water piping.
 - 3. Piping installed in enclosures for:
 - 4. Vents from pressure relief valves.
 - 5. Ducts with internal lining or factory insulated ducts.
- H. Clean and dry all surfaces to be insulated from loose scale, dirt, oil, water and other foreign matter.
- I. 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 on pipe and duct insulation must be continuous and uninterrupted throughout the system except where fire dampers occur.

1.03 DUCTWORK:

- A. Insulation shall cover all standing seams and metal surfaces. Materials shall be applied subject to their temperature limits.

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.
- C. Material shall be furnished to the job bearing the manufacturer's label.
- D. Insulation products shall be Owens-Corning, John-Manville, Certainteed, Knauf, or Armstrong.

PART 2 PRODUCTS

2.01 PRE-MOLDED FOAMGLASS PIPE INSULATION:

- A. Pipe insulation (density of 8.5 lbs. per cubic foot) shall be foamglass accurately molded to conform to the outside diameter of the pipe. Insulation shall be two piece type. Vapor barrier shall be accomplished by coating of outside of insulation with mastic and the application of a glass cloth jacketing. Insulation shall be suitable for use on either hot or cold water pipes with temperature range of +35 degrees to 400 degrees F. Thermal conductivity shall not exceed 0.35 at 75 degrees F. mean temperature.

2.02 PRE-MOLDED FIBER GLASS PIPE INSULATION:

- A. Pipe insulation (density of 4 lbs. per cubic foot) shall be fibrous glass wool 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 with vapor barrier. Insulation shall be suitable for use on either hot or cold water pipes with temperature range of +35 degrees to 400 degrees F. Thermal conductivity shall not exceed 0.26 at 75 degrees F. mean temperature.

For Dual Temperature Systems use the higher temperature rating of the System for insulation thickness.

INSULATION THICKNESS IN INCHES FOR PIPE SIZES					
	Temperature Up to	up to 1"	1-1/4" to 2"	2-1/2" to 3-1/2"	4" & Over
Plumbing					
Hot Water and Hot Water Circulating	200°F	1-2"	1"	1"	1-1/2"
Cold Water	50-65°F	1/2"	1"	1"	1"

INSULATION THICKNESS IN INCHES FOR PIPE SIZES					
	Temperature Up to	up to 1"	1-1/4" to 2"	2-1/2" to 3-1/2"	4" & Over
Above Ground Drains and Drainage Piping Serving Air Conditioning Equipment or Ice Machine Drainage	40-55°F	1/2"	1"	1"	1-1/2"
Horizontal Portion of Rain Leaders Including Each Elbow and Roof Drain Body	Any	--	--	1"	1"

2.03 FIBER GLASS PIPE WRAP INSULATION:

- A. Pipe insulation (1 lb. per cubic foot) shall be semi-rigid fibrous glass wool wrapping with factory applied all service jacket. Insulation shall be sealed with vapor barrier tape.
- B. Insulate with 1-1/2" thick fiber glass pipe wrap insulation:
 - 1. Horizontal portion of rain leaders including each elbow and the roof drain body.

2.04 FOAMED PLASTIC SHEET, AND TUBING:

- A. Foamed plastic sheet and tubing shall be a minimum of 4.5 lbs. per cu. ft. Thermal conductivity shall not exceed 0.28 at 75° F mean temperature.
- B. Insulate with foamed plastic:
 - Water cooler waste and trap with 1/2" thick foamed plastic tubing
- C. Insulate with 1-1/2" Thick Foamed Plastic Sheet Adhered to Removable 20 Gauge Galvanized Sheet Casing:
- D. Piping outside the building may be insulated with 1" thick flexible foamed plastic insulation with weather proof aluminum as hereinafter specified.

2.05 MINERAL WOOL DUCT INSULATION:

- A. Mineral wool duct insulation shall have an average thermal conductivity not to exceed 0.24 BTU-in. per sq. ft. per degrees F. per hour to a mean temperature of 75 degrees F. Finish shall be field applied as hereinafter specified.
- B. Insulate with 2" thick mineral wool duct insulation:

2.06 CALCIUM SILICATE:

- A. Calcium Silicate W. Grooved block insulation shall have an average thermal conductivity not to exceed 0.42 per. sq. ft. per degrees f. per hour at a mean temperature of 200 degrees F. Finish shall be field applied as hereinafter specified.
- B. Insulate with 2" thick calcium silicate:

Emergency generator exhaust
Finish shall be field applied as hereinafter specified.

2.07 FIBERGLASS DUCT INSULATION:

- A. Fiberglass duct insulation shall have an average thermal conductivity not to exceed 0.27 BTU-in. per sq. ft. per degrees F. per hour at a mean temperature of 75 degrees F. Insulation shall have a minimum density of 1 lb./cu. ft. Vapor barrier shall be factory applied reinforced foil-faced flame resistant Kraft paper.
- B. Insulate all supply, return, and outside air ductwork that is not lined or factory insulated with 2" thick fiberglass duct insulation.

2.08 ACOUSTICAL DUCT LINER:

- A. Acoustical duct liner shall be a flexible type using long Fiberglass with a smooth firmly bonded fire-resistant surface to prevent erosion of the insulation. Surface not to exceed 25 flamespread and 50 smoke development. Thermal conductivity shall not exceed 0.26 at 75? F. mean temperature. Noise reduction coefficient (NRC) shall not be less than 0.60 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 (1½) (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 1.50 at 4000 FPM.
- B. Provide one (1") inch thick duct liner for all return duct, outside air duct and either the first twenty (2) feet or to the first take-off for the supply duct.

2.09 REFRIGERANT PIPING INSIDE BUILDING:

- A. Suction Line shall be insulated with preformed sectional fiberglass insulation shall have factory vapor barrier jacket butt strips sealed with pressure sensitive adhesive. Insulation shall be 1½" thick with a density of 4 lb./cu.ft.
- B. Apply insulation with joints butted together. Seal laps and butt strips in accordance with the manufacturer's instructions so as to provide a positive vapor barrier. Seal all punctures in vapor barrier.
- C. Insulate fittings, valves and unions with molded or mitered segments of fiberglass. Maintain insulation thickness, secure with aluminum wire. Finish with vapor barrier coating and glass cloth mesh.

2.10 REFRIGERANT PIPING OUTSIDE BUILDING:

- A. Suction Line shall be insulated with aluminum jacketed fiberglass 2" thick with a density of 4 lb./cu.ft.
- B. Apply in the same manner as refrigerant piping insulation inside building.
- C. Liquid Line shall be insulated with ¾" thick Armaflex.

- D. Apply and secure Armaflex with Armaflex 520 adhesive. All joints shall be secured with Armaflex 520 adhesive and sealed so as to maintain a continuous vapor barrier.
 - E. Insulate fittings and valves with mitered segments of insulation as described for pipe. Maintain insulation thickness.
 - F. Apply two (2) coats of Armaflex vinyl lacquer type finish.
- 2.11 REFRIGERANT PIPING WITHIN PVC CONDUIT:
- A. Suction and Liquid Line shall be insulated with Armaflex 3/4" thick.
 - B. Apply and secure Armaflex with Armaflex 520 adhesive. All joints shall be secured with Armaflex 520 adhesive and sealed so as to maintain a continuous vapor barrier.
 - C. Apply two (2) coats of Armaflex vinyl lacquer type finish.
- 2.12 ADHESIVES, MASTIC, COATINGS:
- A. Adhesives, mastic and coatings shall be manufactured by Benjamin Foster, Childers, Insul-Coustic, EPOLUX, or 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 on piping and duct insulation shall have a perm rating of not more than 0.05 perms. Adhesives, coatings and mastics shall have a perm rating of not more than 0.25 perms.
- 2.13 TAPE:
- A. Wherever tape is used for sealing purposes, it shall be of the type and shall be applied as recommended by the nonconductive covering manufacturer. Where recommendation is lacking, the tape used shall be Minnesota Mining Adhesive EC-1329.
- 2.14 INSULATING CEMENT:
- A. Insulating cement shall be Owens-Corning 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.
- 2.15 GLASS CLOTH JACKET:
- A. Glass cloth jacket on piping shall be open weave and standard weight.
- 2.16 WEATHERPROOFING:
- A. Protect piping and duct insulation exposed to weather outside the building with Pabco Insulating Division corrugated aluminum sheets of 0.024 thickness. Piping joints shall have 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.
- B. Perform pressure tests required by other Sections before applying insulation.
- C. 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 PIPING SYSTEM:

- A. Insulate all indicated 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. For piping not installed in return air plenums, insulate the fittings and valves with PVC one piece shell white covers and precut glass fiber blanket applied in accordance with the manufacturer's recommendations.
- F. Application of all materials shall be in accordance with the manufacturer's instructions.
- G. 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.
- H. Care shall be taken so as not to place insulation over vent and drain inlets and outlets.
- I. Staples are not permitted on pipe insulation.
- J. Insulate all chilled water and 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.
- K. Cover all pipe insulation in mechanical equipment rooms within seven (7'-0") feet of the floor with a 22 gauge galvanized sheet metal cover.

3.03 INSULATION EXPOSED TO WEATHER OUTSIDE THE BUILDING:

- A. Finish with standard weight glass cloth set in a 1/16 coat of vapor barrier. After drying, apply a 1/16 coat of weatherproof vapor barrier similar to SEAL KOTE. Protect insulation including elbows with 0.020" thick corrugated aluminum, overlap two (2") inches, locate seams to shed water, and secure with a minimum of three (3) aluminum bands per section. Oversize insulation to allow for heat tape. Apply insulation after piping has been painted and heat tape

has been installed.

3.04 PROTECTION OF UNDERGROUND STEEL PIPING:

- A. Underground piping other than mill coated and wrapped shall be wire brushed and painted with two (2) field coats of cold applied, self priming coal tar, Koppers Bitumastic No. 50 or Tapecoat CT Mastic. After installation and testing, paint all joints and fittings as specified for pipe.

3.05 INSULATION FOR DUCT SYSTEM:

- A. Secure insulation to duct with Benjamin Foster 85-15 adhesive applied in four (4") inch strips around the duct on eight (8") inch centers. Nylon cord ties at 18" intervals shall be used to secure the insulation on round duct. Where rectangular/oval ductwork is thirty-six inch (36") wide or more in either direction secure insulation to the bottom of the duct using self adhering pins and self locking washers placed not more than eighteen inches (18") on center. Insulation shall overlap lining and factory applied insulation a minimum of two inches (2"). Vapor barrier at all butted joints or breaks shall be sealed with four inch (4") wide foil reinforced tape adhered with Benjamin Foster No. 82-07.
- B. Insulate duct work 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" thick weatherproof mastic similar to "Seal-Kote". After drying, apply a 1/16" thick finish coat of waterproof mastic. Butt insulation joints and seal with mastic.

3.06 INSULATION FOR EQUIPMENT:

- A. Secure insulation with insulation hangers and self locking washers, copper weld wire or galvanized bands. Miter to insure a tight fit. Seal joints with mineral wool insulation cement. Finish with standard weight glass cloth set between two (2)-1/16" thick coats of white mastic.
- B. Insulate flanged ends of strainers, pumps, removable head sections, access plates and coupling with a removable 20 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.
- C. Attention is called to the fact that external duct insulation is required at fire, smoke and fire/smoke dampers sleeves where dampers occur in lined ductwork.

3.07 CLEANING:

- A. At the time scheduled for final inspection, the finished surface of all exposed insulation shall be clean without any stains or blemishes. If necessary to obtain a new appearance, the contractor shall coat any discolored sections with off white latex base water mix semi-gloss paint or lagging adhesive at no cost to the Owner.

END OF SECTION

SECTION 15200

VIBRATION ISOLATORS

PART 1 - GENERAL

1.01 RELATE D DOCUMENTS:

- A. The requirements of the General Conditions, Supplementary Conditions, and Section 15010 apply to all work specified in this section.
- B. Refer to Specification Section 15011, titled "Schedule of Submittal Data," for the submittal and approval requirements regarding the piping system.

1.02 DESCRIPTION:

- A. Provide vibration isolators for all mechanical equipment to prevent the transmission of vibration and mechanically transmitted sound to the building structure. Vibration isolators shall be selected by the isolator manufacturer in accordance with the weight distribution of the actual equipment provided so as to produce a uniform deflection.
- B. Special care should be taken when selecting vibration isolators and housekeeping pad thickness to insure sufficient height to the drain pan outlet of air handling equipment to allow installation of the water seal and sufficient slope to the drain.
- C. Where spring isolators are exposed to exterior conditions, spring shall be neoprene coated or cadmium plated.

1.03 COORDINATION:

- A. The isolation devices and channel frames shall be products of a single vibration manufacturer. Submittal data shall include size, type, load and deflection of each isolator selected. Submittal data shall also include clearly outlined procedures for setting and adjusting all isolation devices. The isolation manufacturer's representative shall maintain an adequate stock of springs and isolators of the type used so that any changes required during construction and checking can be accomplished promptly.
- B. Coordinate the vibration isolation supports with the manufacturer of the equipment to be isolated. Prior to submitting detailed shop drawings to the Engineer for review, the equipment manufacturer shall approve the shop drawings in writing.

1.04 QUALITY ASSURANCE:

- A. Where shown, scheduled, or specified, provide specific vibration isolation equipment, manufactured by Amber-Booth, Consolidated Kinetics Corp., Korfund Dynamics Corp., Mason Industries, Inc., or Vibration Eliminator Co.
- B. Where specific type of vibration isolation equipment is not shown or specified, furnish isolators as recommended by one of the isolation manufacturers listed above, compatible with equipment arrangements shown.

PART 2 - PRODUCTS

2.01 MOUNTINGS:

- A. Type "A" double deflection neoprene mountings. Double deflection neoprene mountings shall have a minimum static deflection of 0.35". All metal surfaces shall be neoprene covered and have friction pads at both top and bottom. Bolt holes shall be provided as required. Mason Type ND or DNR.
- B. Type "B" Spring Mountings. Spring isolators shall be free-standing and laterally stable without any housing and complete with 1/4" neoprene acoustical friction pads between the base-plate and the support. All mountings shall have leveling bolts that must be rigidly bolted to the equipment. Spring diameters shall be no less than 80% of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Submittals shall include spring diameters, deflections, compressed spring height, and solid spring height. Mason Type SLF.
- C. Type "C" housed spring mounting with limit stop. Springs in housings shall be as specified above. Housing shall include vertical resilient limit stops to prevent spring extension when weight is removed as when equipment is drained. The housing shall serve as blocking during erection and the installed and operating heights shall be the same. Spring diameters shall be no less than 80% of the compressed height of the spring at rated load. A minimum clearance of 1/2" shall be maintained around restraining bolts and between the housing and the spring so as not to interfere with the spring action. Limit stops shall be out of contact during normal operation. Mountings used outside shall be hot dipped galvanized. Mason Type W.

2.02 ISOLATION HANGERS:

- A. Type "D" Isolation Hangers. Vibration hangers shall contain a spring and a double deflection neoprene element in series. Neoprene elements shall have a minimum deflection of 0.30 inches. Spring diameters shall be no less than 50% of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Spring diameter and hanger box lower hole shall be large enough to permit the hanger rod to swing thru a 30° arc before contacting the hole and short circuiting the spring. Mason Type 3ON or PC3ON.

2.03 BASES:

- A. Type "G" Steel Base. All mounts shall be spring type as specified herein. Height saving brackets shall be employed in all mounting locations. Furnish integral structural steel bases. Bases shall be rectangular in shape. All perimeter members shall be WF beams with a minimum depth equal to 1/10th of the longest dimension of the base. Mason Type WF.
- B. Type "H" Cradle Base-Steel. Provide steel members welded to height saving brackets for machines having legs or bases that do not require a complete supplementary base. Members shall be sufficiently rigid to prevent stress in the equipment. Mason Type ICS.
- C. Type "J" Floating Concrete Base. Furnish rectangular structural channel concrete forms for floating foundations. Bases for split case pumps shall be large enough to provide support for suction and discharge base ells. Channel depth shall be a minimum of 1/12th of the longest dimension of the base not less than 6". Forms shall include 1/2" reinforcing bars welded in place on 6" centers running both ways in a layer 1/2" above the bottom and drilled steel members with sleeves welded below the holes to receive the equipment anchor bolts. Mason Type K.

- D. Type "K" curb mounted aluminum bases. Curb mounted roof top equipment shall be mounted on vibration isolation bases that fit over the curb and under the isolated equipment. The extruded aluminum top member shall overlap the bottom member to provide water run off independent of the seal. The aluminum member shall house cadmium plated springs having a 1" inch minimum deflection with 50% additional travel to solid. Spring diameter shall not be less than 80% of the spring height at the rated load. The weather seal shall be a continuous closed cell sponge material above and below the base and a flexible connection joining the outside perimeter of the aluminum member. Mason Type CMAB.

2.04 FLEXIBLE DUCT CONNECTORS:

- A. Flexible duct connectors shall be non-combustible. Material shall be glass fabric double coated with neoprene (30 ounce per square yard minimum). Flexible connectors shall be a minimum of 4 inches long. Flexible connectors shall be pre-assembled metal-to-fabric-to-metal; fabric shall be attached to metal with a double lock grid. Provide flexible connectors which meet or exceed the contract documents. Flexible connectors shall be as made by Duro-Dyne, Young Regulator or Vent Fabrics.

2.05 PADS:

- A. Pads shall be of the neoprene waffle type with identical rubber grids molded back to back. The interconnections shall form suction pockets for gripping smooth steel as well as rough surfaces regardless of how the pad is cut. The square waffle pattern shall be layered out on ½ inch centers. Mason Type W.

PART 3 EXECUTION

3.01 GENERAL:

- A. Furnish mounting type and static deflection as follows:

<u>Type of Equipment</u>	<u>Type Mounting</u>	<u>Min. static Deflec.Inch</u>
1. Refrigeration Machines		
a. Pad Mounted Condensing Unit	PAD	-

- B. Shop drawings shall include complete isolator data, and manufacturer's operating weight, load distribution and deflection at each loading point for each piece of isolated equipment.

3.02 FLEXIBLE DUCT CONNECTORS:

- A. Provide flexible duct connectors where shown and all duct connections to the air handling units and inlet and outlet of centrifugal and/or axial fans. Flexible connectors are not required at the inlet of power roof ventilators and propeller wall fans.

3.03 FLEXIBLE PIPE CONNECTORS:

- A. Provide flexible pipe connectors where indicated and at all locations where piping crosses building expansion joints.

END OF SECTION

SECTION 15335

COMPRESSED AIR PIPING SYSTEM

PART 1 GENERAL

1.01 RELATED DOCUMENTS:

- A. All work specified in this Section is subject to the provisions of Section 15010, "Mechanical General".
- B. Refer to the following sections for related work in connection with the compressed air piping system:
 - 1. 15011 Schedule of Submittal Data
 - 2. 15020 Identification of Piping Systems
 - 3. 15100 Pipe Hangers and Supports
 - 4. 15130 Valves
 - 5. 15300 Piping Accessories

1.02 DESCRIPTION OF WORK:

- A. The extent of the compressed air piping systems work, is indicated on the Drawings, and by the requirements of this Section and includes but is not limited to the following:
 - 1. Installation of (tank mounted) air compressors where shown on Drawings.
 - 2. Receivers
 - 3. Air dryers
 - 4. Filters
 - 5. Piping system and accessories

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 five (5) 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 provisions of the American National Standards Institute pertaining to products and installation of compressed air piping systems.

PART 2 PRODUCTS

2.01 COMPRESSED AIR PIPING MATERIALS AND PRODUCTS:

- A. 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.

- B. Where more than one type of material or product is indicated, selection is Installer's option, however systems of piping must remain consistent in the type of materials and fittings utilized.
- 2.02 BASIC IDENTIFICATION:
- A. Provide identification complying with Section 15020, "Identification for Piping Systems."
- 2.03 BASIC PIPE, TUBE, AND FITTINGS:
- A. Provide pipe, tube, and fittings in accordance with the following listings.
 - B. Aboveground Compressed Air Piping:
 - 1. Pipe Size 1inch and smaller: Copper tube.
 - a. Wall Thickness: Type L, hard drawn temper, ANSI B-88.
 - b. Fittings: Wrought copper solder joints, ANSI B16.22.
 - c. Fittings: Cast bronze solder joints, ANSI B16.18.
 - d. Solder: 95-5 tin-antimony with compatible flux.
 - 2. Pipe Size 1-1/2 inches and larger: Galvanized steel pipe.
 - a. Wall Thickness: Schedule 40, ASTM A-53, Grade B, Type E or S.
 - b. Fittings: Class 150 galvanized malleable iron, threaded.
 - c. Fittings: Galvanized forged steel, threaded.
- 2.04 BASIC PIPING ACCESSORIES:
- A. Provide piping accessories complying with Section 15300, "Piping Accessories", and in accordance with the following listing:
 - 1. Pipe escutcheons.
 - 2. Dielectric unions.
 - 3. Pipe sleeves.
 - 4. Sleeve seals.
 - 5. Pressure gauges.
- 2.05 BASIC SUPPORTS, ANCHORS, AND SEALS:
- A. Provide supports, anchors, and seals complying with Section 15100, "Pipe Hangers and Supports," in accordance with the following listing:
 - 1. Adjustable steel clevis pipe hangers for horizontal piping.
 - 2. Two-bolt riser clamps for vertical piping supports.
 - 3. Concrete inserts, clamps, and steel brackets for building attachments.
- 2.06 BASIC VALVES:
- A. Provide valves complying with Section 15130, "Valves," in accordance with the following listing:
 - B. Sectional Valves For Isolating Pumps or Equipment
 - 1. 2 inches and Smaller: Ball Valves or Gate Valves.
 - 2. 2-1/2 inches and Larger: Butterfly Valves.

- C. Shutoff Valves
 - 1. 2 inches and Smaller: Ball Valves or Gate Valves.
 - 2. 2-1/2 inches and Larger: Gate Valves or Butterfly Valves.
- D. Drain Valves
 - 1. 2 inches and Smaller: Gate Valves.
 - 2. 2-1/2 inches and Larger: Gate Valves.
- E. Check Valves
 - 1. All Sizes: Swing Check Valves.

PART 3 EXECUTION

3.01 GENERAL:

- A. All piping shall be pitched at a slope of 1/16 inch per foot to drain to low points. Low points shall be provided with drains and shall be piped to the floor and shall be provided with drip legs and drain valves.
- B. All branch connections shall be made to the top of the pipe.
- C. Provide a manual valved bypass around all automatic drains at compressed air equipment to permit the automatic drain to be bypassed.

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 and Owner. Ample notice of the performance of test must be given by the Contractor to the Engineer and Owner.
- C. Submit certification of all tests.

END OF SECTION

SECTION 15400

DOMESTIC WATER PIPING SYSTEM

PART 1 GENERAL

1.01 RELATED DOCUMENTS:

- A. All work specified in this Section is subject to the provisions of Section 15010, "Mechanical General."
- B. Refer to the following sections for related work in connection with the domestic water piping system:
 - 1. 15011 Schedule of Submittal Data
 - 2. 15020 Identification of Piping Systems
 - 3. 15030 Trench Excavation and Backfill
 - 4. 15100 Pipe Hangers and Supports
 - 5. 15130 Valves
 - 6. 15180 Thermal Insulation for Mechanical Systems
 - 7. 15300 Piping Accessories

1.02 DESCRIPTION OF WORK:

- A. The extent of domestic water piping systems work, is indicated on the Drawings and by the requirements of this Section.
- B. Applications for domestic water piping systems include the following:
 - 1. Domestic cold water piping.
 - 2. Domestic hot water piping.
 - 3. Underground water piping inside building to a point 5'-0" from building unless shown or otherwise noted on Drawings.

1.03 QUALITY ASSURANCE:

- A. Manufacturing firms shall be regularly engaged in the manufacture of domestic water 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 five (5) years of successful installation experience on projects with domestic water piping systems work similar to that required for project.
- C. Comply with applicable portions of Plumbing Code pertaining to plumbing materials, construction and installation of products.
- D. Comply with applicable provisions of the American National Standards Institute pertaining to products and installation of domestic water piping systems.
- E. All plastic pipe fittings and accessories shall be tested and approved for conveying potable cold water by the National Sanitation Foundation Testing Laboratory (NSF) and shall bear the NSF stamp.

PART 2 - PRODUCTS

2.01 DOMESTIC WATER PIPING MATERIALS AND PRODUCTS:

- A. Provide piping materials and factory fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in domestic water piping systems.
- B. Where more than one type of material or product is indicated, selection is Installer's option, however, systems of piping must remain consistent in the type of materials and fittings utilized.

2.02 BASIC PIPE, TUBE, AND FITTINGS:

- A. Aboveground Domestic Water Piping:
 - 1. Copper tube, All Sizes
 - a. Wall Thickness: Type L, hard drawn temper, ANSI B-88-93.
 - b. Fittings: Cast copper alloy solder joints, ANSI B16.18.
 - c. Fittings: Wrought copper, solder joints, ANSI B16.22.
 - d. Solder: Pipe Sizes 3" and smaller:
95-5 tin-antimony, lead free solder, ASTM B-32. Solder shall be Taramet Sterling as manufactured by Taracorp Industries or approved equal.
 - e. Flux: Liquid and paste fluxes, water soluble lead free, compatible with solder, ASTM B813.93 as manufactured by:
LA-CO Industries, Inc.
Oatey Co.
Superior Flux & Mfg. Co.
Taramet Sterling
 - f. Brazing filler metal (piping 4" size and larger): BCuP series filler metal, ANSI A5.8, with compatible flux.
 - 2. Grooved Fittings (Piping 4" - 6"): Roll grooved pipe and fittings with ductile iron mechanical pipe couplings, ASTM A-536 and Grade E, EDPM gaskets, ASTM D-2000 suitable for -30? F to +230? F temperature service. Couplings assembly to be as manufactured by Vitaulic Company of America or Engineer approved equal.
- B. Underground Water Piping:
 - 1. Tube Size 1" through 3": Copper tube.
 - a. Wall Thickness: Type K, soft-annealed temper, ANSI B-88.
 - b. Fittings: Cast bronze solder joints, ANSI B16.18.
 - c. Fittings: Wrought copper solder joints, ANSI B16.22.
 - d. Pipe Sizes 3" and smaller:
Solder: 95-5 tin-antimony, lead free solder, ASTM B-32. Solder shall be Taramet Sterling as manufactured by Taracorp Industries or approved equal.
 - e. Flux: Liquid and paste fluxes, lead free, compatible with solder, ASTM B813 as manufactured by:
LA-CO Industries, Inc.
Oatey Co.
Superior Flux & Mfg. Co.

2.03 BASIC IDENTIFICATION:

- A. Provide identification complying with Section 15020, "Identification for Piping Systems" in accordance with the following listing:
 - 1. Building Distribution Piping: Plastic pipe markers.
 - 2. Valves: Brass valve tags.
 - 3. Underground Piping: Plastic warning tape.

2.04 BASIC PIPING ACCESSORIES:

- A. Provide piping accessories complying with Section 15300, "Piping Accessories," in accordance with the following listing:
 - 1. Pipe escutcheons.
 - 2. Low-pressure Y-type pipeline strainers.
 - 3. Dielectric unions and isolating flanges.
 - 4. Drip pans.
 - 5. Pipe sleeves.
 - 6. Sleeve seals.

2.05 WATER HAMMER ARRESTORS:

- A. Provide stainless steel casing and bellows or piston type water hammer arrestors, pressure rated for 250 psi, tested and certified in accordance with PDI Standard WH-201.
- B. Subject to compliance with requirements, provide water hammer arrestors of one of the following:
 - 1. Amtrol, Inc.
 - 2. Josam Manufacturing Co.
 - 3. Sioux Chief Industries
 - 4. Smith (Jay R.) Mfg. Co.
 - 5. Wade Div., Tyler Pipe.
 - 6. Zurn Industries, Inc., Hydromechanics Div.

2.06 PIPE HANGERS AND SUPPORTS:

- A. Provide pipe hangers and supports complying with Section 15100, "Pipe Hangers and Supports," in accordance with the following listing:
 - 1. Adjustable steel clevis pipe hangers for horizontal piping supports.
 - 2. Two-bolt riser clamps for vertical piping supports.
 - 3. Concrete inserts (Expansion anchors), clamps, and steel brackets for building attachments.
 - 4. Protection shields for insulated piping support in hangers.

2.07 BASIC VALVES:

- A. Provide valves complying with Section 15130, "Valves," in accordance with the following listing:
- B. Sectional Valves For Isolating Pumps or Equipment
 - 1. 2" and Smaller: Ball Valves or Gate Valves.
 - 2. 2-1/2" and Larger: Butterfly Valves.

C. Shutoff Valves

1. 2" and Smaller: Ball Valves or Gate Valves.
2. 2-1/2" and Larger: Gate Valves or Butterfly Valves.

D. Drain Valves

1. 2" and Smaller: Gate Valves.
2. 2-1/2" and Larger: Gate Valves.

E. Check Valves

1. All Sizes: Non-Slam Swing Check Valves.

2.08 SPECIAL VALVES:

A. Hose Bibbs

1. Threaded End: Bronze body, non-rising stem renewable composition disc, 3/4" NPT inlet, 3/4" hose outlet with vacuum breaker, cap and chain. Hose bibb shall be:
 - a. Chicago Faucet 5-T
 - b. Royal Brass 5105
 - c. Watts Regulator SC-6
2. Hose bibbs in mechanical rooms and building service areas shall be rough bronze body, lock shield, wall flange, with vacuum breaker and threaded inlet. Hose bibbs shall be:
 - a. Nibco 63 VB
 - b. Woodford 21-P
 - c. Watts Regulator SC-4
3. Hose bibbs in finished areas shall be chrome plated bronze body, lock shield, wall flange, with vacuum breaker and loose key. Hose bibbs shall be:
 - a. Chicago Faucet No. 387-6
 - b. Woodford 24

B. Drain Valves

1. Threaded End: Bronze body, non-rising stem renewable composition disc, wheel handle, 3/4" NPT inlet, 3/4" hose outlet. Drain valve shall be:
 - a. Nibco - Model 73
 - b. Watts Regulator BD-1
 - c. Woodford 24

C. Hydrants

1. Recessed Non-Freeze Wall Hydrants: Cast-bronze box hydrant, chrome plated face, loose tee handle key, bronze casing, length to suit wall thickness, vacuum breaker, hinged locking cover, 3/4" inlet, hose outlet. Hydrant shall be:
 - a. Josam 71000
 - b. Wade W-8625
 - c. Zurn 1300
2. Subject to compliance with requirements, provide hydrants of one of the following manufacturers:
 - a. Ancon, Inc.
 - b. Josam Mfg. Co.
 - c. Smith, (Jay R.) Mfg. Co.

- d. Wade Div., Tyler Pipe
- e. Woodford
- f. Zurn Industries Inc., Hydromechanics Div.

2.09 BACKFLOW PREVENTERS:

A. Reduced Pressure:

- 1. Provide reduced pressure principle backflow preventers consisting of assembly including shutoff valves on inlet and outlet, and strainer on inlet. Backflow preventers shall include test cocks, air-gap drain funnel, and pressure-differential relief valve located between two (2) positive seating check valves. Construct in accordance with ASSE Standard 1013. Pipe drain to floor drain.

B. Subject to compliance with requirements, provide backflow preventers of one of the following:

- 1. Clayton RP-1
- 2. Hersey Products, Inc. - Model No. FRP-11
- 3. Watts Regulator Co. - Model No. 909
- 4. Wilkens Regulator Co. - Model 575-RP

2.010 PRESSURE REGULATING VALVES:

A. Provide pressure regulating valves, single seated, direct operated type, bronze body, integral strainer, complying with requirements of ANSI/ASSE Standard 1003. Size for maximum flow rate and inlet and outlet pressures indicated on Drawings.

B. Subject to compliance with requirements, provide pressure regulating valves of one of the following:

- 1. Cla-Val Co.
- 2. Watts Regulator Co.
- 3. Wilkens Regulator Co.

2.011 BASIC THERMOMETERS AND GAUGES:

A. Provide thermometers and gauges complying with Section 15300, "Piping Accessories", in accordance with the following listing:

- 1. Pressure gauges.
- 2. Temperature gauges.
- 3. Combination pressure and temperature gauges.
- 4. Glass thermometers.

2.012 INSULATION

A. Refer to Section 15180 "Thermal Insulation for Mechanical Systems" for insulation products for domestic water piping system.

PART 3 EXECUTION

3.01 INSTALLATION OF BASIC IDENTIFICATION:

A. Install mechanical identification in accordance with Section 15020, "Identification for Piping Systems".

3.02 INSTALLATION OF DOMESTIC WATER DISTRIBUTION PIPING:

- A. Extend water service piping of size and in location indicated to water service entrance at building. Provide sleeve in foundation wall for water service entry; make entry watertight. Provide gate valve at water service entry inside building, strainer, pressure gauge and drain valve with hose end connection.
- B. Copper tube shall be joined in accordance with ASTM B828. All copper tube shall be installed in accordance with recommended procedures of the Copper Development Association Handbook 1993.
- C. Install all piping so that entire system may be drained down through plumbing fixtures. Where portions of piping are trapped, provide drain leg and drain valve with threaded hose end and cap.

3.03 INSTALLATION OF PIPING SPECIALTIES:

- A. Install water hammer arrestors/shock absorbers in upright position, in locations and of sizes in accordance with PDI Standard WH-201, and elsewhere as indicated on the Drawings.
- B. Where trap primers, unions or valves are concealed behind walls or above inaccessible ceilings, provide access panels.

3.04 INSTALLATION OF HANGERS, SUPPORTS AND ANCHORS:

- A. Install hangers, supports and anchors in accordance with Section 15100, "Pipe Hangers and Supports".
- B. Where required due to seismic zone and by geographic location, provide additional seismic restraints as required to resist seismic forces.

3.05 INSTALLATION OF VALVES:

- A. Install sectional valves close to main, on each branch and riser, where branch or riser serves two (2) or more plumbing fixtures or equipment connections, and elsewhere as indicated.
- B. Install shutoff valves on inlet of each piece of plumbing equipment and on the inlet of each plumbing fixture, and elsewhere as indicated. Provide reducers, adapters and unions for assembly of piping.
- C. Install drain valves on each plumbing equipment item located to completely drain equipment for service or repair. Install at base of each riser, at base of each rise or drop in piping system, and elsewhere where indicated or required to completely drain domestic water piping system.
- D. Install check valves on discharge side of each pump, and elsewhere as indicated.

3.06 INSTALLATION OF BACKFLOW PREVENTERS:

- A. Install backflow preventers where indicated, and where required by local Plumbing Code. Locate in same room as equipment being protected. Pipe relief outlet from reduced pressure models to nearest floor drain.
- B. Provide strainer between shutoff valve and first check valve.

- C. Provide soft disc check valve between strainer and first check valve on reduced pressure models.
 - D. Provide pressure gauge and shock absorber downstream of backflow preventer.
- 3.07 INSTALLATION OF THERMOMETERS AND GAUGES:
- A. Install thermometers and gauges in accordance with Section 15300, "Piping Accessories".
- 3.08 EQUIPMENT CONNECTIONS:
- A. Provide hot and cold water piping runouts to fixtures of sizes indicated, but in no case smaller than required by local Plumbing Code.
 - B. Connect hot and cold water piping system to mechanical equipment as indicated, and comply with equipment manufacturer's installation instructions. Provide shutoff valve and union for each connection, provide drain valve on drain connection.
- 3.09 TEMPORARY CAPS OR PLUGS:
- A. All piping rough-in or piping not completed at the end of the day shall be provided with temporary caps or plugs to prevent the entrance of foreign material during the construction period, until such time as piping is extended or final connections are made to fixtures.
- 3.10 PIPING ACCESSORY ACCESSIBILITY
- A. All valves and piping accessories shall be located so as to be accessible for operation and maintenance.
 - B. Piping which is located above ceilings or behind walls in chases shall be positioned so that operations and maintenance may be performed through access panels and/or ceiling grid.
- 3.11 PIPE INSULATION
- A. Insulate all aboveground cold water and hot water system piping in accordance with Section 15180 "Thermal Insulation for Mechanical Systems".
 - B. Insulate all piping including piping located in pipe chases.
 - C. Insulated piping shall be provided with rigid inserts and pipe hanger shields.
 - D. Pipe hangers shall support insulated piping on the outside of the insulation.
- 3.12 WALL AND FLOOR PENETRATIONS
- A. All pipe penetrations shall be sealed in accordance with the details shown on Drawings and/or noted in these Specifications.
 - B. Insulated piping passing through fire-rated walls or floors must have the pipe insulation interrupted on both sides of the fire-rated wall/floor penetrations as shown on Drawings.

3.13 TESTING

- A. Upon completion of the water supply system or portions of the system, and before piping is covered up, it shall be hydrostatically tested with potable water at 125 psi for a minimum of two (2) hours. Piping which is to be subjected to working pressure greater than 80 psi must be tested at not less than 50 psi above the working pressure.
- B. System shall maintain pressure and shall be checked for leaks. Any leaks shall be repaired to the satisfaction of the Owner's Representative and the system retested.
- C. All components which may not be rated to withstand the test pressures must be isolated and protected from damage.
- D. Copies of test reports and approval by the local inspector must be submitted to the Owner's Representative.

3.14 FLUSHING AND STERILIZATION

- A. Upon completion of testing, all piping shall be cleaned and flushed in accordance with Section 15010, "Mechanical General."
- B. All potable water piping must be sterilized in accordance with the requirements of the local authority having jurisdiction. As a minimum, the system shall be filled with a chlorine compound solution of at least 50 ppm and allowed to stand for 12 hours. The system must then be flushed until the residual chlorine is a maximum of 2 ppm.

3.15 SPARE PARTS

- A. Furnish to Owner, with receipt, one (1) valve key for each key operated hydrant, bibb, or faucet installed.

END OF SECTION

SECTION 15410

SOIL AND WASTE PIPING SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. All work specified in this Section is subject to the provisions of Section 15010, "Mechanical General."
- B. Refer to the following sections for related work in connection with the soil and waste piping system:
 - 1. 15011 Schedule of Submittal Data
 - 2. 15020 Identification of Piping Systems
 - 3. 15030 Trench Excavation and Backfill
 - 4. 15100 Pipe Hangers and Supports
 - 5. 15180 Thermal Insulation for Mechanical Systems
 - 6. 15300 Piping Accessories
 - 7. 15430 Drains, Cleanouts and Drainage Accessories

1.02 DESCRIPTION OF WORK:

- A. Extent of soil and waste piping work, is indicated on Drawings and by requirements of this Section and includes the following:
 - 1. Underground building drain piping including mains, branches, traps, connections to fixture and drains, and connections to stacks, terminating five (5) feet outside of foundation wall or as shown or noted on Drawings.
 - 2. Installation of sanitary piping as noted on Drawings and in these Specifications.

1.03 QUALITY ASSURANCE:

- A. Manufacturing firms shall be regularly engaged in the manufacture of piping sanitary drainage 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 firms shall have at least five (5) years of successful experience on projects with soil and waste piping systems similar to that required for this project.
- C. Comply with applicable portions of Plumbing Code pertaining to materials, products and installation of soil and waste piping systems.
- D. Comply with applicable Plumbing and Drainage Institute Standards pertaining to materials, products and installation of soil and waste piping systems.

1.04 SUBMITTALS:

- A. Submit manufacturer's data for soil and waste piping systems materials and products in accordance with Section 15011, "Schedule of Submittal Data".

PART 2 - PRODUCTS

2.01 SOIL AND WASTE PIPING MATERIALS AND PRODUCTS:

- A. Provide piping materials and factory fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in soil and waste piping systems.
- B. Where more than one (1) type of material or product is indicated, selection is Installer's option, however systems of piping must remain consistent in the type of materials and fittings utilized.

2.02 BASIC PIPE AND FITTINGS:

- A. Provide pipe and fittings in accordance with the following listing:
 - 1. Aboveground Piping, 8" size and smaller:
 - a. Hubless cast iron soil pipe, CISPI 301 and ASTM A-888.
 - (1) Pipe Class: Service weight (SV).
 - (2) Fittings: Hubless cast iron soil pipe fittings.
 - (3) Couplings: For drainage pipe 4" size and smaller and all vent piping: Hubless coupling consisting of Type 304 stainless steel shield clamp assembly and flanged neoprene rubber gasket, ASTM C 564 conforming to CISPI 310.
 - (4) Heavy Duty Couplings: Heavy duty Type 304 stainless steel shield clamp assembly and flanged neoprene rubber gasket, ASTM C 564, equal to Husky 4000 or Mission Heavy Weight (HW).
 - 2. Underground Building Drain Piping:
 - a. Pipe: Cast iron, hub and spigot soil pipe, ASTM A-74.
 - (1) Pipe Class: Service Weight (SV).
 - (2) Fittings: Cast iron, hub and spigot soil pipe fittings.
 - (3) Gaskets: Neoprene compression gasket joints, ASTM C-564.
 - b. Polyvinyl chloride (PVC), Type 1, DWV in accordance with ASTM D-2665 and D-1785.
 - (1) Pipe Class: Schedule 40.
 - (2) Fittings: Drain-Waste-Vent (DWV), Schedule 40 socket type fittings.
 - (3) Solvent Cement: Primer and PVC cement in accordance with ASTM D-2564.

2.03 BASIC PIPING ACCESSORIES:

- A. Provide piping accessories complying with Section 15300, "Piping Accessories", in accordance with the following listing:
 - 1. Pipe escutcheons
 - 2. Drip pans
 - 3. Pipe sleeves
 - 4. Sleeve seals

2.04 PIPE HANGERS AND SUPPORTS:

- A. Provide pipe hangers and supports complying with Section 15100, "Pipe Hangers and Supports," in accordance with the following listing:
 - 1. Adjustable steel clevis pipe hangers for horizontal piping hangers and supports.
 - 2. Two bolt riser clamps for vertical piping supports.
 - 3. Concrete inserts (Expansion anchors), clamps and steel brackets for building attachments.

2.05 SPECIAL EXPANSION COMPENSATION:

- A. Expansion joints shall be cast-iron body, adjustable bronze sleeve, bronze bolts with wing nuts; for vertical installation only.
 - 1. Manufacturer: Subject to compliance with requirements, provide expansion joints of one of the following:
 - a. Ancon, Inc.
 - b. Josam Mfg. Co.
 - c. Smith (Jay R.) Mfg. Co.
 - d. Wade Div., Tyler Pipe
 - e. Zurn Industries, Hydromechanics Div.

2.06 DRAINS, CLEANOUTS AND DRAINAGE ACCESSORIES:

- A. Refer to Section 15430, "Drains, Cleanouts and Drainage Accessories," for floor drains, floor sinks, cleanouts and drainage accessories.

2.07 INSULATION:

- A. Refer to Section 15180, "Thermal Insulation for Mechanical Systems" for insulation products for drainage systems.

PART 3 EXECUTION

3.01 INSTALLATION OF BASIC IDENTIFICATION:

- A. Install mechanical identification in accordance with Section 15020, "Identification of Piping Systems."

3.02 INSTALLATION OF SOIL AND WASTE ABOVE GROUND PIPING:

- A. Install soil and waste piping in accordance with pipe manufacturer's recommended practices and with Plumbing Code.
- B. Changes in pipe size shall be made with reducing fittings. Bushings will not be permitted.

3.03 INSTALLATION OF BUILDING DRAIN PIPING:

- A. Install underground building drains as indicated and in accordance with Plumbing Code. Lay underground building drains beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Clean interior of piping of dirt and other superfluous material as work progresses. Maintain swab or drag in line and pull past each joint as it is completed. Place plugs in ends of uncompleted piping at end of day or whenever work stops.
- B. Install horizontal soil and waste piping sloped to drain at a minimum slope of 1/4" per foot (2%) for piping 3" and smaller, and 1/8" per foot (1%) for piping 4" and larger.

3.04 INSTALLATION OF PIPING ACCESSORIES:

- A. Install piping accessories in accordance with Section 15300, "Piping Accessories."

3.05 INSTALLATION OF SUPPORTS, ANCHORS, AND SEALS:

- A. Install supports, anchors, and seals in accordance with Section 15100, "Pipe Hangers and Supports."

3.06 INSTALLATION OF SPECIAL EXPANSION COMPENSATION PRODUCTS:

- A. Install expansion joints on vertical risers as required by local Plumbing Code.

3.07 INSTALLATION OF DRAINAGE PIPING PRODUCTS:

- A. Install cleanouts in sanitary above ground piping and sanitary building drain piping as indicated and as required by the Plumbing Code; at each change in direction of piping greater than 45°; at minimum intervals of 75 feet, and at base of each vertical soil or waste stack.
- B. Install floor and wall cleanout covers for concealed piping, select type to match adjacent building finish.
- C. Install cleanouts at the base of stacks with centerline of cleanout 1'-6" above finished floor maximum unless noted otherwise. Coordinate cover with adjacent wall finish.
- D. Install flashing flange and clamping device with each stack and cleanout passing through waterproof membranes.
- E. Install vent flashing sleeves on stacks passing through roof, secure over stack flashing in accordance with manufacturer's instructions.

3.08 INSTALLATION OF FLOOR DRAINS:

- A. Install floor drains in accordance with manufacturer's written instructions and in locations indicated.
- B. Coordinate with soil and waste piping as necessary to interface floor drains with drainage piping systems.
- C. Install floor drains at low points of surface areas to be drained and as indicated. Set top of drains flush with finished floor.

- D. Install drain flashing collar or flange so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes, where penetrated.
 - E. Position drains so that they are accessible and easy to maintain.
 - F. During construction drains shall be kept covered so that traps and sediment buckets are kept free from debris and trash and to protect surface of drains located in finished areas.
 - G. Exact location and top elevation of all drains and cleanouts must be coordinated with architectural and structural drawings.
- 3.09 EQUIPMENT CONNECTIONS:
- A. Provide soil and waste piping runouts to plumbing fixtures and drains, with approved trap, of sizes indicated; but in no case smaller than required by the local Plumbing Code.
 - B. Locate piping run-outs as close as possible to bottom of floor slab supporting fixtures or drains.
- 3.10 TEMPORARY CAPS OR PLUGS:
- A. All rough-in piping or piping not completed at the end of the day shall be provided with temporary caps or plugs to prevent the entrance of foreign material during the construction period, until such time as piping is extended or final connections are made to fixtures or drains.
- 3.11 PIPING TESTS:
- A. Test soil and waste piping system in accordance with requirements of the local Plumbing Code and to the satisfaction of the Plumbing Inspector.
 - B. All piping shall be tested prior to backfilling or concealment behind walls or above ceilings.
 - C. All piping shall be tested with a minimum of a ten (10) foot head of water, for two (2) hours, without loss of water. Inspect all joints while under water test. All pipe shall be retested until demonstrated to be leak free.
 - D. Piping may be tested in sections. A record of each section tested shall be submitted at the end of the project indicating section tested, date, persons observing test and test results.
 - E. At completion of entire piping system, a final tightness test with either smoke or "peppermint" is required before final acceptance by Engineer.
 - F. The Owner's Representative shall be notified a minimum of 48 hours in advance of tests.

END OF SECTION

SECTION 15430

DRAINS, CLEANOUTS AND DRAINAGE ACCESSORIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. All work specified in this section is subject to the provisions of Section 15010, "Mechanical General."
- B. Refer to the following sections for related work in connection with drains, cleanouts and drainage accessories.
 - 1. 15011 Schedule of Submittal Data
 - 2. 15410 Soil and Waste Piping Systems
 - 3. 15420 Storm Water Piping System

1.02 DESCRIPTION OF WORK

- A. The number, type and size of the drains and cleanouts are indicated on the Drawings and shall include the following:
 - 1. Floor Drains
 - 2. Roof Drains
 - 3. Cleanouts

1.03 QUALITY ASSURANCE

- A. Manufacturing firms shall be regularly engaged in the manufacture of plumbing products of type and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.
- B. Subject to compliance with requirements, provide drains, cleanouts & drainage accessories of one of the following manufacturers:
 - 1. Josam Company
 - 2. Jay R. Smith Mfg. Co.
 - 3. Wade Div., Tyler Pipe
 - 4. Zurn Industries, Inc.

PART 2 PRODUCTS

2.01 FLOOR DRAINS

- A. General: Provide floor drains of size and type as indicated on the Drawings, including features as specified herein. Floor drains and floor sinks located on floors above the ground floor shall be provided with flashing clamps.
- B. Floor Drain Type "G": Cast iron body and reversible flashing collar, nickel bronze adjustable with 6 x 6 square or 6" diameter secured strainer top, equal to Jay R. Smith 2010-B Series.
- C. Floor Drain Type "M": Cast iron deep body with flange and 12 inch diameter heavy duty cast iron tractor grate, equal to Jay R. Smith 2141 Series.

- D. Hub Drains Type "HD": Cast iron pipe hub set in floor with top 1" above the finished floor. The indirect waste line run to the hub drain shall stop 2" above the top of the hub.
- E. All floor drains without trap primer connections shall be provided with deep seal "P" traps.
- F. Floor drains where indicated on Drawings shall be provided with trap primer connections.

2.02 CLEANOUTS

- A. Floor Cleanouts shall have a cast iron body with frame, cleanout plug and adjustable top as follows:
 - 1. Nickel-Bronze Top: Manufacturers standard cast unit of the pattern indicated:
 - a. Pattern: Exposed round (square) rim type, with recess to receive 1/8" thick resilient floor finish, equal to J. R. Smith 4140 (4160).
 - b. Pattern: Exposed round (square) rim type, with recess to receive 1" thick terrazzo floor finish, equal to J. R. Smith 4180 (4200).
 - c. Pattern: Exposed finish type, standard mill finish to be covered with carpet and located with carpet marker, equal to J. R. Smith 4020-Y.
 - d. Pattern: Exposed flush type, standard non-slip scored or abrasive finish, equal to J. R. Smith 4020.
 - 2. Heavy duty, round, cast iron top shall be used for all unfinished areas with concrete slabs, equal to J. R. Smith 4240.
 - 3. Heavy duty, round, cast iron tractor top shall be used for exterior locations in pavement, equal to J. R. Smith 4240.
- B. Wall Cleanouts shall be cast iron body adaptable to pipe with ABS plug; stainless steel cover including screws, equal to J. R. Smith 4472.
- C. Cleanouts occurring in elevated floors shall be provided with flashing clamps.

PART 3 EXECUTION

3.01 EXECUTION

- A. All roof drain domes and floor drain strainers shall be securely fastened to drain body.
- B. During construction drains shall be kept covered so that traps and sediment buckets are kept free from debris, trash and sediment. All traps and buckets shall be cleaned of all debris prior to acceptance by Owner.
- C. All floor drains, cleanouts, and floor sinks shall have finishes protected from damage during construction. All tops and surfaces damaged during construction shall be replaced prior to acceptance by Owner.
- D. All floor drain grates and cleanout covers deformed by heavy construction traffic shall be replaced.

END OF SECTION

SECTION 15764 SPLIT SYSTEM

PART 1 GENERAL

1.01 DESCRIPTION:

- A. All work specified in this Section is subject to the provisions of Section 15010.
- B. The split systems shall provide the minimum capacities scheduled, shall meet all constraints of construction, and shall comply with all Sections of these specifications. Condensing unit shall be certified with ARI Standards 210-81 and 270-82. Air handling units shall be UL listed.

1.02 COORDINATION:

- A. The split system of one manufacturer has been used as the basis of design. Any modifications to piping, wiring, or building structure, that results from the use of any other unit shall be coordinated with all trades prior to delivery of approved equipment from the manufacturer. Any modifications required shall be performed without incurring any additional cost to the Contract.

1.03 ACCEPTABLE MANUFACTURERS:

- A. The following manufacturers are acceptable: Carrier, Trane and Lennox. Any system selected must be proven equal in all respects to those scheduled and specified herein.

PART 2 PRODUCTS

2.01 INDOOR UNIT:

- A. Indoor air fancoil unit shall be horizontal type as indicated. Installation shall conform to all applicable codes and ordinances and minimum clearance requirements to combustible materials.
- B. Cabinet shall be constructed of heavy gauge cold rolled steel with a bake-on enamel finish. Knock-outs shall be furnished in the top and bottom panels for hanger rods. Provide complete service access to blower compartment.
- C. Unit shall be equipped with belt direct drive blower. Blower shall be statically and dynamically balanced.
- D. Fan and limit controls shall be factory installed and wired. Fan control shall assure proper blower operation. Continuous blower operation may be accomplished by adjusting the fan controls.
- E. Power supply and thermostat wiring connections shall be made at junction box located on front of the unit.
- F. Blower cooling relay shall be furnished and factory installed on the wiring junction box. Relay shall activate blower operation during cooling cycle.
- G. A 24 volt control transformer shall be furnished and factory installed on the wiring junction box.
- H. Filter shall be 1" throwaway type of woven fiber.
- I. Provide matching evaporator coil compatible with unit air flow and condensing unit. Coil shall be copper tubes with aluminum fins and shall have insulated casing, drain pan and expansion valve. Coil shall be certified for compliance with the provisions of ARI Standard.

- J. Unit shall be provided with electric heating coil. Heater shall be supplied as an integral unit. Heater shall be UL listed and meet all requirements of the National Electrical Code.

2.02 CONDENSING UNIT:

- A. Furnish and install air cooled condensing unit, completely assembled, piped and wired internally ready for field connections. The condensing unit shall be a standard product of a firm regularly engaged in the manufacture of heating-cooling equipment. The manufacturer shall have parts and service available within fifty (50) miles of the project site. Manufacturer shall test operate unit at the factory before shipment.
- B. Unit shall be completely compatible with the evaporator coils supplied and specified in Paragraph 2.01 above.
- C. Compressor shall be internally spring mounted, have positive crankcase lubrication, discharge mufflers, crankcase heater, discharge temperature sensing thermostat, high and low pressure switches, motor in-winding temperatures sensing thermostats, low ambient sensor and solid-state overload protector.
- D. Refrigerant system shall include liquid line service valve(s), suction line service valve(s) and hi-capacity drier(s).
- E. Condenser coil shall be constructed of aluminum fins mechanically fitted to copper tubes and have sub-cooling rows. The coil shall be factory pressure leak tested at 450 psi. Coil shall be protected by a steel guard.
- F. Controls shall be equipped with a compressor timed-off cycle and low ambient controls.
- G. Casing shall be constructed of galvanized steel which has been through a zinc phosphate metal wash preparation and have a finish coat of baked-on outdoor enamel. Large access panels shall be provided to allow complete service. The base section shall be provided with hoisting lugs, support rails and moisture drainage holes. Refrigerant line inlet shall be provided in both sides of cabinet.
- H. Condenser fan shall be direct drive blade type fan. Each motor shall have inherent protection devices and shall be protected from moisture. Fans shall be protected with a steel guard.
- I. All wiring shall be in compliance with National Electric Code. Unit shall be UL listed and ARI rated.

2.03 CONTROLS:

- A. The system shall be complete with a low voltage thermostat and sub-base to provide manual and automatic fan operation and automatic temperature control.

PART 3 EXECUTION

3.01 INSTALLATION:

- A. The split system shall be installed in complete conformance with the manufacturer's installation recommendations and these contract documents.

END OF SECTION

SECTION 15768

GAS-FIRED INFRARED HEATER

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplemental Conditions and Section 15010 apply to all work specified in this section.
- B. Refer to Specification Section 15011, titled "Schedule of Submittal Data", for submittal and approval requirements regarding this equipment.

1.02 DESCRIPTION

- A. The gas fired infrared heater shall be 2-stage radiant tube heater, reflector-beam spread and operating conditions as indicated on the Drawings.

PART 2 PRODUCTS

2.01 GAS-FIRED INFRARED HEATER

- A. The reflector shall consist of 430 polished stainless steel reflector. Provide with manufacturer's standard reflector supports.
- B. Provide with pre-wired control boxes, thermostats and hangers.
- C. Gas valves and piping shall comply with the natural gas piping standards. Use U.L. flue vents and gas vent roof jacks.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install equipment where indicated and as recommended by the manufacturer's recommendations.

END OF SECTION

SECTION 15820 FANS

PART 1 GENERAL

1.01 RELATED DOCUMENTS:

- A. All work specified in this Section is subject to the provisions of Section 15010.

1.02 DESCRIPTION OF WORK:

- A. 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.
- B. 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.

1.03 ACCEPTABLE MANUFACTURERS:

- A. The following manufacturers are acceptable: Greenheck, American Coolair, ILG Industries, Loren Cook, Peerless Electric, and Penn. Any units selected must meet or exceed all the requirements of these Contract Documents.

1.04 GENERAL:

- A. 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.
- B. Fan motor enclosure shall be the drip-proof type unless specifically indicated otherwise. Motors two (2) horsepower and greater shall be the high efficiency type - Century-Plus or an approved equal.
- C. Belt driven power assemblies shall be mounted on vibration isolators.
- D. Centrifugal fan wheels shall be statically and dynamically balanced.
- E. All fans shall be supplied with a factory installed safety disconnect switch.

PART 2 PRODUCTS

2.01 IN-LINE CENTRIFUGAL FANS:

- A. In-line fans shall be the belt driven centrifugal type complete with housings, adjustable motor bases, motor and drives, fan wheel, bearings, drive guards and inlet screens (where indicated).
- B. The fan housing shall be the heavy gauge steel tubular type of all welded Class 1 construction complete with curved conversion vanes, inlet and outlet flanges, access door and drive arrangement indicated. The bearings and drive shall be protected from the air stream by an enclosure. Provide mounting brackets as indicated.

- C. The bearings shall be the self-aligning, ball bearing, pillow block type with double locking cover. The bearings shall have a 400,000 hour average life and shall have the grease lines extended to the outside of the fan housing for ease of maintenance.
- D. The fan wheel shall be the airfoil centrifugal type for fan wheels 27" and larger in diameter and the backward inclined type for fan wheels under 27". Fan wheels shall be of all welded construction and shall have a spun inlet section and cast iron hubs. Fan wheels shall be of Class 1 construction and shall be statically and dynamically balanced. The fan shall bear a certification to verify that the wheel has been balanced.
- E. The motor shall be mounted on an adjustable base and shall be as specified hereinbefore. Provide drive guards.

2.02 SIDEWALL PROPELLER FANS:

- A. Belt drive sidewall propeller fans shall be complete with fan blade, one piece steel fan panel with spun venturi and driver support frame, motor and drive, bearings, outlet screens, motor side guards and mounting collars.
- B. The propeller fan blade shall have six (6) 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 insure vibration free operation.
- C. 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. Provide a thermally fused powdered epoxy external coating five (5) mils thick.
- D. The motor and drive shall be as specified hereinbefore.
- E. Fan shaft shall be ground and polished steel with slotted keyways.
- F. Bearings shall be the ball bearing pillow block type. Bearing shall be rated for an average life of 100,000 hours.
- G. Provide matching factory fabricated motor side guards, outlet screens and mounting collars.

2.03 CABINET FANS:

- A. Cabinet fans shall be of the type and capacity scheduled on the drawings, complete with all accessories indicated and required.
- B. Cabinet fans shall be direct driven. Each fan housing shall be constructed of phosphatized steel with an oven baked enamel finish. The housing interior shall be acoustically lined with 1/2 inch thick insulation. The discharge outlet shall be adaptable to horizontal or vertical positions. The terminal box shall be internally mounted for motor hook-up. The motor shall be mounted on resilient elastic grommets. the fan shall have a forward curved centrifugal wheel. All fans shall bear the AMCA seal for air and sound performance.
- C. Acceptable manufacturers shall be Greenheck, ACME, Penn or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION:

- A. Fans shall be installed in complete conformance with the manufacturer's recommendations and the Contract Documents. Coordinate the actual units to be provide with all trades.

3.02 ADJUSTMENT:

- A. The fans shall be tested and adjusted to provide the scheduled capacities.

END OF SECTION

SECTION 15840

DUCTWORK AND ACCESSORIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS:

- A. The requirements of the General Condition, Supplemental Conditions and Section 15010 apply to all work specified in this section.
- B. Refer to Specification Section 15011, titled "Schedule of Submittal Data," for submittal and approval requirements regarding this equipment.
- C. Refer to Specification Section 15180, titled "Thermal Insulation for Mechanical Systems," for insulation of the duct systems.

PART 2 PRODUCTS

2.01 DESCRIPTION:

- A. SMACNA Standards indicated shall mean standards 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 as follows:
 - 1. From variable volume air handling unit to terminal units (VAV's and Powered Induction Boxes): Medium Pressure – 4 inches static pressure, Class A seals.
 - 2. Ductwork downstream of terminal units (VAV's and Powered Induction Boxes) to diffusers, miscellaneous fans' ductwork and toilet exhaust ductwork: Low Pressure - 1/2 inch static pressure, Class B seals.
- B. Ductwork shall be constructed of G90 galvanized sheet steel. Ductwork shall be round, or rectangular as indicated on the Drawings. Sizes given shall be considered to be the minimum, and any conversion from the given shape shall be made without increasing air velocity or friction losses. All duct dimensions indicated are net clear inside dimensions.
- C. The medium pressure ductwork has been sized according to a particular static regain duct design program. Should any duct layout be submitted different from that which is designed, the contractor shall submit an approved computerized static regain duct design prior to the approval of any duct layout.
- D. Duct leakage tests shall be conducted by the contractor and witnessed by the Test and Balance Contractor. Test shall be the orifice plate type and maximum leakage shall be 5 percent of the design CFM of the system.
- E. As an alternate to the lined medium pressure ductwork, the Contractor's option shall be a double wall sound attenuating duct as manufactured by United, Semco or R.V. Money.
- F. Ductwork fabrication shop drawings shall be submitted as part of the shop drawing submittal.
- G. Turning vanes shall be installed in all low pressure supply ductwork 90 degree square or rectangular elbows and at other locations shown. The turning vanes shall be large size, double thickness air foil style, with vanes secured to the runners and runners secured to the duct. Elbows in round ductwork and other radiused elbows shall have an inside radius equal to the diameter of the duct.

- H. All branch takeoffs in medium pressure ductwork shall be made with pre-manufactured conical, bellmouth or conical lateral fittings. Shop fabricated or saddle taps are not allowed.

2.02 HANGERS AND SUPPORTS:

- A. Duct hangers and supports shall be in accordance with the HANGERS AND SUPPORTS Section of the referenced SMACNA Standards, except:
 1. Hangers shall be spaced **Not** over 8'-0" on centers.
 2. For rectangular ducts with longest dimensions up through 5'-0", hangers shall be the galvanized steel strap type; with the longest dimension 5'-1" 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 for strap hangers and 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. For duct sizes requiring two (2) hangers, the hanger supports shall be minimum 3/8" round steel hanger rods.
 4. Exposed ductwork on the roof shall be welded, watertight construction and shall be painted with an asphaltic based paint to inhibit rust. Ductwork passing through roof curbs shall be flashed water-tight.

2.03 MANUAL DAMPERS AND DAMPER HARDWARE:

- A. Splitter Dampers:
 1. 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 low leakage single blade butterfly type in ducts up to and including 1'-6" X 1'-0" size; for ducts larger than 1'-6" X 1'-0", in either or both dimensions, the dampers shall be the low leakage multi-blade type. All dampers in O.A. ductwork shall shut tightly and have vinyl edge seals.
 2. Single blade butterfly dampers shall be constructed of not less than 16gauge galvanized steel blade 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 1'-0" 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 inches 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.
 4. Acceptable manufacturers of dampers are Ruskin, Air Balance or Louvers and Dampers, Inc. provided the equipment meets or exceeds the Contract Documents.

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 inch diameter steel rod and shall be secured to the damper blade with a clip. When either dimension of a damper exceeds 1'-6", 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 Contract Documents.
- D. Acceptable manufacturers of dampers are Ruskin, Air Balance, or Louvers and Dampers Inc., provided the equipment meets or exceeds the Contract Documents.

2.04 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.
- B. A 1 inch thick, one (1) pound density fiberglass insulation and vinyl outer jacket shall cover the wire helix.
- C. Flexible ductwork shall be designed for pressures up to 4 inches W.G. for low pressure ductwork. The maximum allowable length of low pressure flexible ductwork shall be 7'-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. Medium pressure flexible ductwork shall be designed for 10 inches W.G. The maximum allowable length of medium pressure ductwork shall be 4'-0" and shall be limited to short run-outs connecting PIU and VAV units to medium pressure sheet metal ductwork.
- E. Acceptable manufacturers of low pressure flexible ductwork are Genflex Type SLR.25 or Flexmaster Type 3 medium pressure flexible ductwork shall be Clecon Model FLEX25 VF Series, or Wiremold Type WGC.

2.05 FLEXIBLE DUCT CONNECTIONS:

- A. 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.

2.06 FIRE DAMPERS:

- A. Fire dampers shall be provided at all penetrations through fire rated walls and partitions. Fire dampers shall be UL labeled and shall be Type B (blades out of the air stream) or Type C (round duct).
- B. Acceptable manufacturers of fire dampers are: Prefco, Ruskin, or Air Balance provided the equipment meets or exceeds the Contract Documents.

2.07 MOTOR OPERATED DAMPERS:

- A. Automatic dampers shall have blades not over 6 inches wide and 3'-0" long, heavy channel frames and non-corrosive sleeve type bearings, and shall be furnished by the control manufacturer (except for dampers furnished with air handling equipment). All dampers opening to outside shall have air tight edge seals and end seals.
- B. Dampers specified for proportioning (modulating) service shall be opposed-blade type, with double-thickness extruded aluminum blades with an approximate airflow cross-section.
 - 1. Linkage shall be outside of airstream.
 - 2. Blades shall seat against continuous resilient seals. When fully closed, leakage shall not exceed 6 CFM per square foot, as measured inside damper frame, at pressure difference of 2 inches WG.
- C. Dampers for 2-position service shall be parallel-blade type with #16 gauge blades.
- D. Damper operators shall position the controlled device positively and accurately. Operators shall provide not less than 7.5 inch-pounds torque per square foot of damper area to the damper drive shaft.
- E. Damper actuators shall be of the 2-position control as required by the application. The actuator shall use an overload-proof synchronous motor or an electric motor with end switches to de-energize the motor at the end of the stroke limits. Control voltage shall be 24 VAC, 0-20 VDC, or 4-20 mA as required.

2.08 DUCT ACCESS DOORS:

- A. Provide a duct access door at each fire, fire/smoke or smoke damper. Access doors 18" x 18" and larger shall have a continuous hinge on each side with latch on the other side. Access door shall be designed for five (5) times the pressure of the duct in which it is mounted. Access doors shall be of sufficient size to provide access to the dampers for resetting or replacing thermal links. Access doors downstream of fire dampers in medium pressure ductwork shall be the implosion type.
- B. Coordinate the location of duct access doors with the Documents. Duct access doors above inaccessible ceilings shall be unacceptable unless approved by the Architect prior to installation.

PART 3 EXECUTION

3.01 INSTALLATION:

- A. Install all ductwork and accessories as shown and in accordance with applicable SMACNA standards.
- B. All joints in ductwork shall be sealed with a fire retardant duct sealant. Tape is not acceptable.
- C. Sound proof construction for duct penetrations shall be required for openings between ductwork and following construction:
 - 1. Floors, except in shafts.

- D. Sound proofing installation shall include:
1. Fill openings with fibrous glass blanket for full depth of penetration.
 2. Caulk each side of opening with non-hardening, non-aging caulking compound equal to Johns-Manville "Duxeal".

3.02 DUCTWORK:

- A. Round ducts up to and 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 three (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 three (3) screws in each section.

END OF SECTION

SECTION 15870

GRILLES, REGISTERS AND DIFFUSERS

PART 1 GENERAL

1.01 DESCRIPTION:

- A. All work specified in this Section is subject to the provisions of Section 15010.
- B. Grilles, registers and diffusers shall be provided to meet the minimum capacities indicated, shall meet all constraints of construction, and shall comply with all Contract Documents.

1.02 COORDINATION:

- A. The grilles, registers and diffusers of one manufacturer have been used as the basis of design. Any modifications to ductwork, controls, or building structure, that result from the use of any other units shall be coordinated with all trades, especially Architecture; this coordination shall occur before delivery of equipment from the manufacturer. Any modifications shall be performed without incurring any additional cost to the Contract.
- B. The color of all grilles, registers and diffusers shall match the surface in which they are installed as selected by the Architect. Additionally, ceiling mounted devices shall be selected to fit in the ceiling in which they are applied.

1.03 ACCEPTABLE MANUFACTURERS:

- A. Grilles, registers and diffusers shall be the products of Krueger, Carnes, Titus, Metalaire or E.H. Price. Devices shall be ADC tested, rated and certified.
- B. All devices selected must meet or exceed all the requirements of these contract documents.
- C. Model numbers of various manufacturers are designated as conforming to the specific specification. Devices of like characteristics may be furnished.

PART 2 PRODUCTS

2.01 GRILLES, REGISTERS AND DIFFUSERS:

- A. Ceiling diffusers shall be perforated plate sized to fit the ceiling grid with round neck sized as indicated. Provide adjustable grids to diffuse the air in the pattern indicated. Provide a factory applied finish of a color as selected by the Architect.

Basis of Design
Titus Model PAS

Additional Manufacturers
Krueger Model 4500
Carnes Model SPGB
E. H. Price Model PDF
Metal Aire Model 7600

- B. Return air grille shall be aluminum with 1/2" x 1/2" x 1/2" grid. Provide a face operable opposed blade damper and factory applied primer for field painting.

Basis of Design
Titus Model 50F

Additional Manufacturers
Krueger Model EGC-5
Carnes Model RWPA
E. H. Price Model F80
Metal Aire Model CC5

- C. Exhaust air grille shall be all aluminum with 45 degrees fixed deflection blades on 3/4" centers. The blades shall be horizontal. Provide a face operable opposed blade damper and the finish shall be factory applied primer for field painting.

Basis of Design
Titus Model 3FL

Additional Manufacturers
Krueger Model S580H
Carnes Model RWAAH
E. H. Price Model F-60
Metal Aire Model RH

PART 3 EXECUTION

3.01 INSTALLATION:

- A. Grilles, registers and diffusers shall be installed as indicated and in conformance with the manufacturer's recommendations. Coordinate the actual units to be provided with all trades. Items shall match the ceiling provided to insure proper installation.
- B. Grille, register and diffuser locations shall be coordinated with the Architectural reflected ceiling plans.

3.02 ADJUSTMENT:

- A. The grilles, registers and diffusers shall be tested and adjusted to provide the scheduled capacities.

3.03 SHOP DRAWINGS:

- A. Provide air flow capacities, pressure drop and noise criteria data for grilles, registers and diffusers as indicated.
- B. Provide dimensional data including frame styles for each unit provided.
- C. Indicate type of finish and provide color chart for Architectural selection of colors as indicated.

END OF SECTION

SECTION 16000 ELECTRICAL GENERAL

PART 1 GENERAL

1.01 GENERAL

- A. The general provision of the Contract including the Conditions and Bidding of the Contract (General, Supplementary and Other Conditions) and Division 1 as appropriate apply to work specified in this Division.

1.02 DESCRIPTION

- A. This division of the Specifications, Division 16000, covers the complete electrical systems as indicated on the drawings or as specified herein. Provide all materials, labor, equipment and supervision to install these electrical systems.

1.03 QUALITY ASSURANCE

- A. Building Codes: All electrical work shall be in accordance with the following codes and agencies.
 - 1. The National Electrical Code - NEC (N.F.P.A. 70) - 1996 Edition.
 - 2. The National Electrical Safety Code (A.N.S.I. C-2) – 2005 Edition.
 - 3. The Life Safety Code (N.F.P.A. 101) - 1994 Edition.
 - 4. The International Building Code – 2003 Edition.
 - 5. Regulations of the local utility company, Mississippi Power, with respect to metering and service entrance.
 - 6. Municipal ordinances governing electrical work.
- B. Material Standards: All material shall be new and shall conform to the standards where such have been established for the particular material in question. Publications and Standards of the organization listed below are applicable to materials specified herein.
 - 1. American Society for Testing and Materials (A.S.T.M.)
 - 2. Underwriters' Laboratories, Inc. (U.L.)
 - 3. National Electrical Manufacturer Association (N.E.M.A.)
 - 4. Insulated Cable Engineers Association (I.C.E.A.)
 - 5. Institute of Electrical and Electronic Engineers (I.E.E.E.)
 - 6. National Fire Protection Association (N.F.P.A.)
 - 7. American National Standards Institute (A.N.S.I.)

1.04 PERMITS

- A. Obtain all permits and inspections for the installation of this work and pay all charges incident there to. Deliver to the Owner all certificates of said inspection issued by authorities having jurisdiction.

1.05 WARRANTY

- A. The components of the electrical systems furnished under this division of the Specifications shall be warranted for a period of one year from the date of acceptance thereof, either for beneficial use or final acceptance, whichever is earlier, against defective materials, design, and workmanship. Upon receipt of notice from the Arch/Eng of failure of any part of the equipment or system during the warranty period, the affected part or parts shall be replaced promptly which includes removing the defective part or parts, replacing and installing the new part or parts and at no cost to the Owner.

1.06 DRAWINGS

- A. The drawings indicate the arrangement of electrical equipment. Review architectural drawings for door swings, cabinets, counters and built-in equipment; conditions indicated on architectural plans shall govern. Coordinate installation of electrical equipment with structural system and mechanical equipment and access thereto. Coordinate installation of recessed electrical equipment with concealed ductwork and piping, and wall thickness.
- B. Do not scale drawings. Obtain dimensions for layout of equipment from Architectural and Structural plans unless indicated on Electrical plans.
- C. Bring all discrepancies between drawings and specifications or between contract documents and field conditions to the immediate attention of the Architect.
- D. Equipment layout is based on one manufacturer's product. Where equipment is selected by the Contractor for use on the job differs from layout, the Contractor shall be responsible for coordinating space requirements and connection arrangements.

1.07 SUBMITTALS

- A. Shop Drawings and Product Data:
 - 1. The Contractor shall submit for review by the Architect data of materials and equipment to be incorporated in this Project. Submittals shall be supported by descriptive material, catalogs, cuts, diagrams, performance curves, and charts published by the manufacturer to show conformance to specification and drawing requirements; model numbers alone will not be acceptable. Provide complete electrical characteristics for all equipment. Submittals for lighting fixtures shall include Photometric data.
 - 2. Product submittals shall be made by specification section and submitted in not more than two submittals. All items of a section, requiring submission, shall be submitted together at one time in a tabbed binder. If two or more sections require inter-ordination, (e.g. emergency generator and transfer switch) they shall be submitted at the same time. Each individual submittal items within a binder shall be marked to show paragraph number which pertains to the item. Product submittals shall be submitted on items as outlined in sections hereinafter. Section binders shall be report cover type with solid cover and 3 metal fasteners. Binders shall be labeled on outside with project name, Contractor name, date of submission, and specification section and number. Binders shall also have a tab indicating submittal number and specification section number. If product submittals for section exceed the capacity of one binder, two or more binders shall be used. In addition to above, a notation cover shall indicate the number of binders for the section and the number of that binder (i.e. 2 of 3).

3. The Contractor shall not submit any shop drawings or product data that does not comply with the contract documents. Prior to submitting shop drawings, review submittal for compliance with Contract Documents and place a stamp or other confirmation thereon which states that submittals without such verification will be returned without review.
4. If resubmittals are necessary, they shall be made as specified above for submittals. Resubmittals shall highlight all revisions made and cover shall include the phrase "RESUBMITTAL NO. _____. Resubmittal requirements do not entitle the Contractor to additional time and are not a cause for delay of the project.
5. The Engineer reserves the right to require a sample of any equipment to be submitted for approval and to retain its possession.
6. Refer to the individual sections for identified equipment and material for which submittals are required. Provide shop drawings and product data on the following equipment:
 - a. Transient Voltage Surge Suppression (TVSS)
 - b. Device Cover Plates
 - c. Lighting Contactors
 - d. Photocells
 - e. Motor Starters
 - f. Generator Set
 - g. Dry Type Transformers
 - h. Automatic and Transfer Switches
 - i. Switchboards
 - j. Lighting Fixtures
 - k. Panelboards
 - l. Safety Switches
 - m. Fire Alarm System
 - n. Lightning Protection System
 - o. Fire Stop Materials and Installation Details
 - p. Fuses
7. Do not submit on equipment or materials not requested in the specifications.
8. Review of shop drawings and product data by the Engineer, including any review annotations or stamp notations, does not relieve the Contractor from the required compliance with the contract documents.
9. The shop drawing and product data review stamp notation requirements are defined as follows:
 - a. "NO EXCEPTIONS TAKEN": The reviewer did not observe any items which were not in compliance with the contract documents. All dimensions, details and coordination with other trades is the responsibility of the Contractor.
 - b. "MAKE CORRECTIONS NOTED": The reviewer indicated items observed that were not in compliance with the contract documents. The Contractor shall not resubmit, but shall make corrections and provide corrected documents with the "Record Drawings".
 - c. "AMEND AND RESUBMIT": The reviewer indicated items observed which were not in compliance with the contract documents. The Contractor shall resubmit showing corrections of all noted items. Delays for resubmittal does not relieve the Contractor from meeting project schedules.
 - d. "REJECTED-SEE REMARKS": The submission does not comply with the contract requirements. The entire submittal must be corrected and submitted for review. Reviewer's remarks should not be interpreted as being a complete description of submittal deficiencies. Delays for resubmittal does not relieve the Contractor from meeting project's schedules.
 - e. If shop drawings are submitted and returned as "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED" and meet contract requirements, the Contractor shall not resubmit any other shop drawings for these items.

B. Record Drawings:

1. Prior to the final construction review and at a time designated by the Architect, provide three (3) sets of data on electrical equipment used in the project. Data shall be in bound form and shall include the following items:
 - a. Shop drawings and product data of all equipment and materials specified to be submitted in the shop drawings and product data section of the specification.
 - b. Panelboard circuit directories reflecting all field changes.
 - c. Results of all tests performed as required by these specifications.
 - d. Certificates of inspection from authorities having jurisdiction.
2. Record Drawings (As-Builts)
 - a. Provide and keep up to date a complete set of record (as-built) prints, which shall be corrected regularly to show electrical changes from original set of Contract Drawings, including all Addenda, Modifications, Change Orders, field order, job decisions, etc. Project record set shall be kept on job site and shall be used only as Record Drawings. Drawings to be dimensioned.
 - b. Upon completion of work, Contractor shall purchase a set of mylar transparencies from [Arch/Eng] at cost of printing and postage. All changes noted on record set of prints shall be incorporated thereon by the Contractor. The set of transparencies, together with 1 set of blue-line prints therefrom and original annotated set of Record Drawings, shall be delivered to the [Arch/Eng].

1.08 OPERATION AND MAINTENANCE INSTRUCTIONS:

- A. Operating and Maintenance Instructions, printed and bound in hard cover three ring loose leaf notebooks, shall be provided for each item of equipment listed hereinafter; 3 separate copies shall be provided. Each notebook shall be provided with an identifying label under a clear plastic cover shield on the front cover which shall identify the Project, Architect, Contractor, and Date.
- B. Prior to the final construction review and at a time designated by the Architect, the services of a competent representative shall be provided by the Contractor to instruct Building Owner and a representative from each tenant in the operation and maintenance of each of the systems specified herein.

1.09 EQUIPMENT REQUIRING ELECTRICAL SERVICE:

- A. Review all specification sections and drawings including plumbing and HVAC drawings and Division 15 of the specifications for equipment requiring electrical service. Provide service to and make connections to all such equipment requiring electrical service.
- B. Drawings indicate design loads and voltages and corresponding control equipment and feeders. If equipment actually furnished have loads other than those indicated on the drawings or specified herein, control equipment and feeders shall be adjusted in size accordingly at no additional cost. Such adjustment shall be subject to the approval of the Architect.

1.10 MECHANICAL SYSTEMS INTERFACE:

- A. All control wiring for plumbing and heating, ventilating and air conditioning systems shall be installed under Division 15. Review Division 15 specifications and shop drawings for control systems to assure compatibility between equipment furnished under Division 16 and wiring furnished under Division 15.

- B. Motor controllers (starters), motor disconnecting means, and circuit protection shall be provided for every motor as required by NEC. Division 15 may specify part or all of this equipment, specifically as an integral component of HVAC, plumbing, etc. equipment. Compliance with Division 16 shall govern for all interconnections and non-integral motor controller equipment as necessary to comply with NEC. Provide the number and type of auxiliary contacts necessary to interlock equipment and provide specified control sequence.
 - C. Power wiring to all motors and motor controllers and between motors and controllers shall be provided in Division 16.
 - D. Where drawings indicate or where specified, equipment to be controlled by line voltage interlock or device, provide line voltage control wiring in Division 16.
 - E. All electric heating equipment shall be provided and installed under Division 15 "Heating, Ventilating and Air Conditioning". Power wiring to all electric heating equipment shall be provided under Division 16 of these specifications.
 - F. Provide one 120V, 20A circuit per floor for connection to VAV boxes. Circuit shall originate nearest Electrical Room 208/120V panelboard.
- 1.11 SCHEDULING OF OUTAGES:
- A. Schedule all work requiring interruption of electrical power two weeks prior to actual shut down. Submit schedule in writing indicating extent of system to be deenergized, date and time when power is intended to be interrupted, and date and time power will be restored. Schedule shall be subject to the approval of the Project Engineer and MDOT Architect.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All material shall be new.
- B. Furnish all materials specified herein or indicated on the drawings.
- C. Materials of the same type shall be the product of one manufacturer.
- D. U.L. listed material shall be U.L. labeled.

2.02 MATERIALS STANDARDS BY MANUFACTURER AND SUBSTITUTION:

- A. Materials Standards:
 - 1. Use materials or equipment specified by manufacturer's name unless approval of other manufacturers is listed in addendum to these Specifications.
- B. Substitutions:
 - 1. Refer to the General Conditions, which governs "Substitution" of specified equipment or materials.

2. The Contractor shall submit for approval by the Architect data of materials and equipment to be substituted in the work. Submittals shall be supported by descriptive material, catalogs, cuts, diagrams, performance curves, and charts published by the manufacturer to show conformance to specification and drawing requirements; model numbers alone will not be acceptable. Provide complete electrical characteristics for all equipment. Submittals for lighting fixtures shall include Photometric data.
3. Where substitution of materials alters space requirements indicated on the drawings, submit shop drawings indicating proposed layout of space, all equipment to be installed therein and clearances between equipment. All clearances required by the National Electrical Code and applicable state and local regulations must be maintained.
4. Submittals shall be noted with any differences, deviations, or limitations of the substituted product from the specified materials. Failure to indicate this information, which subsequently results in conflicts or failure to perform comparably to the originally specified material, will result in the product rejection. It will be the Contractor's responsibility to replace the substituted material with the originally specified one and to bare the resulting costs of demolition, repair or other incidental costs.

2.03 SUPPORT FASTENING DEVICES:

- A. Anchors for solid masonry and concrete shall be self drilling expansion shields, insert type expansion shield, or lead shields with machine bolts.
- B. Anchors used on wood shall be wood screws.
- C. Anchors used on hollow masonry shall be toggle bolts.
- D. Fastening devices used to attach to steel shall be machine screws, bolts, or beam clamps.
- E. Fastening devices used on sheet rock walls shall be with sheet rock or pan head screws, attached directly into the support studs. Connect support device to a minimum of two (2) studs.

2.04 IDENTIFICATION:

- A. Equipment or devices specified in the individual sections to be identified shall be identified with an engraved plastic nameplate. Identification of flush mounted cabinets shall be on the inside of the device, surface mounted equipment shall be on the outside cover. Plastic nameplates shall be minimum 3/4" x length as required multicolored laminated plastic with faceplate and core as scheduled. Lettering shall be engraved minimum 1/4" high letters.
- B. 208/120 volt normal power equipment shall be identified with white faceplate with black core.
 1. Equipment identification is to indicate the following:
 - a. Equipment I.D. abbreviation.
 - b. Voltage, phase, wires and frequency.
 - c. Emergency or other system.
 - d. Power source origination.
 2. Example:
 - a. Panel HEA
 - b. 480/277V, 3 phase, 4 wire
 - c. Emergency System
 - d. Fed by ATS-1

2.05 SPARE PARTS AND ATTIC STOCK

- A. Prior to the final construction review and at the time designated by the Architect, turn over to the Owner spare parts or attic stock consisting of the following materials. Materials shall be new, in the original packing, of the same manufacturer and type as installed on the project and comply with these specifications receive receipt for all materials turned over to Owner:
1. Lamps (5% of installed lamps - not less than 2 nor more than 30 each type)
 - a. 32 watt T8
 - b. Each wattage compact fluorescent used – 15 percent
 - c. Each wattage metal halide used – total of 10.
 2. Overcurrent Protective Devices:
 - a. Molded case circuit breakers; Refer to Drawings.
 - b. Fuses, 600 Volt; Quantity of 3 spare for each amperage used on project.

PART 3 EXECUTION

3.01 PRODUCT DELIVERY, STORAGE, HANDLING AND PROTECTION:

- A. Refer to the general requirements section of the specifications, Division 1, for storage, protection, and handling requirements.
- B. Inspect materials upon arrival at Project and verify conformance to Contract Documents. Prevent unloading of unsatisfactory material.
- C. Provide trailers or shed for storage of materials, equipment, tools, etc., requiring such a facility. Areas for general storage and storage trailers or sheds shall be provided by Contractor.
- D. Provide dry, weather tight place for storing materials requiring protection from weather.
- E. Store packaged materials in original undamaged condition with manufacturer's labels and seals intact.
- F. Handle and store materials in accordance with manufacturer's and supplier's recommendations and in manner to prevent damage to materials during storage and handling. Replace damaged materials.
- G. Containers which are broken, opened, watermarked, or otherwise damaged materials are unacceptable and shall be removed from premises.
- H. Provide protection against direct sunlight, rain, snow, wind, ice, or heat for suitable storage of materials or equipment delivered to site to be incorporated into Project.
- I. Equipment and materials shall not be installed until such time as the environmental conditions of the job site are suitable to protect the equipment or materials. Conditions shall be those for which the equipment or materials are designed to be installed. Equipment and materials shall be protected from water, direct sunlight, cold or heat. Equipment or materials damaged or which are subjected to these elements are unacceptable and shall be removed from the premises and replaced.

3.02 CLEANING AND PAINTING

- A. Remove oil, dirt, grease and foreign materials from all raceways, fittings, boxes, panelboard trims and cabinets to provide a clean surface for painting. Touch up scratched or marred surfaces of lighting fixtures, panelboard and cabinet trims, motor control center, switchboard or equipment enclosures with paint furnished by the equipment manufacturers specifically for that purpose. Painting is specified under the "Painting", Section of the Specifications, unless noted herein.
- B. Do not paint trim covers for flush mounted panelboards, telephone cabinets, pull boxes, junction boxes and control cabinets unless required by the Architect. Remove trim covers before painting. Under no conditions shall locks, latches or exposed trim clamps be painted.
- C. Unless indicated on the drawings or specified herein to the contrary, all painting shall be done under the "Painting" Section of these Specifications.
- D. Where plywood backboards are used to mount equipment provided under Division 16, paint backboards with two coats of fire retardant light grey semi-gloss paint under Division 16.

3.03 EQUIPMENT CONNECTIONS:

- A. Connect all equipment requiring electrical connections under Division 16 of these specifications. Where electrical connections to equipment requires specific locations, obtain location from shop drawings. Do not scale drawings for location of conduit stub-ups or boxes mounted in wall or floor to serve specific equipment.
- B. Electrical circuits to equipment furnished under other divisions of these specifications are based on design loads. If actual equipment furnished has loads other than design loads, revise electrical circuits and protective devices to be compatible with equipment furnished and in compliance with the National Electrical Code at no additional cost to the Owner.
- C. The Contractor's attention is directed to other divisions of these specifications, where equipment requiring electrical service is specified, to become aware of the scope of work under this division of these specifications requiring electrical service and connections to equipment specified elsewhere.

3.04 SIGNS, LABELING AND TAGGING

- A. Reference all sections under Division 16 of these specifications for requirements for labeling, tagging, or signs.
- B. Signs shall be provided in compliance with NEC Articles 230-2b and 225-8d, when multiple building services exist. Review signs design with governing authority and comply with their instructions.

3.05 EXCAVATION, TRENCHING AND BACKFILLING:

- A. Perform all excavation to install conduit and duct banks indicated on the drawings or specified herein. During excavation, pile material for backfilling back from the banks of the trench to avoid overloading and to prevent slides and cave-ins. Remove and dispose of all excavated materials not to be used for backfill. Grade to prevent surface water from flowing into trenches and excavation. Remove any water accumulating therein by pumping. Do all excavation by open cut. No tunneling shall be done unless indicated on the drawings or unless written permission is received from the Civil Engineer.

- B. Grade the bottom of trenches to provide uniform bearing and support for [conduits] [or] [duct bank] on undisturbed soil at every point along its entire length. Tamp overdepths with loose, granular, moist earth. Remove unstable soil that is not capable of supporting equipment or installation and replace with specified material for a minimum of 12" below invert of equipment or installation.
- C. Backfill the trenches with excavated materials approved for backfilling, consisting of earth, loam, sandy, clay, sand and gravel or soft shale, free from large clods of earth and stones, deposited in 6" layers and rammed until the installation has cover of not less than the adjacent ground but not greater than 2" above existing ground. Backfilling shall be carried on simultaneously on both sides of the trench so that injurious pressures do not occur. Compaction of the filled trench shall be at least equal to that of the surrounding undisturbed material. Do not settle backfill with water. Reopen any trenches not meeting compaction requirements or where settlement occurs, refill, compact, and restore surface to grade and compaction indicated on the drawings, mounded over and smoothed off.

3.06 ELECTRICAL SYSTEMS OPERATIONAL TESTS

- A. Refer to the individual specification sections [and the electrical systems testing section of the specifications] for test requirements.
- B. Prior to the final construction review, the systems or equipment shall be tested and tests shall be submitted to the Architect for approval.
- C. All electrical systems shall be tested for compliance with the specifications.

3.07 MANUFACTURER'S SYSTEMS CERTIFICATION

- A. The electrical systems specified herein shall be reviewed for compliance with these specifications, installation in accordance with the manufacturer's recommendations and system operation by a representative of the manufacturer. The manufacturer shall submit certification that the system has been reviewed and installed per the manufacturer's recommendations and is operating in accordance with the specifications.

3.08 DESIGN AUTHORITY ASSISTANCE

- A. The Contractor shall provide personnel to assist the Architect/Engineer or his representative during all construction review visits. The Contractor shall provide all necessary tools and equipment to demonstrate the system operation and provide access to equipment, including screwdrivers, wrenches, ladders, flashlights, circuit testing devices, meters, keys, etc.
- B. Remove equipment covers (i.e. panelboard trims, motor controls, device plates, junction box covers, etc.) as directed for observation of internal wiring. Accessible ceiling shall be removed as directed for observation of equipment installed above ceilings. Reinstall all covers or ceilings after observation.
- C. Energize and deenergize circuits and equipment as directed. Demonstrate operation of equipment as directed by the representative.

END OF SECTION

SECTION 16011-ES ELECTRICAL 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 complete electrical systems as documented.
- B. There are many interfaces between the work involved with this Division and the work in other Divisions, particularly with Division 15. Be aware of the responsibilities at the interfaces.
- C. The Drawings and Specifications are considered cooperative and complimentary.

1.02 DEFINITIONS:

- A. Provide: furnish, install, connect, test, demonstrate and leave operational.
- B. Wiring: wire or cable installed in raceway with all required boxes, fittings, connectors, etc.
- C. Work: materials completely installed, including the labor involved.
- D. 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).

1.03 CODES AND REGULATIONS:

- A. All Work shall comply with all local laws, ordinances and regulations applicable to the electrical installation, applicable building codes and with the requirements of the National Electrical Code (NEC), Vol. 70 of the N.F.P.A.
- B. Where different sections of any of the aforementioned codes and regulations, the Specifications and/or the Drawings require different materials, methods of construction, or other requirements, the most restrictive 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 city, county, state and other authorities having jurisdiction and present certificates of approval to the Owner or his designated representative.
- D. Under no circumstances will asbestos, or asbestos related materials, be allowed on this project. Should any be found on the project they will be reported in writing and removed from the project by the contractor at no change in contract time or price.
- E. Communicate with all required utility offices to meet utility schedules and regulations. Acquire services to avoid project delays.

1.04 SITE VISIT:

- A. All interested parties shall visit the site and thoroughly familiarize themselves with the local conditions in advance of any project activity.

- B. No allowances will be made for lack of knowledge of job conditions.

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, couplings or other such elements.
- 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, the Specifications shall govern.
- D. Refer to the Architectural, Structural and Mechanical plans and details for dimensions, and fit the work to conform to the details of building construction. The right is reserved to shift any switch, receptacle, ceiling outlet or any other outlet 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.
- E. All conduit and wiring shown on the Electrical Drawings shall be provided under this Division regardless of its function.

1.06 DEVIATIONS:

- A. No deviations from the drawings and specifications shall be made without the full knowledge and consent of the Owner and/or Engineer.
- B. If it is found that existing conditions make desirable a modification in requirements covering any particular item, report such item to the Owner and/or Engineer for his decision and instructions.

1.07 MECHANICAL EQUIPMENT LOADS:

- A. The horsepower, wattage (or amperes) of mechanical equipment indicated is the estimated requirement of equipment furnished under another Division. All wiring, protective devices and disconnect switches shall be of the voltage, size and ampacity for the actual equipment installed. In no case shall these items be of smaller capacity than those indicated.
- B. Coordinate with other trades and provide suitable equipment so that the above requirements shall be met without incurring additions to the Contract in time or cost.
- C. The Contractor shall provide suitable 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.

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), the American National Standards Institute (ANSI), the Institute of Electrical and Electronic Engineers (IEEE) and the American Society of Testing Materials (ASTM) shall govern and apply where applicable.
 - C. Specified catalog numbers and trade or manufacturers names are intended to describe the material, devices, or apparatus desired for type, style and quality. Similar materials of other manufacturers, if of equal quality, capacity or character may be substituted in conformity with the provisions of the General Requirements.
 - D. Where 3 or more manufacturers are named, one of the named manufacturers shall be used.
 - E. Where, in the opinion of the designer, no equal exists then "no equal" will be stated.
- 2.02 SHOP DRAWINGS:

A. Shop drawings shall be submitted for the following equipment and items suitably bound.

I. SECTION 16100

- | | |
|----------------------------|-------------------------------|
| 1. Conduit and fittings | 10. Receptacles |
| 2. Wire and Cable | 11. Coverplates |
| 3. Junction boxes | 12. Supporting devices |
| 4. Pull boxes | 13. Wire connection devices |
| 5. Outlet boxes | 14. Nameplates |
| 6. Floor boxes | 15. Smoke & firestop fittings |
| 7. Cabinets | 16. Grounding system |
| 8. Wall switches | |
| 9. Individual wall dimmers | |

II. SECTION 16200

- | | |
|-----------------------|------------------------|
| 1. Circuit breakers | 3. Disconnect switches |
| 2. Panelboards | 4. Fuses |
| 5. Distribution Panel | |

III. SECTION 16300

- | | |
|----------------------|-------------------------|
| 1. Lighting fixtures | 3. Ballasts |
| 2. Lamps | 4. Lenses and diffusers |

IV. SECTION 16920

1. Motor starters

2.03 MAINTENANCE AND INSTRUCTION MANUALS: Submit to the Owner and/or Engineer, upon completion of the work, copies of maintenance and instruction manuals for equipment provided.

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.
- 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.

3.02 PROTECTION OF MATERIALS:

- A. All conduit and other openings shall be kept protected to prevent entry of foreign matter. Fixtures, equipment, and apparatus shall be kept covered for protection against dirt, water, chemical or mechanical damage before and during construction.
- B. 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: The contractor shall 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 ACCESS TO ELECTRICAL ITEMS: The contractor is responsible for maintaining access to all concealed electrical equipment, apparatus, or devices whether, or not, shown or indicated. Where access panels are required, refer to Owner or Engineer for approved means, methods and appearance.

3.06 ELECTRICAL ROOMS AND CLOSETS:

- A. Doors to electric rooms and closets shall open outward. If in conflict with Arch. drawings refer to Owner or Engineer for resolution.
- B. Manufacturer's equipment shall not be larger than that dimensioned, or scaled, on plans. Conflicts shall be brought to the attention of the Owner, or Engineer for resolution prior to order.
- C. Clear working space in electric rooms and closets shall be no less than that required by the N.E.C.

- D. The contractor shall submit for review, prior to construction or purchase of any equipment, scaled drawings of electrical rooms, closets, or spaces showing, in detail, his planned installation locations of the equipment he intends to purchase. These shall clearly show compliance with A, B, and C above.

3.07 TESTS:

- A. Upon completion of the electrical work, conduct an operating test in the presence of the Engineer 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 Engineer shall be removed, repaired or replaced as directed without incurring additions to the Contract in time or cost.
- C. Furnish all instructions, tools and personnel required for the test. Have sufficient tools and personnel available to remove panel covers, coverplates, etc., as required for proper inspection. Provide suitable test equipment.

3.08 DEMONSTRATION AND INSTRUCTIONS: Present to the Owner and/or Engineer or his designated representative a physical demonstration and oral instructions for proper operation and maintenance of electrical equipment and systems installed.

3.09 GUARANTEE:

- A. All systems and components shall be provided with a one year guarantee from the time of final acceptance. The guarantee shall cover all materials and workmanship. During this guarantee period, all defects in materials and workmanship shall be corrected without incurring additions to the Contract. The correction shall include 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 guarantee.
- B. In addition to this general guarantee, present to the Owner and/or Engineer any other guarantees or warranties from equipment or system manufacturers. These supplemental guarantees or warranties shall not invalidate the general guarantee.

END OF SECTION

SECTION 16100-ES BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. All Work specified in this Section shall comply with the provisions of Section 16011.
- B. This Section covers the basic electrical materials and installation methods that are applicable to Division 16.

PART 2 - PRODUCTS

2.01 CONDUIT:

- A. Galvanized rigid steel conduit (GRC) shall be low carbon, hot-dipped galvanized and to meet UL Standards and shall have threaded joints.
- B. Intermediate metal conduit (IMC) shall be steel, galvanized to meet UL Standards and shall have threaded joints.
- C. Electrical metallic tubing (EMT) shall be steel, galvanized to meet UL Standards.
- D. Plastic conduit (PVC) shall be schedule 40 PVC heavy wall type for 1-1/2" and smaller, schedule 20 for 2" and larger.
- E. Flexible metal conduit (FLX) shall be flexible steel conduit tubing and shall meet Underwriters Laboratories Standard for Flexible Steel Conduit.
- F. Steel conduit approved manufacturers are Allied, Southwire, Triangle, Republic, Wheatland and Pittsburg.
- G. PVC conduit approved manufacturers are Carlon, Triangle, and Johns-Manville.

2.02 CONDUIT FITTINGS:

- A. GRC and IMC conduit fittings shall be zinc-coated, ferrous metal and taper threaded type.
- B. EMT fittings shall be zinc-coated steel and hexnut compression or set-screw type. EMT connectors shall have insulated throats.
- C. PVC fittings, elbows and cement shall be 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 with specific grounding requirements, shall have grounding wedge lugs between the bushing and the box or 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. Conduit fittings approved manufacturers are Raco, Steel City, O.Z Gendy, Thomas & Betts, Efcor and Appleton.

- G. Expansion fittings shall be provided in all conduit which crosses an expansion joint either in, across, or through same.
- 2.03 CONDUCTORS: Conductors shall be copper of 98% conductivity, 600 volt insulation. Sizes specified are AWG gauge for No. 4/0 and smaller and circular mils (MCM) for all sizes larger than No. 4/0. Conductors No. 10 and smaller shall be solid and type "THHN" or THWN" insulation. No. 8 and larger shall be stranded and type "THHN" or "THWN" insulation.
- 2.04 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. In special "Fire Rated" partitions, outlets shall comply with ASTM No. E119.
 - B. Flush ceiling outlets for surface or pendant mounted lighting fixtures shall be one-piece 4" square or octagonal pressed steel boxes. Boxes for devices in unfinished masonry walls or stud walls shall be pressed steel, square corner, sectional switch boxes, or shall be 4" square box with a square cornered tile wall cover, set flush with masonry construction. Boxes in concrete ceiling slab shall be octagonal, shallow concrete boxes. Welded boxes are not acceptable. Steel boxes shall be used with all steel conduit and type AC or MC cable. Boxes used in conjunction with ENT shall conform with the foregoing except shall be made of a high heat-resistant plastic suitable for fixture support and shall be specifically designed for use with ENT.
 - C. All outlet boxes in plaster or masonry walls or ceiling shall be provided with plaster rings.
 - D. 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.
 - E. Outlet boxes exposed to the weather and outlet boxes for vaportight lighting fixtures and devices shall be of cast corrosion resistant type.
 - F. Outlet box approved manufacturers are Appleton, Raco, Steel City or Crouse-Hinds.
- 2.05 DISCONNECT SWITCHES:
- A. Disconnect switches shall be "heavy-duty" type enclosed switches of quick-make, quick-break construction. Switches shall be horsepower rated for 600 volts AC as required. Lugs shall be UL listed for copper and aluminum cable.
 - B. Padlocking provisions shall be provided for padlocking in the "Off" position.
 - C. 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.
 - D. Fused disconnect switches shall have rejection type fuse clips with dual element, current limiting fuses of rating shown.
 - E. Disconnect switches for water heaters and vent fans shall be HVAC molded case switches unless otherwise noted on Drawings.

2.06 NAMEPLATES: Nameplates shall have 3/8" high engraved letters, white core laminated bakelite with black finish for 120/208V.

2.07 WALL SWITCHES:

A. Wall switches shall be plastic, totally enclosed, quiet type, self-grounding, 120-277 volts and 20A rating.

Single Pole: Hubbell No. 1221
Double Pole: Hubbell No. 1222
Three-way: Hubbell No. 1223
Four-way: Hubbell No. 1224

B. Color shall be grey or as selected by owner's representative.

C. Comparative switches by Arrow Hart, Leviton, Bryant, or Sierra are acceptable as equal.

D. Flush motor switches shall have a red pilot light and overload protection for fractional horsepower motors.

E. Wall dimmer switches shall be totally enclosed, self-grounding, vertical slide type, square law dimming, with 600 watt capacity unless shown otherwise, Lutron Nova Series.

2.08 RECEPTACLES:

A. Duplex receptacles shall be plastic, two-pole, three wire, self-grounding, side wired, 125 volts and 20A rating. Hubbell No. 5262 Series. Isolated ground type to be Hubbell No. IG-5262 Series. GFCI type to be Hubbell No. GF-5362 Series.

B. Single receptacles shall be two-pole, three wire, self-grounding, side wired, 125 volts and 20A rating, Hubbell No. 5361 Series. Isolated ground type to be Hubbell No. IG-5361 Series.

C. Color shall be grey or as selected by owner's representative.

D. Clock outlets shall be Arrow-Hart 5708.

E. Comparative devices by Arrow-Hart, Leviton, Bryant, or Sierra are acceptable as equal.

2.09 COVERPLATES:

A. Coverplates for flush mounted devices in all areas shall be grey nylon, standard size or as selected by owner's representative.

B. Telephone outlet coverplates shall have same finish as above and have a bushed hole in the center.

C. Coverplates for exterior receptacles shall be self closing, die cast aluminum.

2.10 PLYWOOD BACKBOARDS:

A. Provide plywood backboards where shown. Backboards shall be minimum 3/4" thick and sized as shown or to accommodate equipment indicated to be mounted thereon. Plywood shall be fire retardant.

- B. Secure plywood to the building structure and paint with two coats of fire retardant gray paint.
- 2.11 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, busway 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.
- 2.12 FLOOR OUTLETS:
- A. If and where required, floor outlets shall be single gang floor boxes, Steel city No. 600 Series, complete with cast iron body, vertical angular adjustment, bronze frame, bronze floorplate and gasket. Larger than standard tappings shall be furnished where required. Adjacent boxes shall be installed on minimum 7" centers.
 - B. Duplex floor receptacle outlets shall have No. P-60-DU floor plate, a No. P-60-CP carpet plate where installed in carpeted floor and a Hubbell 5262 Series duplex receptacle. Single floor receptacle outlets shall have a No. P-60-2 plate and Hubbell single receptacle. Provide a No. 700 split bell nozzle for each 5261 Series single receptacle and two (2) No. 703 for each duplex receptacle.
 - C. Floor outlets for telephone, signal or alarm use shall have a No. P-60-3/4-2 floor plate and a No. 467 bushed opening standpipe with a No. 461 base, all bronze finish.
- 2.13 FUSES:
- A. Provide all fuses. All fuses shall be of the same manufacturer. All fuses shall be of the high interrupting rating (200,000 Amps), current limiting type and manufactured by Bussmann or an approved equal. Fuses shall be provided for each fuse cutout and the specified quantity of fuses shall be furnished for spares.
 - B. Circuits 0 to 600 ampere shall be protected by rejection type, current limiting BUSSMANN LOWPEAK Dual Element Fuses LPN-RK (250 volts) or LPS-RK (600 volts). All dual-element fuses shall have separate overload and short-circuit elements. Fuse shall incorporate element having a 284 degree F. melting point alloy and shall be independent of the short-circuit clearing chamber. The fuse must hold 500% of rated current for a minimum of 10 seconds and be listed by Underwriter's Laboratories, Inc., with an interrupting rating of 200,000 amperes RMS symmetrical. The fuses shall be UL Class RK-1.
 - C. Circuits 601 to 6000 ampere shall be protected by current limiting BUSSMANN HI-CAP Time-Delay Fuses KRP-C. Fuses shall employ "O" rings as positive seals between the end bells and the glass melamine fuse barrel. The terminals shall be peened. Fuses shall be time-delay and must hold 500% of rated current in .01 seconds or less and be listed by Underwriter's Laboratories, Inc., with an interrupting rating of 200,000 amperes RMS symmetrical. The fuses shall be UL Class L.
 - D. Furnish and turn over to the Owner a minimum of one (1) set of spare fuses (set consisting of three fuses) for each type and rating of fuse used. When the number of fuse sets of the same type and rating actually installed exceeds five (5) sets, furnish an additional spare set of fuses for each five (5) or fraction thereof.
 - E. Provide a cabinet in which to store all spare fuses, Bussmann Catalog No. SFC or equal.

PART 3 - EXECUTION

3.01 CONDUIT:

- A. Rigid steel shall be used for service entrance and all feeders and branch circuits where exposed to damage.
- B. EMT may be used for branch circuits, fire alarm and telephone when not underground or in concrete in contact with the earth (Contractor's option).
- C. Schedule 40 PVC may be used for all underground feeders, service entrance conductors when encased in 4" of concrete on all sides, or under the lowest floor slab.
- D. ENT may be used for lighting and receptacle circuits (Contractor's option).
- E. Schedule 40 PVC may be used for all underground feeders, service entrance conductors when encased in 4" of concrete on all sides, or under the lowest floor slab.
- F. 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 boxes or conduit fittings. Conduit connections to any box which has no threaded hub shall be double locknotted.
- G. Provide junction boxes or pull boxes where shown and where necessary to avoid excessive runs or too many bends between outlets. The conduit sizes shown may be increased if desired to facilitate the pulling of cables.
- H. 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 iron 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 high enough to permit removal of ceiling panels and lighting fixtures. Use threaded rods and hangers consisting of double-nutted threaded rods and "Unistrut" channels or angles of 12 gauge minimum steel for supporting multiple conduit.
- I. Minimum size conduit for branch circuits shall not be smaller than 1/2". 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".
- J. At couplings, conduit ends shall be threaded so that they meet in the coupling. Right and left hand couplings shall not be used; conduit couplings of the Erikson Type shall be used at locations requiring such joints.
- K. All conduit for future use and for telephone data or TV wire shall be left with No. 16 gauge wire or approved pull cord pulled in them.
- L. Expansion fittings shall be installed in all conduit which pass through expansion joints.
- M. 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 and for each conduit passing from one space into another which is normally at a lower temperature.

- N. Provide watertight conduit hubs on conduit terminating in a box or cabinet exposed to the weather.
 - O. 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 unlabeled fire resistive material that will maintain the rating of the barrier penetrated.
 - P. All conduit located on exterior of building shall be rigid aluminum.
- 3.02 FLEXIBLE CONDUIT:
- A. PVC extruded cover flexible conduit shall be used in making short flexible connections to 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".
 - B. A green stranded bonding jumper shall be installed outside 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. When the bonding jumper is installed outside of the flexible conduit, plastic wire straps shall be used 6" o.c. to secure the jumper to the flexible conduit.
- 3.03 CONDUIT PROTECTION:
- A. All conduit installed in the ground either outside or beneath the building (with the exception of exterior lighting circuits), shall be encased in 4" of concrete on all sides. Concrete shall be a minimum of 3000 P.S.I. mix. All threaded joints in rigid conduit that is encased in concrete shall have a U.L. listed joint compound applied. Where conduit inside the 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.
 - 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 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.
- 3.04 WIRING:
- A. All conductors shall be installed in conduit. No conductors shall be pulled into the conduit until the conduit system is complete.
 - 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 pressure type connectors. Where connection is made to any terminals of more than 30 amperes capacity and where conductors larger than No. 10 AWG are connected to any terminal, copper terminal lugs shall be bolted 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 two (2) 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.
- 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 throughout the entire job as follows:

120/240 Volt System
Phase A - Black
Phase B - Red
Neutral - White
Ground - Green
- E. The feeder and service entrance conductors shall be color coded by the use of colored plastic tape applied within 6" of each conductor end.
- F. Branch circuit conductors shall not be smaller than No. 12 AWG and where the home run from center of load exceeds 100'-0", the conductors from home run outlet to panel shall be No. 10 AWG 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 terminals, junction boxes and at panelboards within 6" of conductor ends.
- J. Stranded conductors, #10 and smaller, shall be terminated at screw type terminals with fork type insulated wire terminals applied with manufacturer's tool.
- K. Conductor sizes are generally indicated in schedules and riser diagrams, otherwise follow rules of N.E.C.

3.05 OUTLETS:

- A. Provide galvanized steel or cast type boxes for all outlets.
- B. Where outlet boxes are used to support lighting fixtures, the outlet box shall be anchored to the structural members of the building per NEC 370-13.
- C. Outlet boxes shall be flush mounted unless they are specifically shown as being used with exposed conduit or are located above a ceiling.
- D. 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.
- E. 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 Engineer's approval, so that the outlet box, top or bottom, will occur at a masonry joint.

- F. 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.
 - G. 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.
- 3.06 NAMEPLATES:
- A. Provide specified nameplates on the main switchboard, feeder switches, feeder breakers, distribution panels, panelboards, disconnect switches, contactors, starters, transformers, start-stop push buttons and motor switches.
 - B. Nameplates for surface mounted equipment shall be installed on the exterior of equipment with sheetmetal screws. Nameplates for flush or recessed mounted equipment shall be installed on the inside of the panel door or cover with epoxy cement.
- 3.07 WALL SWITCHES AND RECEPTACLES: Where more than one device is indicated at a location, the devices shall be gang-mounted in combined multi-gang boxes and covered jointly by a common coverplate. Provide barriers as required by the devices and voltages being used.
- 3.08 COVERPLATES:
- 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 unless designated otherwise.
 - B. Coverplates shall be mounted vertically unless designated otherwise.
- 3.09 GROUNDING:
- A. Ground connections shall be in accordance with the 1999 National Electrical Code.
 - 1. Provide a grounding electrode system consisting of a minimum of three (3) copper weld rods, 3/4" x 10'-0", driven 24" below grade a minimum of 72" apart in the form of an equilateral triangle, bonded together with No. 4/0 conductors. Install rods a minimum of 36" clear of foundation walls to effect the building ground. If the resistance to ground exceeds 25 ohms, additional rods shall be driven and bonded together until a reading of 25 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 Engineer two (2) copies of each test report certified by the testing technician and the Engineer's representative.
 - 2. Extend from the electrodes to the main service disconnect with a No. 4/0 copper insulated ground conductor in a 1" conduit and connect to the neutral bar, housing and frame.
 - 3. Provide a No. 4/0 copper insulated conductor across the water meter with the conductor attached with clamps to the water line on each side of the meter.
 - 4. Provide a No. 4/0 copper insulated ground conductor in a 1" conduit from cold water entrance pipe ahead of first valve to the main service disconnect and connect to the neutral bar, housing and frame.

5. Where nonmetallic insulating couplings or dielectric flanges are used in metallic water piping systems, provide a No. 4/0 copper, insulated ground conductor across the couplings with the conductor attached with clamps to the water line on each side of the coupling.
 6. All ground clamps shall be equipped with compression type cable lugs independent of the compression device clamping the pipe or rod.
 7. All steel conduit entering the main service disconnect shall have threaded conduit insulated grounding bushings. All bushings shall be bonded together and bonded to the main grounding bus with a No. 4 bare conductor.
- B. Provide an insulated green bonding jumper from the grounding lug of all receptacles to a clip or a sheet metal screw in the outlet box. The ground wire installed behind the device mounting screws will not be acceptable.
 - C. Provide 1 #6 AWG copper conductor in 1" conduit from the point of attachment of the system ground at the water main to the telephone company room backboard.
 - D. All branch circuits shall include a green insulated ground wire sized per NEC or as shown connected to each device and outlet box on the circuit and to the panelboard ground bus. Multiple wire branch circuits with common neutral require only one ground wire. The number of wires shown on the drawings does not include this ground wire.
- 3.10 TELEPHONE/INTERCOM CONDUIT SYSTEM:
- A. Telephone service shall include wood backboards with service entrance conduit as shown.
 - B. Telephone service entrance cable, all branch cabling and telephone instruments shall be provided by the telephone equipment vendor.
 - C. Provide an outlet and conduit system for the telephones as shown and leave the same in readiness for wiring by others. Provide pull line in all telephone conduit. Terminate all conduit at a uniform height with smooth insulated bushings at the telephone wood backboards.
 - D. Telephone wall outlets shall be pressed steel sectional switch boxes, wall mounted at the locations indicated. Coverplate shall have a bushed hole or modular jack as required.
 - E. Telephone conduits shall be 3/4" and stub out of walls 6" above ceiling for each outlet.
 - F. Telephone floor outlets, if and where required, shall be floor boxes as specified at the locations indicated.
- 3.11 CONNECTION TO EQUIPMENT:
- A. Equipment furnished by the Owner or under other Sections, such as mechanical, signs, kitchen equipment, etc., will be installed by others. Provide electrical service and make the electrical circuit connection to this equipment.
 - B. Provide PVC insulated flexible cord sets for all cord and plug connected building appliances and equipment. Cords shall be sized in accordance with electrical circuits indicated. Multiple conductor cords shall be type "SO" cable with PVC jacket and green insulated ground conductor.

3.12 CORING, CUTTING AND PATCHING:

- A. 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.

3.13 EQUIPMENT ANCHORING: All items of electrical equipment, such as switchboards, panelboards, 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.

3.14 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 Division 15; however, where a control device such as a pushbutton, 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.
- C. Control wiring and conduit for control wiring shown on the electrical drawings shall be provided regardless of its function.

END OF SECTION

SECTION 16110 CONDUIT SYSTEM

PART 1 GENERAL

1.01 DESCRIPTION

- A. This section covers the complete conduit system.
- B. Definition: The term conduit, as used in this Specification, shall mean any or all of the raceway types specified.

1.02 PROJECT CONDUIT SYSTEM CLASSIFICATIONS

- A. Conduit systems in general shall be of the following materials unless otherwise noted. Special conditions, transitions in materials or conditions governed by location or terminations requiring difference materials shall take precedence over the following:
 - 1. Feeder and branch circuits shall be Rigid Nonmetallic Electrical Conduit below grade or concrete encased and EMT above grade.
 - 2. Branch circuit(s) concealed in stud and masonry walls shall be EMT and exposed circuits shall be EMT or Rigid Metallic conduit.
 - 3. Suspended conduits shall be metallic.

1.03 QUALITY ASSURANCE

- A. Referenced Industry Standard: 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 to by basic designation only.
 - 1. Underwriters' Laboratories, Inc. (U.L.) Publications:
 - a. No. 1: Flexible Metal Electrical Conduit
 - b. No. 6: Rigid Galvanized Conduit
 - c. No. 467: Electrical Grounding and Bonding
 - d. No. 651: Rigid Nonmetallic Electrical Conduit
 - e. No. 797: Electrical Metallic Tubing
 - f. No. 1242: Intermediate Metal Conduit
- B. Acceptable Manufacturers: Products of the following manufacturers, which comply with these specifications, are acceptable.
 - 1. Metallic Conduit Fittings:
 - a. Appleton
 - b. Crouse Hinds
 - c. ETP
 - d. Thomas and Betts
 - e. Steel City
 - f. RACO
 - g. Efcor
 - 2. Support Channel:
 - a. Unistrut
 - b. Kindorf
 - c. Powerstrut

3. Non-Metallic Conduit and Fittings:
 - a. Cantex
 - b. Carlon
 - c. Certainteed

C. Coordination:

1. Coordinate conduit installation with electrical equipment furnished.
2. Coordinate conduit installation with contract documents and other Contractors. Adjust installation to eliminate conflicts. Review all shop drawings submitted under this and other sections to insure coordination with all equipment requiring electrical service and to avoid conflict interferences. Coordinate installation sequence with other Contractors to avoid conflicts including equipment access and provide the fastest overall installation schedule.

1.04 STORAGE AND HANDLING

- A. Refer to the electrical general section of the Specifications for storage and handling requirements.
- B. Non-metallic conduits stored on site prior to installation shall be stored on a flat surface off of the ground and shall be protected from the direct rays of the sun and debris.
- C. Damaged, oxidized, warped, improperly stored material or with excessive amounts of foreign debris will be removed from the project and replaced with new materials.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Furnish all materials specified herein.
- B. All conduit and fittings shall be listed and bear a label by Underwriters' Laboratories (U.L.) for use as raceway system for electrical conductors.
- C. Raceway is required for all wiring, unless specifically indicated or specified otherwise.
- D. Size: The minimum size of conduit shall be 1/2-inch except when installed underground or in concrete slabs then the minimum size shall be 3/4 inch. The size of all conduits shall be in accordance with the NEC, but, not less than indicated on the drawings. 3/8 inch flexible conduits may be used for connections between outlet box and lighting fixture.

2.02 EMT CONDUIT FITTINGS

- A. Electrical Metallic Tubing (EMT) couplings and connectors shall be steel "raintight" type. Malleable iron, die cast or pressure cast fittings are not permitted.
- B. Fittings 2.0-inch and smaller shall be gland and ring compression type. Connectors for conduits 2.5-inch and larger shall be compression type with two (2) screws each. Couplings for conduits 2.5-inch and larger shall be compression type with four (4) screws each. All connectors shall be insulated throat type.

- 2.03 RIGID CONDUIT AND INTERMEDIATE METAL CONDUIT (IMC) CONDUIT FITTINGS
- A. Fittings for rigid steel and IMC shall be standard threaded couplings, locknuts, bushings and elbows. All materials shall be steel or malleable iron only. Setscrew or non-thread fittings are not permitted. Bushings shall be metallic insulating type consisting of insulating insert molded or locked into the metallic body of the fitting. Erickson-type couplings may be used to complete a conduit run.
- 2.04 PVC COATED RIGID CONDUIT AND INTERMEDIATE METAL CONDUIT (IMC) CONDUIT FITTINGS
- A. Fittings for PVC Coated rigid steel and IMC shall be standard threaded couplings, bushings and elbows. All materials shall be steel. Setscrew or non-thread fittings are not permitted. Bushings shall be metallic insulating type consisting of insulating insert molded or locked into the metallic body of the fitting. Fittings shall be PVC coated both on interior and exterior. Exterior coating shall be designed to overlap threads for complete protection of metal components.
- 2.05 NON-METALLIC CONDUIT AND FITTINGS
- A. Non-metallic conduit shall be heavy wall, Schedule 40 PVC. EB type thin wall PVC, for concrete encasement in duct banks.
- B. Non-metallic conduit fittings shall be of the same material as the conduit furnished and be the product of the same manufacturer.
- 2.06 CONDUIT SUPPORTS:
- A. All parts and hardware shall be zinc-coated or have equivalent corrosion protection.
- B. Conduit straps shall be one-hole cast metal type or two-hole galvanized metal type. Conduit clamps shall be beam clamps for use with exposed structural steel.
- C. Conduit support channels shall be 1-1/2 inches by 1-1/2 inches by 14 gauge galvanized (or with equivalent treatment) channel. Channel suspension shall be 3/8 inch threaded steel rods. Use swivel type connector to attach suspension rods to structure. Spring steel clips are not acceptable. Conduit straps shall be spring steel conduit straps compatible with channel. Wire or chain is not acceptable for conduit hangers.
- D. Individual conduit hangers shall be galvanized spring steel specifically designed for the purpose, sized appropriately for the conduit type and diameter, and have pre-assembled closure bolt and nut and provisions for receiving threaded hanger rod. Support with 1/4 inch threaded steel rod for individual conduits 1.5 inch and smaller and 3/8 inch rod individual conduits 2.0 inch and larger.
- E. Individual conduit straps on metal studs shall be spring steel and should wrap around entire face of stud securely biting into both edges and have provisions for screwing into stud. Size straps for conduit to be supported. Tie wraps are not acceptable.
- F. Support multiple conduits from metal studs using pre-assembled bar hanger assembly consisting of hanger bar, retaining clips and conduit straps.

2.07 FLEXIBLE CONDUIT AND FITTINGS:

- A. Flexible conduit shall be steel metallic type when connected to metallic raceway. Flexible conduit shall be nonmetallic type when connected to nonmetallic raceway. Liquidtight flexible conduit shall be used where specified herein, indicated on the drawings, or when used in damp or wet locations, as classified by the National Electrical Code.
- B. Metallic flexible conduits shall be classified as suitable for system grounding.
- C. Connectors for metallic flexible conduit shall be insulated throat type rated as suitable for system ground continuity. Connectors for liquidtight conduit shall be screw-in ground cone type.
- D. Flexible conduit use for other than connections to lighting fixtures shall not be less than 1/2-inch trade size and in no case shall flexible conduit size be less than permitted by the National Electrical Code for the number and size of conductors to be installed herein. Three-eighths inch (3/8 inch) flexible conduit may be used for connection to lighting fixtures providing conduit fill requirements of National Electrical Code are not exceeded.

2.08 MISCELLANEOUS CONDUIT FITTINGS AND ACCESSORIES:

- A. Vinyl all weather electrical tape for corrosion protection shall be Scotch #88, Tomic #85, Permacel #295.
- B. Expansion and deflection couplings shall be in accordance with U.L. 467 and U.L. 514. They shall accommodate 3/4-inch deflection, expansion, or contraction in any direction and shall allow 30-degree angular deflections. Couplings shall contain an internal flexible metal braid to maintain raceway system ground continuity.
- C. Fire and smoke stop materials shall be, rock wool fiber, silicone foam, or silicone sealant, U.L. rated to maintain the fire floor and firewall partition rating.

PART 3 EXECUTION

3.01 GENERAL INSTALLATION

- A. Conceal all conduits, except in unfinished spaces such as equipment rooms or where indicated by symbol on the drawings.
- B. Leave all empty conduits 1-1/2 inches and smaller with a galvanized pull wire and 2 inches and larger with a 200 pound test nylon cord pull line.
- C. Install as complete raceway runs prior to installation of cables or wires.
- D. Flattened, dented, or deformed conduits are not permitted and shall be removed and replaced.
- E. Secure rigid conduit i.e. rigid galvanized conduit and intermediate metal conduit in dry locations, to sheet metal enclosures with two (2) locknuts and insulated bushing. Secure EMT to sheet metal enclosures with insulated throat connectors.
- F. Fasten conduit support device to structure with wood screws on wood, toggle bolts on hollow masonry, anchors as specified on solid masonry or concrete, and machine bolts, clamps, or spring steel clips, on steel. Nails are not acceptable.

- G. Protect conduits against dirt, plaster, and foreign debris with conduit plugs. Plugs shall remain in place until all masonry is complete. Protect conduit stub-ups during construction from damage. Replace any damaged conduits.
 - H. Seal all conduits entering buildings from below grade, all conduits entering refrigerated spaces i.e. freezers and coolers, and all conduits entering exterior mounted electrical equipment with insulating electrical putty to prevent entrance of moisture. Expanding foam is not acceptable.
 - I. Install conduit with wiring, including homeruns as indicated on the drawings. Any change resulting in a savings in labor or materials is to be made only in accordance with a contract change. Deviations shall be made only where necessary to avoid interferences and when approved by Architect by written authorization.
 - J. Conduits penetrating roof membranes shall be installed in accordance with roofing system manufacturer's recommendations and architectural specifications and detail on the drawings.
 - K. Non-metallic conduit installed through framing members or in concrete walls shall be at least 1¼-inch from the wall's surface. Where 1¼-inch separation from wall surface is not maintained provide fasten in place protective 1/16-inch thick galvanized steel plate, steel sleeve or clip to protect conduit from fastener damage.
 - L. Wire shall not be used to fasten conduits.
 - M. Use flexible conduit for connection to vibrating equipment and rotating machinery and for connection from junction box to flush mounted lighting fixtures.
 - N. Separate raceway systems are to be installed for power systems and for control, signal and communications systems. Do not install control, signal or communications cables in the same raceways as branch circuit or feeder cables, unless indicated otherwise on the drawings.
 - O. Install a complete telephone raceway system as indicated on the drawings. The minimum conduit size shall be not less than 3/4-inch. All bends in conduit shall be long sweep radius. Install no more than four 90-degree bends [in branch raceways and no more than two 90 degree bends in main trunk raceways or conduits 2.0 inch and larger] between pull or outlet boxes and backboard/cabinets. Install no more than one outlet box on the same home run.
 - P. Conduit shall be installed from each CATV, data, voice, etc. Systems locations as designated on Electrical Drawings to above accessible ceiling system.
- 3.02 USES PERMITTED
- A. Feeder conduits installed within concrete floor slabs in direct contact with grade shall be galvanized rigid steel (G.R.S.) or intermediate metal conduit (I.M.C.).
 - B. Feeder conduits installed under concrete floor slabs in direct contact with grade shall be Rigid Nonmetallic Electrical Conduit.
 - C. Branch circuit conduits installed in direct contact with earth shall be schedule 40, heavy wall PVC.
 - D. Other conduit in direct contact with earth shall be schedule 40, heavy wall PVC.
 - E. Conduits penetrating building roof(s) shall be galvanized rigid steel (G.R.S.) or intermediate metal conduit (I.M.C.).

- F. All other conduit, unless specified herein, not permitted in accordance with the National Electrical Code, or otherwise indicated on the drawings, shall be electrical metallic tubing (EMT).
- G. Conduit types shall not be mixed indiscriminately with other types in the same run, unless specified herein or required by the NEC.
- H. Use flexible conduit for connections to motors or dry type transformers and flush mounted lighting fixtures.
 - 1. Flexible conduit used for connection of motors and dry type transformers shall not exceed 18-inches in length.
 - 2. Flexible conduit from outlet box to flush mounted lighting fixture shall not exceed 6-feet in length.
 - 3. Maintain ground continuity through flexible conduit with green equipment grounding conductor; do not use flexible conduit for ground continuity.
 - 4. Liquidtight flexible conduit shall be used to connect equipment in exterior, damp or wet locations, mechanical equipment rooms and below access floors connecting data processing other equipment.
- I. All conduits installed exposed from the finished floor to a minimum height of 10 feet above the floor shall be galvanized rigid steel (G.R.S.) or intermediate metallic conduit (IMC).
- J. Any conduits installed exposed, unless indicated on the drawings otherwise, shall be galvanized rigid steel.
- K. Where hazardous locations, as classified by the National Electrical Code, exist all conduits and fittings and the installation of these materials shall comply with Article 500 of the National Electrical Code.
- L. Concrete encased underground duct banks shall be installed for the installation of the primary cable system and incoming communication conduit system. Duct bank conduits shall be non-metallic Schedule 40, heavy wall PVC.

3.03 BELOW GRADE RACEWAY INSTALLATIONS

- A. Direct Burial Conduit
 - 1. Install top of conduits 18-inches minimum below finished grade.
 - 2. Install top of conduits 6 inches minimum below bottom of building slabs.
 - 3. Install top of conduits 30-inches minimum below grade, below roads and any other paved surfaces.
 - 4. Where transition is made from below grade PVC installation to a metallic conduit system above grade or slab, make transition with rigid galvanized elbow and extend thru slab or above grade with galvanized rigid steel conduit. For corrosion protection, where the conduit penetrates surface, wrap with vinyl all-weather electrical tape or coat with bituminous asphaltic compound, for 6-inches above and below concrete surface.
 - 5. For excavation and backfilling, refer to earthwork specification section.
 - 6. Conduit shall be run following the most direct route between points.

3.04 RACEWAY INSTALLATIONS WITHIN CONCRETE

- A. Conduit shall be run following the most direct route between points.
- B. Conduit shall not be installed in concrete which is less than 3-inches thick or where the outside diameter is larger than 1/3 of the slab thickness.
- C. Conduits installed in concrete slabs shall be buried in the concrete slab. Wire low conduits to upper side of the bottom reinforcing steel, and upper conduits to the lower side of the top reinforcing steel. Separate parallel runs of conduits within slab by at least one inch.
- D. Conduits shall not be installed within shear walls unless specifically indicated on the drawings. Conduits shall not be run directly below and parallel with load bearing walls.
- E. Protect each metallic conduit installed in concrete slab or conduits 12 inch and smaller passing through a concrete slab against corrosion where conduit enters and leaves concrete by wrapping conduit with vinyl all-weather electrical tape.
- F. The maximum projection of conduit stub-up and bushing above slab shall be three inches. Conduit stub-up penetrations through slabs shall be installed with the top of a conduit coupling flush with the finished slab in equipment rooms.
- G. Protect all conduits entering and leaving concrete floor slabs from physical damage during construction.
- H. Provide expansion fittings in all conduits where length of run exceeds 200 feet or where conduits pass through building expansion joints.
- I. Install all conduits penetrating rated fire floors to maintain the fire rating of the floor penetrated.

3.05 CONCEALED (ABOVE CEILING AND IN WALLS) AND EXPOSED RACEWAY INSTALLATION

- A. Conduit shall be run parallel or at right angles to walls, ceilings, and structural members.
- B. Support branch circuit conduits at intervals not exceeding ten feet and within three feet of each outlet, junction box, panelboard, enclosure or cabinet. Support conduits from structural steel members with spring steel type or beam conduit clamps and to non-metallic structural members with one-hole conduit straps. For exposed conduits and where conduits must be suspended below structure, single conduit runs shall be supported from structure by hanger rod and conduit clamp assembly, and multiple conduits shall be supported by trapeze type support suspended from structure. Do not attach conduits to ceiling suspension system channels or suspension wires.
- C. Attach feeder conduits larger than one inch trade diameter to or from structure on intervals not exceeding twelve feet with conduit beam clamps, one hole conduit straps or trapeze type support in accordance with support systems described for branch circuit conduits.
- D. Exposed conduits shall be painted, reference painting section of the Specifications.
- E. Where conduits must pass through structural members obtain approval of Architect with respect to location and size of hole prior to drilling.

- F. Install conduit sleeves in slabs, not on grade, where conduits 2.0 inch and larger pass through. Sleeves shall extend 1-inch minimum above finished slab. Seal all spare sleeves and between conduits and sleeves to maintain fire rating and to make watertight and smoke tight.
 - G. Install all conduits or sleeves penetrating rated firewalls or fire floors to maintain fire rating of wall or floor.
 - H. Conduits rigidly secured to building construction on opposite sides of a building expansion joint shall be provided with an expansion and deflection coupling. In lieu of an expansion coupling, conduits 2-1/2 inches and smaller may be provided with junction boxes on both sides of the expansion joint connected by 15-inches of slack flexible conduit with bonding jumper.
 - I. Where exposed conduit is indicated on the drawings, all conduits shall be rigid metallic type and all outlet boxes shall be cast metal type with threaded hubs.
 - J. Install conduits flat against wall; offsets or "kicks" shall be permitted only to enter outlet box.
 - K. Support conduits on centers not exceeding 5'-0" and within 12 inches of each outlet box using two hole conduit straps attached to surface with non-removable break off security type bolts.
- 3.06 ADJUSTMENT, CLEANING AND PROTECTION

- A. Clean: Upon completion, clean all installed materials of paint, dirt, and construction debris. All conduit systems shall be cleaned of water and debris prior to the installation of any conductors.

END OF SECTION

SECTION 16120 CONDUCTORS AND CABLES (600 VOLTS AND BELOW)

PART 1 GENERAL

1.01 DESCRIPTION

- A. The work required under this section of the Specifications consists of furnishing, installation and connections of the building wiring system. Exterior branch circuit wiring and feeder conductors extended beyond the building are included. Wiring systems for communication and alarm systems are not included in this Section unless specified to be included by reference, in the respective Specification sections for alarm and communication systems.

1.02 PROJECT DESCRIPTION

- A. Feeders: Type THHN/THWN-2 or XHHW-2.
- B. Branch circuits: Type THHN/THWN-2.
- C. Mechanical Equipment Room, Elevator Room: Type THHN/THWN-2 in raceway.
- D. Exposed Wiring.
- E. Concrete Encased: In Raceway.

1.03 QUALITY ASSURANCE

- A. Industry Referenced Standards. 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 to be basic designation only.
 - 1. Underwriters' Laboratories, Inc. (U.L.) Publications:
 - a. No. 44: Rubber - Insulated Wire and Cables
 - b. No. 83: Thermoplastic - Insulated Wires
 - c. No. 493: Thermoplastic - Insulated Underground Feeder and Branch Circuit Cables
 - d. No. 486: Wire Connectors and Soldering Lugs.
 - 2. Federal Specifications (Fed. Spec.):
 - a. J-C-30A(1): Cable and Wire Electrical (Power Fixed Installations)
 - b. HH-I-595C: Insulation Type, Electrical, Pressure-Sensitive Adhesive, Plastic
 - 3. Insulated Power Cable Engineers Association Standards (IPCEA):
 - a. 0S-61-402: Thermoplastic Insulated Wire and Cable
 - b. S-66-524: Cross-Linked-Thermosetting Polyethylene Insulated Wire and Cable
 - 4. National Electrical Manufacturer's Standards (NEMA):
 - a. WC-3: Rubber Insulated Wire and Cable
 - b. WC-5: Thermoplastic Insulated Wire and Cable
 - c. WC-7: Cross-Linked-Thermosetting Polyethylene Insulated Wire and Cable
 - d. WC-8: Ethylene Propylene Rubber Insulated Wire and Cable
 - 5. National Fire Protection Association Publication (NFPA): No. 70: National Electrical Code (NEC)

- B. Acceptable Manufacturers. Products produced by the following manufacturers which conform to this Specification are acceptable.
1. Wire and cables:
 - a. American Insulated Wire Corporation
 - b. Southwire Company
 - c. General Cable
 2. Hydraulically applied conductor terminations:
 - a. Scotch (3M)
 - b. Burndy
 - c. Thomas and Betts (T & B)
 - d. IlSCO
 - e. Anderson
 3. Mechanically applied (crimp) conductor terminations:
 - a. Scotch (3M)
 - b. Thomas and Betts (T & B)
 - c. Ideal
 - d. Burndy
 - e. Anderson
 4. Vinyl electrically insulating tape:
 - a. Scotch (3M)
 - b. Tomic
 - c. Permacel
 5. Twist-on wire connectors:
 - a. Scotch (3M)
 - b. Ideal
 - c. Buchanan
 6. Encapsulated insulating kits: Scotch (3M)
 7. Portable cable fittings:
 - a. Crouse Hinds
 - b. Appleton
 - c. T & B
- C. All conductors shall be electrically continuous and free from short circuits or grounds. All open, shorted or grounded conductors and any with damaged insulation shall be removed and replaced with new material free from defects.

PART 2 PRODUCTS

2.01 GENERAL MATERIALS REQUIREMENTS

- A. Provide all materials under this Section of the Specifications.
- B. All wire and cable shall be U.L. listed and shall bear a U.L. label along the conductor length.
- C. All conductors shall have size, grade of insulation, voltage and manufacturer's name permanently marked on the outer cover.
- D. Conductor size shall be a minimum of No. 12 AWG. Conductor size shall not be less than indicated on the drawings. The minimum size of emergency systems and egress lighting conductors shall be No. 10 AWG.
- E. Insulation voltage level rating shall be 600 volts.

2.02 PRODUCT/MATERIALS DESCRIPTION

- A. All conductors shall be of copper. The use of aluminum conductors is prohibited.
- B. Conductors No. 10 AWG and smaller shall be solid copper. Conductors larger than No. 10 AWG shall be stranded copper.
- C. Conductors shall be rated for 90 degree C. and Type THHN/THWN-2. Conductors larger than No. 4 shall be Type THHN/THWN-2 or XHHW-2. These requirements shall be met unless otherwise indicated on the drawings, required by the National Electrical Code, or specified elsewhere in Division 16.
- D. Fixture wire shall be No. 16 AWG silicone rubber insulated, stranded fixture wire, Type SFF-2 (150 degrees C.), or No. 16 AWG thermoplastic, nylon jacketed stranded fixture wire, Type TFFN (90 degrees C.). Color code as specified herein shall not be required for fixture wire; however, neutral conductor shall be identified distinctly from phase conductors.
- E. Control conductors for use on 120 volt control wiring systems shall be No. 12 AWG stranded type THHN unless indicated otherwise on the drawings.
- F. Portable power cables and outlets shall be provided where indicated on the drawings. Cables shall be sized as indicated on the drawings with equal size green equipment ground. #14/2 with ground may be used for connection to lighting fixtures. Cables to be jacketed 600 volts SO type. Cable connectors shall be steel case liquid tight sized for cable diameter and shall use strain relief gland fitting to prevent tension on conductor terminals. Where cable drops are indicated on the drawings, use wire mesh strain relief cable grips at both ends of cable. Use cast type outlet device box for device cable drops.
- G. Splices and taps (No. 10 AWG and smaller) - Connectors for solid conductors shall be solderless, screw-on, spring pressure cable type, 600 volt, 105 degree C. with integral insulation and U.L. approved for aluminum and copper conductors. Connectors for stranded conductors shall be crimp-on type with integral insulating cover.
- H. Splices and taps (No. 8 and larger) - Hydraulically applied crimping sleeve or tap connector sized for the conductors. Insulate the hydraulically applied connector with 90 degree C., 600 volt insulating cover provided by the connector manufacturer. Insulator materials and installation shall be approved for the specific application, location, voltage and temperature and shall not have an insulation value less than the conductors being joined.
- I. Electrical insulating tape shall be 600 volt, flame retardant, cold and weather resistant, minimally .85 mil thick plastic vinyl material; Scotch No. 88, Tomic No. 85, Permacel No. 295.

PART 3 EXECUTION

3.01 EXECUTION

- A. Install all wiring (including grounding) in raceway system, except where direct burial cable or other conductors are indicated or specified not to be installed in raceway.
- B. Connect all conductors. Torque each terminal connection to the manufacturer's recommended torque value. A calibrated torquing tool shall be used to insure proper torque application.

- C. Do not install more conductors in a raceway than indicated on the drawings. A maximum of three branch circuits are to be installed in any one conduit, on 3 phase 4 wire system, unless specifically indicated otherwise on the drawings. A maximum of two branch circuits are to be installed in any one conduit, on 1 phase 3 wire systems, unless specifically indicated otherwise on the drawings. No two branch circuits of the same phase are to be installed in the same conduit, unless specifically indicated on the drawings.
- D. Dedicated (DED) circuits shall contain a separate neutral and ground conductor independent of non-dedicated circuits. Dedicated circuits shall be run in separate raceways from non-dedicated circuits. Install a maximum of three dedicated circuits in a raceway.
- E. Conductors shall be tested to be continuous and free of short circuits and grounds.
- F. Identification:
 - 1. Conductors within pull boxes shall be grouped and identified with nylon tie straps with circuit identification tag.
 - 2. Identify each control conductor at its terminal points with wrap around tape wire markers. I.D. to indicate terminal block and point designation, or other appropriate identifying indication.
- G. Color code conductors
 - 1. Where an existing color code is not in place or enforced by the authority having jurisdiction, color code all secondary service, feeder and branch circuit conductors. Control and signal system conductors need not be color coded.
 - 2. Coding shall be as follows: 208Y/120 volt three phase four wire wye system - Phase A, Black; Phase B, Red; Phase C, Blue; Neutral, White
 - 3. Grounding conductors shall be green or green traced. [Grounding conductors for isolated ground circuits shall be green with a yellow trace.]
 - 4. Conductors No. 10 and smaller shall have solid color compound insulation or color coating. Conductors No. 8 and larger shall have solid compound, color coating or colored phase tape. Colored tape shall be installed on conductors in every box, at each terminal point, cabinet, through manhole or other enclosure.
 - 5. Color coding of switchlegs, travellers, etc. shall be different and distinct from phase and neutral conductors. Where systems utilize two (2) different voltages, the color coding shall be different and distinct from each voltage color coding system.
- H. Maintain phase rotation established at service equipment throughout entire project.
- I. Group and lace with nylon tie straps all conductors within enclosures, i.e. panels, motor controllers, switchboard, terminal cabinets, program instruments and control cabinets.
- J. Make splices in conductors only within junction boxes, wiring troughs and other enclosures as permitted by the National Electrical Code. Do not splice conductors in pull boxes, panelboards, safety switches or switchboard.
- K. Support conductors installed in vertical raceways at intervals not exceeding those distances indicated in the National Electrical Code. Support conductors in pull boxes with bakelite wedge type supports provided for the size and number of conductors in the raceway. Do not splice conductors in pull boxes used for vertical cable supports unless written permission for splicing is obtained. Where splicing is permitted, make splice with hydraulically applied splicing sleeve.

- L. Terminate stranded conductors No. 10 AWG and smaller, with crimp type lug or stud. Direct termination of stranded conductors with crimp terminator to terminal screws, lugs, or other points is not permitted even if terminal is rated for stranded conductors. Crimp terminal shall be the configuration type suitable for terminal point.
 - M. Make connections between fixture junction box and fixture with fixture wire.
 - N. Control, communications or signal conductors shall be installed in separate raceway systems from branch circuit or feeder raceway, unless indicated otherwise on the drawings.
 - O. Splices in conductors installed below grade is not permitted, unless approved in writing by the Engineer. For taps indicated on the drawings and approved splices below grade, connections shall be made in flush mounted watertight junction box with crimp connectors and watertight resin encapsulating insulating kit.
 - P. Secure portable cables in accordance with the N.E.C. Install strain relief devices to prevent tension on terminations if cable is pulled. Install cable grips on drops and connect to outlet box or structure. Leave slack cable loop at drop point.
- 3.02 USES PERMITTED
- A. Service entrance: Type USE or XHHW-2.
 - B. Feeders: Type THHN/THWN-2 or XHHW-2 and/or Type MC, 75 degree C. in wet or dry locations, with integral copper grounding conductor, aluminum armor and PVC jacket where used in wet area.
 - C. Branch circuits: Type THHN/THWN-2.

END OF SECTION

SECTION 16130 OUTLET BOXES AND PULL BOXES

PART 1 GENERAL

1.01 DESCRIPTION

- A. The work required under this section of the specification consists of the installation of outlet boxes, pull boxes, and junction boxes throughout the wiring system including box supports.
- B. Definition: Box (es) as used in this specification, includes all electrical boxes such as outlet, device, junction, and pull boxes.

1.02 QUALITY ASSURANCE

- A. Industry Standards: 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 bids, shall apply. In text, such specifications and standards are referenced to by basic designation only.
 - 1. Underwriter's Laboratories, Inc. (U.L.) Publications:
 - a. No. 50: Enclosures for Electrical Equipment
 - b. No. 467: Electrical Grounding and Bonding Equipment
 - c. No. 514A: Metallic Outlet Boxes
 - d. No. 514B: Fittings for Cable and Conduit
 - e. No. 514D: Cover Plates for Flush-Mounted Wiring Devices
 - 2. National Fire Protection Association (NFPA):
 - a. No. 70: National Electrical Code (N.E.C.)
- B. Coordination: Review architectural drawings for areas where boxes occur within specific architectural or structural features and install boxes as shown on architectural drawings; or if not shown, accurately center and align boxes within the architectural feature or detail.
- C. Acceptable Manufacturers:
 - 1. Exterior junction or pull boxes:
 - a. O-Z Gedney Type YR
 - b. Crouse-Hinds Type GB
 - c. Killark DB Series
 - d. Quazite Composolite Series

PART 2 PRODUCTS

2.01 GENERAL MATERIALS REQUIREMENTS

- A. Furnish all materials specified herein.
- B. All boxes shall be U.L. listed and labeled.
- C. Interior outlet, device, junction and pull boxes shall be galvanized steel sheet metal, unless rustproof cast metal is specified or required by the N.E.C., or unless otherwise specified or indicated on the drawings.

2.02 OUTLET AND DEVICE BOXES

- A. Outlet boxes for surface mounted and pendant mounted lighting fixtures shall be four inch octagon boxes, 1-1/2" deep.
- B. Outlet boxes for flush mounted lighting fixtures shall be four inch square boxes 1-1/2" deep, with blank cover, installed adjacent to fixture. Connection to fixture shall be with flexible conduit and fixture wire.
- C. Outlet boxes for switches, receptacles and wall mounted junction boxes shall be four inch square boxes, 1-1/2" deep with square edge tile type cover. Where only one conduit enters box, 3-1/2" deep single gang switch box may be used. Outlet boxes for GFI receptacles shall be 2-3/4" deep.
- D. Outlet boxes for switches and receptacles in exposed wiring system and below access floors shall be cast FS boxes with matching device plate. Device plates for exterior installations shall be spring loaded hinged covers. Use FD box for GFI receptacle.
- E. Outlet boxes for individual switches, and receptacles flush mounted in exposed concrete block shall be single gang masonry boxes 3-1/2" deep.
- F. Outlet boxes for devices mounted in metal doorjambs shall be sheet metal partition boxes 1-3/8" wide and 1-5/8" deep.
- G. Outlet boxes for support of surface or pendant mounted incandescent or H.I.D. lighting fixtures shall be provided with fixture stud.
- H. Where special purpose device specified requires 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.
- I. Outlet boxes installed in poured concrete or cast in place shall be concrete-tight type. The box depth shall allow 2 inches minimum of concrete cover.

2.03 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 for the number, size and position of conductors entering the box. Only a single extension ring shall be permitted on a box to increase the volume.
- B. Pull boxes installed in finished spaces shall be flush mounted cabinets provided with trim, hinged door, flush latch and lock to match flush mounted electrical panelboard trim.
- C. Pull boxes for installation of vertical conductors shall be provided with supports for all conductors as required by the National Electrical Code.
- D. Pull boxes required for horizontal runs containing more than one circuit with No. 8 or larger conductors shall be provided with reinforced flange and removable 12 gauge 1-1/2" x 1-1/2" galvanized channel for support of conductors. Wood supports within pull boxes are not acceptable.
- E. Provide box covers for all junction and pull boxes.

2.04 FLOOR OUTLET BOXES

- A. Where installation of floor mounted device requires penetration of a fire rated floor slab, the installation shall be made with a fire rated "poke-through" fitting, U.L. listed for use with concrete floors with fire rating equal to the fire rating of the penetrated slab. Fitting shall be selected for depth of floor slab. Fire barrier shall also be rated to prevent passage of smoke when heat is not present.

2.05 EXTERIOR JUNCTION OR PULL BOXES, FLUSH WITH GRADE

- A. Junction or pull box to be mounted flush with grade shall be polymer concrete reinforced by a heavy-weave fiberglass, rain tight and watertight boxes with screw cover lids. Box dimensions shall be as indicated on the drawings. Covers shall be galvanized steel, checkered pattern, suitable for pedestrian traffic or for driveways and off road applications secured to box with stainless steel screws. Box to be furnished with continuous neoprene gasket to seal cover. In metallic boxes, conduit entry shall be by factory drilled and tapped openings. Provide PVC adapter fitting for PVC conduits. Box to be provided with grounding lug secured by bolt to the enclosure.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All boxes shall be completely accessible and as required by the N.E.C. Provide access panels in any non-accessible spaces to allow access to boxes installed.
- B. Provide an outlet box for a maximum of four (4) lighting fixtures and for each device. Boxes shall not be smaller than indicated in this section of the specifications and shall be larger if required by Article 370 of the National Electrical Code for the number and size of conductors installed. Where lighting fixtures are installed in continuous rows, only one outlet box shall be required.
- C. Outlet boxes for flush mounted lighting fixtures shall be accessible. Where fixture installation is in non-accessible ceiling, outlet box shall be accessible when fixture is removed.
- D. Set outlet boxes for flush mounted devices to within 1/8" of finished wall. Spacers or shims between box and device are not acceptable.
- E. Where low voltage device is to be installed in common outlet boxes with line voltage device, provide metal barrier within outlet box to establish two separate compartments.
- F. Where drawings indicate ganged installations of switches controlling 277-volt lighting circuits of opposite phase, separate switches with permanently installed non-metallic barrier. Where space available for horizontal ganged installation is not adequate, install switches vertically to maintain required clearances between energized terminals.
- G. Support every box from structure:
 - 1. Secure to wood with wood screws.
 - 2. Secure to hollow masonry with toggle bolts.
 - 3. Secure to metal with sheet metal screws, machine bolts, or clamps.
 - 4. Anchors for solid masonry and concrete shall be self-drilling expansion shields, insert expansion shields, or lead shields with machine bolts.

5. Secure outlet boxes to metal studs with spring steel clamp, which wraps around entire face of stud and digs into both sides of stud. Clamp shall be screwed into stud. Provide far side box support brackets, for all wiring device outlet boxes.
 6. Where box is suspended below structure, support from structure with threaded steel rod. Secure rod directly to outlet boxes with double nuts. For pull boxes larger than 18" x 18" x 6", construct 1-1/2" x 1-1/2" x 14 gauge metal channel frame. Connect frame to box by bolting and secure frame to threaded rod at each corner.
 7. Hub type cast boxes need not be directly attached to structure if rigid conduit is used and supported in conformance with N.E.C.
- H. Support outlet boxes for support of surface mounted incandescent lighting fixtures by light weight channel spanning between and attached to main ceiling support member. Attach channel to ceiling support members with galvanized tie wire or nylon tie straps.
- I. Remove only knockouts as required and plug all unused openings. Use threaded plugs for cast boxes and snap-in metal plugs for sheet metal boxes.
- J. Boxes in the same wall shall not be mounted back-to-back unless specifically noted to be so on the drawings. Offset boxes a minimum of 6-inches. Boxes on opposite sides of a fire resistant wall, shear wall or shaft enclosure shall be separated by a horizontal distance of 24 inches minimum.
- K. Install interior pull boxes only in unfinished spaces or concealed above accessible ceilings.
- L. Install pull boxes when any of the following conditions apply:
1. Where indicated on the drawings.
 2. Where conduit run exceeds 200 feet from box to box or from box to terminal.
 3. Where conduit contains more than 4-90 degree bends or the equivalent offsets.
 4. To facilitate conductor installation or to insure that the manufacturer's maximum pulling tension is not exceeded.
 5. As described in the conduit system section of the specifications for crossing expansion joints.
- M. Do not splice conductors in pull boxes. Splices are not permitted in pull boxes except when approved in writing by the Engineer or where shown on the drawings. Where splices are permitted, make splices with splicing sleeves attached to conductors with hydraulic crimping tool. Split bolt connectors are not acceptable for splices within pull boxes.
- N. Where a pull box is required, one shall be installed for each individual branch circuit or feeder conduit. The box shall contain only the conductors of one conduit. A combined pull box for multiple branch conduits or feeders is not permitted, unless approved by the Engineer or indicated on the drawings. Where permitted, multiple circuits within pull box shall:
1. Branch and feeder circuit conductors shall be individually laced with nylon tie straps of the type with enlarged tab to permit identification of each circuit within pull box. Identify each with respect to load served.
- O. Box covers shall be in place and secured to box.
- 3.02 IDENTIFICATION
- A. After completion, using an indelible wide tip marker, indicate on the cover of each junction and pull box the designation of the circuits contained therein, i.e., A-1, 2, 3. Use a black marker for normal power circuits and a red marker for emergency circuits and orange marker for UPS circuits.

3.03 EXTERIOR PULL OR JUNCTION BOXES

- A. Exterior pull or junction boxes shall be mounted flush with the grade, unless specified elsewhere or indicated to be aboveground on the drawings.
- B. Flush mounted boxes shall be installed per manufacturer's recommendations or surrounded on all sides and bottom with 6 inch minimum of concrete. Top of concrete shall be flush with grade.
- C. Seal conduit entries into box with duct seal to prevent entrance of moisture, after conductors are installed.
- D. Taps and splices, where permitted by these specifications within exterior junction boxes, shall be performed with an encapsulating watertight splice or tap kit, which insulates and moisture seals the connection. Kit shall consist of the appropriate size and type mold, encapsulating resin and end sealing tape.

3.04 CLEANING AND ADJUSTMENT

- A. After completion, clean all work of dirt, paint and construction debris.
- B. Adjustments: Where device boxes are not set to within 1/8-inch of finished wall, install box extension ring to bring within tolerance.

END OF SECTION

SECTION 16140 DEVICES

PART 1 GENERAL

1.01 DESCRIPTION

- A. The work included under this Section of the Specifications consists of furnishing, installation and connection of all devices.
- B. Definition: The term "devices", as used in these Specifications, shall include general use switches, individual wall dimmers, receptacles, caps, plugs, and cover plates.

1.02 QUALITY ASSURANCE

- A. Referenced Industry Standard: The following Specifications and standards are incorporated into, and become a part of the 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 to by basic designation only.
 - 1. National Electrical Manufacturers Association (NEMA) Publications (Latest Edition):
 - a. No. WD-1-____: General Purpose Wiring
 - b. No. WD-5-____: Specific Purpose Wiring Devices.
 - 2. National Fire Protection Association (NFPA):
 - a. No. 70: National Electrical Code (NEC)
 - 3. Underwriters Laboratories, Inc. (U.L.):
 - a. No. 498
 - b. No. 20
 - c. No. 943 Class A (GFCI)
 - d. No. 1699 (AFCI)
- B. Acceptable Manufacturers: Products of the following manufacturers, which comply with these Specifications, are acceptable:
 - 1. Specification grade devices and cover plates:
 - a. Hubbell
 - b. Arrow Hart
 - c. Leviton
 - d. Pass & Seymour/Sierra
 - 2. Decorator devices and cover plates:
 - a. Hubbell
 - b. Arrow Hart
 - c. Leviton
 - d. Pass & Seymour/Sierra
 - 3. Weatherproof "While in Use" cover plates: (where indicated on drawings):
 - a. Taymac
 - b. Bryant
 - c. Intermatic

4. Individual wall dimmers:
 - a. Lutron
 - b. Lightolier
 - c. Leviton
 5. Floor boxes and fittings:
 - a. Hubbell
 - b. Steel City
 - c. Walker
- C. Coordination:
1. Coordinate installations with architectural and structural features, equipment installed under other sections of the Specifications, and electrical equipment.
 2. Coordinate the installation of switches and wall dimmers with the door swings to insure the devices are located on the strike side of the door.
 3. Review architectural and interiors drawings for devices requiring specific locations.

PART 2 PRODUCTS

2.01 GENERAL MATERIAL REQUIREMENTS

- A. Furnish all materials specified herein.
- B. All devices shall be U.L. listed and bear a U.L. label.
- C. Notwithstanding catalog number references, all devices shall be ivory in color, except special purpose devices which shall be black, emergency power system devices which shall be red, corrosion resistant devices which shall be yellow, or isolated ground devices which shall be orange.
- D. All devices shall be premium/industrial specification grade and standard commercial grade in public areas.

2.02 PRODUCT/MATERIAL DESCRIPTION

- A. Where reference is made to a particular manufacturer, catalog number or product series, it is the intent of the Specification only to establish the minimum criteria for quality and features of the product in public areas. Where the products of the other listed acceptable manufacturers are comparable, they shall be acceptable.
- B. General Purpose Switches:
 1. 20 amp 120/277 volt toggle switch:

a. SP	Hubbell	1221
b. 3-Way	Hubbell	1223
c. 4-Way	Hubbell	1224
 2. 20 amp 120/277 volt weather proof press switch/ cover plate:

a. SP	Hubbell	1281/1750
b. 3-Way	Hubbell	1283/1750
 3. 20 amp 120/277 volt key switch:

a. SP	Hubbell	1221L
b. 3-Way	Hubbell	1223L

4. 20 amp 120/277 volt security tumbler lock key switch:
 - a. SP Pass & Seymour 20AC1-KL
 - b. 3-Way Pass & Seymour 20AC3-KL

 5. 20 amp toggle switch with pilot light in handle:
 - a. 120v SP Hubbell 1221 PL
 - b. 277v SP Hubbell 1221 PL7

 6. 120 volt, 6 amp door switch: Pass & Seymour 1200
 7. 15 amp 120/277 volt switch in narrow door jamb:
 - a. SP Bryant 4641
 - b. 3-Way Bryant 4643

 8. 20 amp single pole 120/277 volt momentary contact three position two circuit toggle switch: Hubbell 1557
 9. 20 amp single pole 120/277 volt maintained contact three position two circuit toggle switch: Hubbell 1385
- C. Decorator Series Switches:
1. 20 amp 120/277 volt rocker switch:
 - a. SP Hubbell 5621
 - b. 3-Way Hubbell 5623
 - c. 4-Way Hubbell 5624
- D. General Purpose Receptacles:
1. 15 amp 125 volt 3-W grounding receptacle:
 - a. Single, NEMA 5-15R Hubbell 5261
 - b. Single, NEMA 5-15R, Isolated ground Hubbell IG-5261
 - c. Duplex, NEMA 5-15R Hubbell 5262
 - d. Duplex, NEMA 5-15R, Isolated ground Hubbell IG-5262

 2. 20 amp 125 volt 3-W Grounding Receptacle:
 - a. Single, NEMA 5-20R Hubbell 5361
 - b. Single, NEMA 5-20R, Isolated ground Hubbell IG-5361
 - c. Duplex, NEMA 5-20R Hubbell 5362
 - d. Duplex, NEMA 5-20R, Isolated ground Hubbell IG-5362

 3. 15 amp, 125 volt, 3-W grounding clock hanger receptacle: Leviton 5261-CH
 4. 125 volt, 3-W ground fault circuit interrupter (GFCI) duplex receptacle:
 - a. 15 amp, NEMA 5-15R Hubbell GF-5262
 - b. 20 amp, NEMA 5-20R Hubbell GF-5362

 5. 125 volt, 3-W grounding weather proof duplex receptacle:
 - a. 15 amp, NEMA 5-15R Hubbell 52CM62/5222
 - b. 20 amp, NEMA 5-20R Hubbell 53CM62/5222
- E. Special Purpose Receptacles: Special purpose receptacles shall be selected by NEMA designation as indicated on the drawings.

F. Device Plates:

1. Device shall be one piece single or multi-gang type selected to match the device, or combination of devices. Device plates for flush mounted devices shall be Type 302 stainless steel unless otherwise indicated.
2. Device plates for use with devices flush mounted in exposed masonry construction shall be jumbo type.
3. Device plates for surface devices shall be for use with the type of outlet box in which the device is mounted. Device plates for cast boxes shall be cast type.
4. For all devices installed exposed to the weather, moisture, or where indicated on the drawings, device plates shall be weatherproof in-use type. Device plates shall be cast type with gasketing to prevent entrance of moisture when closed.
5. Where engraved device plates are indicated on the drawings, or specified in Division 16, engraving shall be done by the device manufacturer. All lettering shall be 1/8" high and shall be black for normal power systems and red for emergency power systems unless other contrasting color is specified.

G. Floor Outlets:

1. Floor boxes shall be fully adjustable galvanized stamped steel concrete type for single gang installations of in floor or above floor service fittings. Boxes shall be cast iron watertight type for multi-gang installations shown on the drawings.
2. Floor boxes shall be fully adjustable cast iron watertight type for single or multi-gang installations.
3. Service fittings and accessories shall be brass.
4. Service fittings shall be in floor flush type compatible with outlet devices as indicated on the drawings.
5. Provide covers, extensions, adapters and necessary components to provide the service type indicated on the drawings. Install brass carpet flange on all floor outlets located in carpeted areas.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The mounting height of devices is indicated in the electrical legend on the drawings and is intended to mean the center of the device above the finished floor unless otherwise indicated on the drawings. Where finished walls are exposed concrete block, brick or tile, the height shall be adjusted to allow outlet box for device to be mounted at a joint.
- B. Receptacles above countertops shall be installed with major axis horizontal above the backsplash.
- C. Mount all devices within outlet boxes to allow device plates to be in contact with wall on all sides. Align devices with major axis of device parallel to adjacent predominate building feature, i.e. door frames or countertops.
- D. Install wall switches on the strike side of doors and within 12 inches of the door frame.
- E. Install vertically mounted receptacles with the ground connection up.

- F. Connect the grounding terminal of each device to the equipment grounding conductor of the circuit or, where no equipment grounding conduction is installed, connect to the metallic outlet box grounding lug with a pigtail conductor. Where connection to the equipment grounding conductor is made and where other down stream devices are served, the connection shall be made with a conductor pig tail such that removal of the device will not interrupt the ground continuity of the other downstream devices.

3.02 CLEANING AND ADJUSTMENT

- A. Where the device plate does not completely cover the wall opening, replace the plate with an oversized plate or repair wall opening. Where an oversized plated is used, replace all device plates in the room with the oversized plates.
- B. Where outlet boxes for devices are not within 1/8" of finished wall surface, install extension ring or reinstall outlet box to bring it within this tolerance in order to provide secure support for the device.
- C. Protect all devices and cover plates from paint and construction material. All devices and cover plates shall be clean, undamaged and unscratched.
- D. Remove concrete protectors and clean all floor boxes after concrete pour. Adjust boxes to be flush with floor.

END OF SECTION

SECTION 16200-ES SERVICE AND DISTRIBUTION

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. All work specified in this Section shall comply with the provisions of Section 16011.
- B. Provide a complete electrical distribution system. The system shall include the secondary service entrance, main switchboard, feeders, distribution panels, panelboards, busway, remote control switches, contactors, etc., to provide a complete system.
- C. All distribution switchgear (branch circuit panelboards, switchboard, distribution panelboards, busway, etc.) shall be the unit responsibility of one manufacturer. All component parts of the above listed items shall be of the same manufacturer except where a written request for a deviation from this requirement has been approved prior to bid date.
- D. Shop drawings for equipment specified in this Section shall show that all specified requirements have been incorporated.
- E. All floor mounted distribution equipment shall be mounted on a 4" high concrete pad.

1.02 ELECTRICAL SERVICE:

- A. Make all arrangements with the power company and pay all charges made by the power company for permanent electric service. In the event that the power company's charges are not available at the time the project is bid, the bids shall be qualified to notify the Owner and/or Engineer that such charges are not included.
- B. The contractor shall provide the required conduit and/or weatherheads. There shall be one active and one spare primary conduit.
- C. The contractor shall provide ground rods, ground cables, and ground wires, so as to provide a complete grounding system as per NEC 250.
- D. The secondary service to the building shall be 120/240 volts, single phase, 3 wire, 60 Hertz AC. Provide all conduit and wire as specified from the secondary terminals of the transformer to the main switchboard.

PART 2 - PRODUCTS

2.01 BRANCH CIRCUIT 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 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 copper sized 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.
- I. Phase bussing shall be full height without reduction. Cross and center connectors shall be of the same material as the bus.
- J. The neutral bus shall 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.
- K. Spaces for future devices shall be included as indicated and shall be bussed for the maximum rated device that can be fitted into them.
- L. 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 on 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. 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 or Square D I-Line 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. Panels shall be as manufactured by ITE/Siemens, Square D or Westinghouse.

2.02 DISTRIBUTION PANELBOARDS

- A. Distribution panelboards shall be of the circuit breaker type, factory assembled by the manufacturer of the circuit breakers, complete with front door cover. The main breaker and the branch circuit breakers shall be as indicated. The main bus shall be copper rated as and of capacity equal to or greater than the rating or setting of the over-current protective device next back in the line. Panel shall be suitable for the voltage and phase indicated. Provide 25% ground bus.
- B. Panels shall be flush or surface mounted as indicated, with baked-on enamel trim, adjustable trim clamps and door with chromium plated combination cylinder lock and catch, all locks keyed alike. Provide a specified nameplate for each device and a blank (not engraved) nameplate for each spare breaker or space.
- C. The neutral bus shall utilize set-screws to bond 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.
- D. All circuit breakers shall be manually operated, thermalmagnetic, automatic, of the ampacity and poles as indicated. They shall be quick-make, quick-break both on manual and on 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 multipole breakers shall have internal common trip. All breakers shall be capable of being locked in the "off" position.
- E. The interrupting capacity of the breakers furnished shall be 42,000 RMS symmetrical unless indicated otherwise.
- F. All main circuit breakers shall be molded case and vertically mounted. All vertically mounted molded case circuit breakers shall be mounted so that the handle is up for "ON" and down for "OFF", when viewed from the normal standing position. All vertically mounted molded case main circuit breakers shall be UL approved for feeding in the bottom and out the top.
- G. All circuit breakers, including any connectors to the main bus, shall be bolted and rigidly braced.
- H. Spaces for future installation of molded case circuit breakers are specified by range of trip rather than a single trip size or frame size. The spaces so scheduled shall be complete with all bus and required bus connectors such that future breakers can be installed without adding or changing bus connectors on the main bus and without using a larger (frame size) or more expensive breaker than the trip size and interrupting capacity would require. If the bus connectors furnished on the main bus will not cover the trip range specified, then duplicate sets of connectors shall be furnished on the main bus for each frame size required.
- I. Distribution panels shall be as manufactured by Square D, Westinghouse, or ITE/Siemens.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Provide a typewritten directory under plastic for all panelboards with spares marked in pencil.
- B. Provide all necessary hardware to level and secure the switchgear 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 switchgear of all foreign matter, including dust.

END OF SECTION

SECTION 16300-ES

LIGHTING

PART 1 GENERAL

1.01 DESCRIPTION:

- A. All work in this Section shall comply with the provisions of Section 16011.
- B. Provide all lighting fixtures and lamps as specified herein and as shown.
- C. All lamps shall be operating at the time of the final inspection.
- D. Confirm exact locations of all lighting fixtures by coordination with the Architectural Reflected Ceiling Plans and mechanical equipment above or on the ceiling.
- E. Confirm all ceiling types before ordering lighting fixtures.
- F. Each lighting fixture shall have been tested and certified for proper operation by the fixture manufacture for the type mounting and ceiling on/in which it is installed.
- G. Lamps and ballasts shall be compatible.

PART 2 PRODUCTS

2.01 LAMPS:

- A. The type lamps shall be as specified with each lighting fixture and shall be suitable for use in the fixture for which it is specified.
 - 1. The lamp catalog number is given as a standard of the quality and performance required. Equal lamps by General Electric, Sylvania or Phillips/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.
 - 2. Energy conserving and standard (non-energy conserving) fluorescent lamps shall be by the same manufacturer.
- B. Fluorescent Lamps:
 - 1. Fluorescent lamps shall be as specified in Lighting Fixture Schedule.
 - 2. Floor lamps shall be listed by manufacturer as suitable for use on the ballasts intended for use.
- C. High Intensity Discharge (HID) lamps shall be the voltage and type specified in the lighting fixture schedule.

2.02 BALLASTS:

- A. Provide ballasts of the proper voltage rating to match the circuit voltage from which the units are supplied.
- B. Fluorescent ballasts shall be the high power factor type, Class "A" sound rating, non-PCB, CBM certified and shall have an automatic resetting thermostat to provide Class P ballast protection.
- C. Fluorescent ballasts shall be energy-saving, solid-state, full light output type. Electromagnetic interference shall be minimal. Ballast shall be protected from voltage transients and minimum power factor shall be 90%. Ballast current third harmonic content shall be less than 10%. Average input wattage shall be 65 or less when operating 2 – 32 watt energy-saving lamps. Ballasts shall be as manufactured by Magnetek or approved equal by Advance or Motorola.
- D. Ballasts for High Intensity Discharge (HID) lamps shall be Constant Wattage Autotransformer (CWA) type or equal type with 90% minimum power factor. Low power factor or normal power factor (NPF) ballast shall not be used.

2.03 DIFFUSERS:

- A. Unless specified otherwise, all prismatic diffusers for fluorescent lighting fixtures shall be prismatic acrylic with a thickness of 0.125", measured from the back side to the peak of the prism.
- B. All wraparound lenses shall be virgin acrylic, one-piece and injection molded.

2.04 LIGHTING FIXTURE TRIM:

- A. 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.
- B. Each lighting fixture recessed in a plastered ceiling of any type shall have a plaster frame.

2.05 LIGHT FIXTURE TYPES:

- A. Most lighting outlets are lettered or groups of outlets are indicated by a letter.
- B. Each lighting fixture shall have a manufacturer's label affixed and shall comply with the requirements of all authorities having jurisdiction.
- C. The lighting fixtures that are indicated by the letters shall be as indicated on the Lighting Fixture Schedule.

2.06 RECESSED INCANDESCENT FIXTURES: All recessed incandescent fixtures shall comply with Article 410-65, C of the N.E.C.

2.07 LIGHTING CONTROL:

- A. Provide a Photo/Control system with mechanically held contactor for exterior lighting. Photocontrol shall operate to energize the contactor circuits whenever natural lighting falls below 25 footcandles.

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 insure the fixture weight being equally distributed from each support and the fixture remaining in a level position.
- B. Fluorescent fixtures installed recessed in a suspended ceiling system shall be supported from the building structure with two (2) 12 gauge wires on diagonal corners of the fixture. In addition, the fixture shall be clipped to members of the ceiling suspension system.
- C. Fluorescent fixtures installed in or on any ceiling other than a suspended ceiling system specifically mentioned above shall be supported with concealed steel rods. Rods shall be 1/4" diameter minimum and shall be located where recommended by the fixture manufacturer. Provide a minimum of two (2) supports for each 4' or 8' fixture chassis. Supports shall be maximum of 48" centers. For incandescent fixtures, steel hanging wire may be used by attaching the wire to the fixture mounting frame.
- D. Pendant mounted incandescent fixtures shall be stem supported by a fixture stud mounted in the outlet box. Suspended fluorescent fixtures shall have mounting stems located as per the manufacturer's recommendations, but in no case shall have less than two (2) stems per chassis.

3.02 AIMING OF ADJUSTABLE LIGHT FIXTURES: All fixtures with lamp position, tilt, shutters, rotation, or other types of adjustment shall be rough adjusted at the time of installation. The Engineer or his representative will determine the final inspection. Fixtures serving areas where daylighting is predominant will be adjusted after sunset.

3.03 LIGHTING FIXTURES IN MILLWORK, IF AND WHERE REQUIRED:

- A. Special attention shall be given to lighting fixtures indicated to be mounted within, under, on or otherwise incorporated into millwork or cabinetry.
- B. Refer to the Architectural drawings and details for specific dimensions. This coordination shall occur prior to ordering fixtures to assure fixtures will fit the space limitations of the millwork.
- C. This requirement is intended to preclude incurring additions to the Contract due to fixtures being too small or too large for the space.

END OF SECTION

SECTION 16470 PANELBOARDS

PART 1 GENERAL

1.01 DESCRIPTION

- A. The work required under this section of the specifications consists of the furnishing, installation and connection of lighting and appliance panelboards and distribution type panelboards.
- B. Panelboards shall be designated as shown on Drawings.
- C. Panelboards designated Distribution shall be of the distribution type. Lighting and Receptacle panelboards shall be of the lighting and appliance type. Mechanical and kitchen panelboards 600A and above shall be load center type, all others shall be lighting and appliance type.
- D. Definitions: The term panelboard, as used in this Specification or on the drawings, shall mean the complete assembly including the enclosure, bus work, trim hardware and circuit breaker or fused devices. The words panel and panelboard are used synonymously in these contract documents.

1.02 QUALITY ASSURANCE

- A. Industry Referenced Standards. 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 to by basic designation only.
 - 1. Underwriters' Laboratories, Inc. (U.L.) Publications:
 - a. No. 50: Enclosures for Electrical Equipment
 - b. No. 67: Panelboards
 - c. No. 489.9: Molded Case Circuit Breakers and Circuit Breaker Enclosures
 - 2. Federal Specifications (Fed. Spec.):
 - a. WC-375: Circuit Breakers
 - 3. National Electrical Manufacturer's Association (NEMA) Publications:
 - a. No. PB-1: Panelboards
 - b. No. AB-1: Molded Case Circuit Breakers
 - 4. National Fire Protection Association (NFPA):
 - a. No. 70: National Electrical Code (N.E.C.)
- B. Acceptable Manufacturers: Products of the following manufacturers, which comply with these Specifications, are acceptable.
 - 1. General Electric
 - 2. Square D
 - 3. Siemens
- C. Coordination: Coordinate installation with architectural and structural features, equipment installed under other sections of the Specifications and electrical equipment to insure panel access and so that clearance minimums are provided.

1.03 SUBMITTALS

- A. Refer to Section 16000, "Electrical General," for submittal requirements.
- B. Manufacturer's Product Data:
 - 1. Submit material Specifications and installation data for products specified under Part 2 - Products to include:
 - a. Circuit Breakers
 - b. Panelboards
- C. Shop Drawings: Submit shop drawings to indicate information not fully described by the product data to indicate compliance with the contract drawings.
 - 1. Include electrical characteristics and ratings for each panelboard with dimensions, mounting, bus material, voltage, ampere rating, mains, poles and wire connection, and any accessories. Indicate method of ground bus attachment to enclosure.
 - 2. Include bussing diagram indicating each bussing circuit breaker position.
 - 3. Provide a schedule indicating circuit breaker type, trip and size, poles, frame type, interrupting capacity.
 - 4. Nameplate identification designation schedule.
- D. Record Drawings. Include in each set:
 - 1. A complete set of panelboard manufacturers product data and shop drawings indicating all post bid revisions and field changes.
 - 2. A copy of each panelboard directory incorporating all post bid revisions and field changes.

PART 2 PRODUCTS

2.01 GENERAL MATERIALS REQUIREMENTS

- A. Furnish all materials specified herein.
- B. All panels and circuit breakers shall be U.L. listed and bear a U.L. label. Where panel serves as service entrance equipment, panel shall bear a U.L. label indicating suitability as service entrance equipment.
- C. Panels shall be of the dead front safety type.
- D. Provide panels complete with factory-assembled circuit breakers connected to the bus bars in the positions shown on the panel schedules or bus diagrams as indicated on the drawings. Where not shown on the drawings, position circuit breakers in panelboards with single pole breakers, equally divided, occupying top positions with two and three pole breakers occupying lower positions.
- E. Number all panelboards circuit in the following sequence:
 - 1. Circuits No. 1 and 2, Phase A.
 - 2. Circuits No. 3 and 4, Phase B.
 - 3. Circuits No. 5 and 6, Phase C.
- F. Connect two pole breakers to phase indicated on the drawings.

2.02 BUSSING AND INTERIORS

- A. All bus bars shall be copper. Main lugs and main breakers shall be U.L. approved for copper or aluminum conductors and shall be of a size range for the conductors indicated on the drawings. Each panel shall contain a full size grounding bus. Each lighting and appliance panelboard shall contain a full size insulated neutral bus. Where a distribution type panelboard is indicated on the drawings to have a neutral bus, the bus shall be insulated and full size, unless otherwise indicated on the drawings.
- B. The neutral and ground bus shall have a sufficient number of lugs to singularly terminate each individual conductor requiring a connection.
- C. The ground bus shall be factory brazed, riveted or installed on studs welded to the panel enclosure. The ground bus shall not be attached to the panel interior.
- D. Where designated on panel schedule as "space", include all necessary bussing, device support and connections. Provide blank cover for each space.
- E. Where specified or indicated on the drawings, provide feed-through lugs opposite to the mains and increase box heights to provide additional cable bending and termination space. Lugs to be the same size and capacity as mains and rated for aluminum or copper conductor terminations.

2.03 ENCLOSURES

- A. Panelboard width shall not be less than twenty inches unless indicated on the drawings. Panelboard depth shall not exceed 5-3/4 inches. Maximum enclosure width shall be twenty-two inches for panelboards less than 400 amp, thirty inches for 600 amp and less.
- B. Distribution panelboard width shall not be less than 32 inches and the depth shall not exceed 11 inches.
- C. Review panelboard schedules and system one line diagram and provide panelboard gutters and bending space at terminals to conform to the National Electrical Code.
- D. Provide concealed captive clamping devices, concealed hinges and chrome lock for all flush [and surface] mounted panels unless otherwise noted. Key all panels throughout project alike.
- E. All surface mounted panels shall be provided with door-in-door hinged cover trims where indicated on the Drawings. Trims to be secured by piano hinges to enclosure and secured closed by two trim clamps.
- F. Where multiple section panels are required, all sections shall have fully rated bus, separate cabinets connected by conduit nipples. Interconnect sections with copper conductors with ampacity equal to rating of main bus. Route phase and neutral conductors together between panels. Provide separate trims for each section. Each section shall be of the same physical size.
- G. Provide a directory card, metal holder, and transparent cover permanently mounted on inside of doors.
- H. Where indicated on the drawings or required for the environmental conditions, provide a NEMA 3R enclosure.

2.04 CIRCUIT BREAKERS

- A. Interrupting rating of all circuit breakers in panelboards operating on 208Y/120 volt system shall have U.L. rating of not less than 10,000 RMS symmetrical amps at system voltage. Panelboards for use on 480Y/277 volt system shall contain circuit breakers with U.L. interrupting rating of not less than 14,000 RMS symmetrical amps at system voltage. Provide circuit breakers with higher interrupting capacity when indicated on the drawings. Series-rated breakers are not acceptable.
- B. Circuit breakers shall be provided with trip rating, poles and minimum interrupting rating as indicated on the drawings or specified herein. Where "Circuit Breaker Class" is indicated, designation refers to Federal Specification W-C-375B and indicates the frame size and interrupting rating.
- C. Multi-pole breakers shall be common trip and common reset; tie handle connection between single pole breakers is not acceptable.
- D. Branch circuit breakers in lighting and appliance panels shall be quick-make, quick-break, thermal magnetic type bolted to the bus. Circuit breakers in distribution type panel boards shall be bolted to the bus except, Square D I-line style plug in devices are acceptable.
- E. Molded case circuit breakers shall have automatic, trip-free, non-adjustable, inverse time, and instantaneous magnetic trips for 100-ampere frame or less. Magnetic trip shall be adjustable from 3X to 10X for breakers with 600-ampere frames and higher. Factory setting shall be HI, unless otherwise noted.
- F. Provide the following special devices and accessories when indicated on the drawings or specified herein.
 - 1. Ground fault interrupting circuit breakers (GFI) and arc-fault interrupting circuit breakers (AFCI) where indicated on the drawings.
 - 2. Provide handle lock-off device to prevent manually turning off device without removal. Install on all circuit breakers serving exit lighting, egress lighting, fire alarm system, security system and communications system.
 - 3. Provide U.L. listed "SWD" switching duty circuit breakers on the devices.
 - 4. Provide shunt trip device for electrically tripping circuit breakers indicated on the drawings. Shunt trip to be for operation on a 277V source and have integral coil clearing contacts to de-energize coil after operation. Connect shunt trip to a 480 to 120 volt control power transformer. Drill and tap bus and connect primary leads. Provide primary and secondary fuses. Mount transformer to panel enclosure.

2.05 SEPARATELY ENCLOSED MOLDED CASE CIRCUIT BREAKERS

- A. Where separately enclosed molded case circuit breakers are shown on the drawings, provide circuit breakers in accordance with the applicable requirements of those specified for panelboards.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Mount panelboards with top circuit breaker not more than 6'-6" above finished floor.

- B. Lace and group conductors installed in panels with nylon tie straps. Only one conductor shall be installed under terminal of individual circuit breakers. Form and train conductors in panel enclosure neatly parallel and at right angles to sides of enclosure. Uninsulated conductor shall not extend beyond one-eighths inch from terminal lug.
- C. Do not splice conductors in panels. Where required, install junction box adjacent to panel and splice or tap conductors in box. Refer to number of conductors in a conduit limitation defined in the conductors and cables section of the Specifications and do not exceed.
- D. Mounting and Support:
 - 1. Mounting
 - a. Enclosure shall be secured to structure by a minimum of four (4) fastening devices. Panelboards 600 amp and larger shall be secured by a minimum of eight (8) devices. A 1.5 inch minimum diameter round washer shall be used between head of screw or bolt and enclosure.
 - b. Enclosures shall be mounted where indicated on the drawings or specified herein. Support from the structure with fastening device specified.
 - c. Attach enclosure directly to masonry, concrete, or wood surfaces.
 - d. Mount enclosure on metal channel (strut), which is connected to structure with fastening device specified, for installation on steel structure or sheet rock walls.
- E. Conductors not terminating in panelboard section shall not extend through or enter panel enclosure.
- F. Maintain conductor phase color code requirements described in the conductors and cables section of the specifications.
- G. Provide in each panelboard a typewritten circuit directory mounted under clear plastic in metal directory frame on interior or panel door. Directory shall reflect any field changes or additions.

END OF SECTION

SECTION 16476 SAFETY SWITCHES

PART 1 GENERAL

1.01 DESCRIPTION

- A. This section covers disconnect switches for electrical equipment, 600V and below, and fuses mounted in the disconnect devices.
- B. Furnish and install disconnect switches for any of the following conditions:
 - 1. Where indicated on the drawings.
 - 2. For all motor controllers unless installation conforms to exceptions in the National Electrical Code.
 - 3. For all motors located out-of-sight of its motor controller
 - 4. For water heaters
 - 5. For electrical duct heaters
 - 6. Where required by the National Electrical Code.
- C. Definitions: The term safety switch and disconnect switch, as used in these contract documents, are synonymous.

1.02 QUALITY ASSURANCE

- A. Referenced Industry Standard: The following Specifications and standards are incorporated into and become a part of the 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 to by basic designation only.
 - 1. Underwriters' Laboratories, Inc. (U.L.) Publications:
 - a. No. 98: Enclosed Switches
 - b. No. 198.2: High-Interrupting Capacity Fuses, Current Limiting Type
 - c. No. 198.4: Class R fuses
 - 2. National Fire Protection Association (NFPA) Publications:
 - a. No. 70: National Electrical Code (N.E.C.)
 - 3. National Electrical Manufacturers Association (NEMA) Publications:
 - a. No. KS 1: Enclosed Switches
 - 4. Federal Specification (Fed. Spec.): No. WS-865-C
- B. Acceptable Manufacturers: Products of the following manufacturers, which comply with these Specifications, are acceptable:
 - 1. General Electric
 - 2. Square D
 - 3. Siemens
- C. Coordination: Coordinate installations with architectural and structural features, equipment installed under other sections of the Specifications and electrical equipment to insure disconnect switch access and so that clearance minimums are provided.

PART 2 PRODUCTS

2.01 GENERAL MATERIAL REQUIREMENTS

- A. Furnish all materials specified herein.
- B. All disconnects and fuses shall be U.L. listed and bear a U.L. label.
- C. Switches shall be heavy duty, type, minimum 30 amp rated, unless larger size is indicated, and type HD horsepower rated as required when motor load is served.
- D. Switches shall be 600 volt rated, except for use in system below 240 volt, when they may be 250 volt rated.
- E. Furnish a solid neutral bus or lug for each switch being installed in a circuit, which include a neutral conductor.
- F. Furnish equipment grounding conductor lug bonded to the switch enclosure.
- G. Disconnect switches shall be non-fusible 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.
- H. Enclosure shall be NEMA Type One gasketed in all interior dry locations and shall be NEMA Type 3R in all damp, wet, or exterior locations, unless other type is indicated on the drawings or specified herein.

2.02 PRODUCT/MATERIAL DESCRIPTION

- A. Switching mechanism shall be quick-make, quick-break type.
- B. Switches shall have the following features:
 - 1. Provide line terminal shields in all switches.
 - 2. Each switch shall have provisions for padlocking in the "OFF" position.
 - 3. Each switch shall have door interlocks to prevent door from being opened when switch is in closed position. Provide inconspicuous means to defeat interlock mechanism.
 - 4. Provide permanent nameplate indicating switch rating in voltage, amperes and horsepower
 - 5. ARC chute for each pole.
 - 6. Where three pole shall have visible blades.
- C. Disconnect switches for three phase motors rated two horsepower and above shall be three pole non-fusible type rated as indicated on the drawings. Disconnect switches for three phase motors rated below two horsepower shall be three pole manual motor starter switches without overload protection. Disconnect for single-phase motors shall be single or two pole horsepower rated switches without overload protection.
- D. Fusible switches through 600 amp shall be provided with rejection clips to accept RK1 or RK5 fuses only. Fusible switches larger than 600 amp shall be suitable for class L fuses. Furnish and install a complete set of fuses in each disconnect sized as indicated on the drawings. Fuses serving predominantly motor or transformer load shall be dual-element, time delay type, otherwise non-time delay fast acting type is required. Fuses shall be current limiting with 200,000 A.I.C. Furnish one complete set of fuses for each type and size installed in the project and turn over to the Owner at the time of the final inspection.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Locate disconnect switches to provide working clearance and full accessibility as required by the National Electrical Code.
- B. Unless indicated otherwise on the drawings, locate disconnects adjacent to equipment served.
- C. Lace and group conductors installed in disconnect with nylon tie straps. Only one conductor shall be installed under terminals. Form and train conductors in enclosure neatly parallel and at right angles to sides of box. Uninsulated conductor shall not extend beyond one-eighths inch from terminal lug.
- D. Mounting and Support
 - 1. Enclosure shall be secured to structure by a minimum of four (4) fastening devices. Disconnect switches 600 amp and larger shall be secured by a minimum of eight (8) devices. A 1.5 inch minimum diameter round washer shall be used between head of screw or bolt and enclosure.
 - 2. Mounting
 - a. Enclosures shall be mounted where indicated on the drawings or specified herein. Support from the structure with fastening device specified.
 - b. Attach enclosure directly to masonry, concrete, or wood surface.
 - c. Attach enclosure on metal channel (strut), which is connected to structure with fastening device specified, for installations on steel structure, sheet metal equipment enclosure, or sheet rock walls.
 - d. Where enclosure is not indicated on a wall or structure, construct a metal channel (strut) freestanding frame secured to floor, pad, or other appropriate building structure. Refer to the detail on the drawing for frame installation and construction information.
 - e. Mount switch with handle between 36" and 60" above floor or grade, unless otherwise indicated on the drawings.
- E. Do not splice conductors in enclosure. Where required, install junction box or wireway adjacent to disconnect and splice or tap conductors in box. Refer to number of conductors in a conduit limitation defined in the conductors and cables section of the Specifications and do not exceed.
- F. Conductors not terminating in disconnect shall not extend through or enter disconnect enclosure.
- G. Install push-in knockout closure plugs in any unused knockout openings.
- H. Identification:
 - 1. Disconnect switches shall be identified with a 1" x 3" laminated engraved plastic nameplate.
 - 2. Refer to the electrical general section of the Specifications for identification requirements.

3.02 CLEANING AND ADJUSTMENT

- A. After completion, clean the interior and exterior of dirt, paint and construction debris.
- B. Touch up paint all scratched or marred surfaces with factory furnished touch up paint of the same color as the factory applied paint.

END OF SECTION

SECTION 16483

MANUAL AND MAGNETIC STARTERS – 600 VOLTS

PART 1 GENERAL

1.01 DESCRIPTION

- A. The work required under this section of the Specifications consists of the installation of manual or magnetic starters for use on systems 600 Volts and below for all integral or fractional horsepower motors not controlled by starters in a motor control center or by starters provided as an integral component of a specific piece of equipment.
- B. Definition: The words motor control units, starters, and motor controllers are used synonymously in these contract documents.

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. Federal Specifications (Fed. Spec.):
 - a. W-C-375: Circuit Breakers, Molded Case
 - b. W-F-1814: Fuse, Cartridge, High Interrupting Capacity
 - 2. National Electrical Manufacturers Association (NEMA) Standards:
 - a. ICS-1: General Standards for Industrial Control and Systems
 - b. ICS-2: Industrial Control Devices, Controllers and Assemblies
 - c. ICS-3: Industrial Systems
 - d. ICS-4: Terminal Blocks for Industrial Control Equipment and Systems
 - e. ICS-6: Enclosures for Industrial Controls and Systems
 - 3. Underwriters Laboratories, Inc. (U.L.) Publications:
 - a. UL 198.2: High Interrupting Capacity Fuses, Current Limiting Type
 - b. UL 198.4: Class R Fuses
 - c. UL 508: Industrial Control Equipment
 - 4. National Fire Protection Association (NFPA):
 - a. NFPA 70: National Electrical Code
 - 5. American National Standards Institute (A.N.S.I.):
 - a. C97.1: Low Voltage Cartridge Fuses, 600 Volts or Less
- B. Acceptable Manufacturers: Products of the following manufacturers, which comply with these Specifications, are acceptable.
 - 1. Motor controllers:
 - a. Square D
 - b. General Electric
 - c. Allen-Bradley
 - d. Siemens
 - e. Furnas
 - f. Joslyn Clark

2. Fuses:
 - a. Chase-Shawmut
 - b. Bussman
- C. Coordination:
 1. Review shop drawings submitted under this and other sections, as well as other divisions, to ensure coordination between 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 and so that clearance minimums are provided.

PART 2 PRODUCTS

2.01 GENERAL

- A. Furnish all materials specified herein. Provide a starter for each motor furnished on the project, except where controllers are specified to be furnished as integral with the motor/equipment.
- B. Motor starter units, circuit breakers, and fused devices shall be U.L. listed and bear the U.L. label.
- C. Enclosure shall be NEMA Type One gasketed in all interior dry locations and shall be NEMA Type 3R in all damp, wet, or exterior locations, unless other type is indicated on the drawings or specified herein.
- D. The motor starters shall be rated for the system voltage in which they are installed.
- E. Magnetic motor starters shall be across the line, full voltage, non-reversing type, unless otherwise indicated on the drawings or specified herein.
- F. All combination starters shall have provisions for padlocking unit handle in the open de-energized position.
- G. Furnish an equipment grounding conductor lug, bonded to the starter enclosure.

2.02 PRODUCT/MATERIAL DESCRIPTION

- A. Magnetic starters shall be minimum NEMA Size O, the combination type, fusible switch unless otherwise indicated on the drawings or specified herein. U.L. listed interrupting rating of molded case circuit breaker or motor circuit protectors shall not be less than that required. Fusible switches shall have rating, fuses and number of poles as indicated on the drawings. Fusible switches shall contain rejection type fuse clips that will accept only Class "RK1" current limiting fuses.
- B. Each magnetic starter shall have three overload relays. Control voltage shall be 120 volts provided from a control power transformer built into starter. Provide fuse for control coil in the primary circuit for each phase connection.

- C. Manual motor starters shall be manually operated, trip free, quick make quick break switching device with motor running protection overload heaters elements in each underground conductor of the motor circuit. Provide red neon "running" pilot lamp in cover of starter. Manual starters installed in finished spaces shall be recessed mounted in wall with flush cover.
- D. Magnetic starter doors shall be interlocked to prevent door from being opened until switch is in the "OFF" position. However, a "cheater screw" or other inconspicuous means shall be provided to permit access to energized starter, by authorized personnel. An interlock contact shall be provided within the starter to open control circuit to magnetic starter when device handle is in the open position. A door activated interlock switch is not acceptable.
- E. Each magnetic starter shall be provided with H.O.A. switch, on-off switch, start-stop pushbutton or provisions for remote mounted control device as indicated on the drawings. Where no device is indicated on the drawings, provide an H.O.A. switch for any motors automatically controlled or an ON-OFF switch for those specified to be manually controlled. Provide each magnetic starter with a "RUN" and an "OVERLOAD" pilot lamp. Control devices shall be of oil-tite construction. Identify each control and pilot device with a metal tag or plastic laminated label.
- F. Overload heaters shall be non-adjustable and manually reset melting alloy or bi-metallic type shall be selected in accordance with full load rating of motors actually furnished. A heater schedule applicable to starter size shall be provided on inside of door of each magnetic starter. Relay switching mechanism in magnetic starters shall be single pole, double throw normally open position connected to operate a door mounted, oil-tite blue pilot lamp to indicate starter has tripped on overload.
- G. Provide contacts in magnetic starters to provide interlocking control sequence of operation specified under Division 15 or 16. Provide one N.O. and one N.C. spare auxiliary contact in each starter.
- H. Starter sizes are based on design conditions using horsepower ratings of motors indicated on drawings. If motors actually furnished have horsepower ratings other than those indicated, motor starters and feeders shall be adjusted in accordance with the rated horsepower at no additional cost to the Owner.
- I. Nameplates
 - 1. Each magnetic and manual motor starter shall be provided with an engraved plastic nameplate approximately 1" X 3" permanently attached to the unit exterior door of magnetic starters or to the wall above or below manual motor starters.
 - 2. Refer to the electrical general section of these Specifications for nameplate requirements.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Locate motor starters to provide working clearance and full accessibility as required by the National Electrical Code.
- B. Lace and group conductors installed in starter with nylon tie straps. Only one conductor shall be installed under terminals. Form and train conductors in enclosure neatly parallel and at right angles to sides of box. Uninsulated conductor shall not extend beyond one-eighths inch from terminal lug.

C. Mounting and Support:

1. Mounting

- a. Enclosure shall be secured to structure by a minimum of four (4) fastening devices. A 1.5 inch minimum diameter round washer shall be used between head of screw or bolt and enclosure.
- b. Enclosures shall be mounted where indicated on the drawings or specified herein. Support from the structure with fastening device specified. Mount with operating handle at 60" AFF, unless other height is indicated.
- c. Attach enclosure directly to masonry, concrete, or wood surfaces.
- d. Mounted enclosure on metal channel (strut), which is connected to structure with fastening device.
- e. Where enclosure is not indicated on a wall or structure, construct a metal channel (strut) freestanding frame secured to floor, pad, or other appropriate building structure. Refer to the detail on the drawing for frame installation and construction information.
- f. Mount starter with control devices between 48" and 60" above floor or grade, unless otherwise indicated on the drawings.

D. Do not splice conductors in enclosure. Where required install junction box or wireway adjacent to disconnect and splice or tap conductors in box. Refer to number of conductors in a conduit limitation defined in the conductors and cables section of the Specifications and do not exceed.

E. Conductors not terminating in starter shall not extend through or enter starter enclosure.

F. Install push-in knockout closure plugs in any unused knockout openings.

G. Current limiting type RK1 dual element time delay fuses shall be furnished and installed in each combination fused device; rating shall be as shown on the drawing.

3.02 CLEANING AND ADJUSTMENT

A. After completion, clean the interior and exterior of dirt, paint, and construction debris.

B. Touch up paint all scratched or marred surfaces with factory furnished touch up paint of the same color as the factory applied paint.

C. Select and install overload heaters based on the full load current of the motor actually installed. All heaters which nuisance trip with the next larger size only.

D. Adjust motor circuit protector settings in accordance with the manufacturers recommendations to sustain motor locked rotor current.

END OF SECTION

SECTION 16510

LIGHTING FIXTURES

PART 1 GENERAL

1.01 DESCRIPTION

- A. The work required under this section of the specification consists of the installation of all interior and exterior lighting fixtures, lamps, and lighting control devices described herein.

1.02 QUALITY ASSURANCE

- A. The following specifications and standards are incorporated into and become a part of this Specification 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 70 National Electrical Code
2. Underwriter's Laboratories, Inc. (U.L.):
 - a. U.L. 57: Electric lighting fixtures
 - b. U.L. 676: Underwater Luminaires & Submersible Junction Boxes
 - c. U.L. 773: Plug-In, Locking Type Photocontrols for use with Area Lighting
 - d. U.L. 773A: Non-Industrial Photoelectric Switches for Lighting Control
 - e. U.L. 844: Electric lighting fixtures for use in Hazardous locations
 - f. U.L. 924: Emergency lighting & power equipment
 - g. U.L. 935: Ballasts, fluorescent lamp
 - h. U.L. 1029: Ballasts, high intensity discharge lamp
 - i. U.L. 1241: Junction Boxes for Swimming Pool Luminaires
 - j. U.L. 1570: Fluorescent lighting fixtures
 - k. U.L. 1574: Track Lighting Systems
 - l. U.L. 1598: Luminaries
 - m. U.L. 1838: Low Voltage Landscape Lighting Systems
 - n. U.L. 1994: Low Level Marking & Lighting Systems
 - o. U.L. 2388: Flexible Lighting Products
 - p. U.L. 15771: Incandescent lighting fixtures
 - q. U.L. 15772: High intensity discharge lighting fixtures
3. American National Standards Institute (ANSI):
 - a. ANSI C82.1, .2, .3: Ballasts

- B. Acceptable Manufacturers: Products of the following manufacturers, which comply with these Specifications, are acceptable.

1. Photoelectric Controls: General Electric, Paragon, Tork
2. Time Clocks: Tork, Intermatic, Paragon
3. Lighting Contactors: ASCO, Square D
4. Ballasts: Jefferson, General Electric, Advance, Universal
5. Lamps: Westinghouse, Sylvania, Phillips, General Electric, Venture

1.03 SUBSTITUTION

- A. Lighting fixtures shall be selected from those fixtures included in the fixture schedule. Request for fixtures other than those listed in the fixture schedule must be submitted in accordance with the substitution paragraph of the "Electrical General," section of these specifications.

1.04 COORDINATION

- A. The catalog numbers of recessed, incandescent, fluorescent and high intensity discharge fixtures included in the fixture schedule are for use with a specific type suspended ceiling. Review architectural plans and specifications and provide lighting fixtures compatible with ceiling suspension system.
- B. It is the Contractor's responsibility to coordinate and verify the mounting compatibility of the lighting fixtures with the ceiling type before fixtures are released for ordering and manufacture.

1.05 SUBMITTALS

- A. Refer to Section 16000, "Electrical General," for submittal requirements.
- B. Manufacturer's Product Data:
 - 1. Submit material Specifications and installation data for products specified under Part 2 - Products to include:
 - a. Lighting Fixtures
 - b. Lighting Standards

PART 2 PRODUCTS

2.01 GENERAL

- A. Furnish all materials specified herein or indicated on the drawings.
- B. All lighting fixtures, ballasts & lighting controls shall be U.L. listed and bear a U.L. label.
- C. Fixtures shall be selected from the fixture schedule not only by catalog number but with consideration to mounting, number and types of lamps, and reference notes as contained in the fixture schedule, and in accordance with these specifications.
- D. All fixtures installed in damp areas as classified by the definitions article of the National Electrical Code shall be U.L. listed and labeled as suitable for damp locations. All fixtures installed in wet areas as classified by the definition article of the National Electrical Code shall be suitable for wet locations.
- E. Plaster frames, furnished with fixtures, shall be provided for all fixtures flush mounted in plaster or stucco ceiling.
- F. Ballasts and transformers shall be rated for operation on electrical system voltage to which they are shown connected.

2.02 PRODUCT/MATERIAL DESCRIPTION

- A. Lighting Fixtures
 - 1. Incandescent and high intensity discharge (H.I.D. fixtures shall be pre-wired type with junction box and flexible conduit with fixture wire mounted on fixture frame at manufacturing plant. Fixtures shall be provided with this feature irregardless of catalog number in fixture schedule.

2. Incandescent and high intensity discharge (H.I.D.) fixture installed in non-accessible ceilings shall be bottom access type, i.e. fixture component shall be removable from below for access to junction box.
3. Recessed incandescent fixtures shall be provided with integral thermal protection to comply with the National Electrical Code.
4. Fixtures specified with plastic prismatic lens, lens shall be U.V. stabilized virgin acrylic with thickness not less than 0.125 inches. Lens shall be supported within hinged doorframe in not less than six points and in such a manner to prevent vibration of the lens. Hinged doors for support of lens shall be gasketed on all sides to prevent light leaks.
5. All wrap-around lenses shall be virgin acrylic, one-piece, injection molded type, with DR additive.
6. H.I.D. fixtures with metal halide lamps shall have a protective glass lens.

B. Ballasts

1. Fluorescent Ballasts
 - a. Ballasts for fluorescent lamps shall be electronic and designed for operation of the lamps in the indicated application. Ballasts shall be designed to operate on the voltage system to which they are connected. Power factor shall be 0.95 (minimum). Lamp current crest factor shall be 1.7 (maximum). Ballast shall operate at a frequency of 20,000 Hertz (minimum). Ballast shall be UL listed Class P with a sound rating of "A". Ballast shall operate in an instant set mode. Ballast factor shall be 85 percent (minimum). Electronic ballast shall have a full replacement warranty of 5 years from date of manufacture.
 - (1) T-8 Lamp Ballast:
 - aa. Ballast shall be capable of starting and maintaining operation at a minimum of 50 degrees F for F32T8 lamps, unless otherwise indicated. Total harmonic distortion (THD): Shall be less than 15 percent. Input wattage: (1) 62 watts (maximum) when operating two F32T8 lamps, (2) 92 watts (maximum) when operating three F32T8 lamps, (3) 115 watts (maximum) when operating four F32T8 lamps. Provide three and four lamp fixtures with two ballasts per fixture to accommodate multilevel switching where indicated on the drawings.
 - b. Ballasts installed in fixtures outdoors or in enclosed loading docks shall have an ambient temperature rating of 0°F.
 - c. Ballast for 800 milliamp fluorescent lamps shall be rated at "B" sound rating.] [Ballast for 1500 milliamp fluorescent lamps shall be rated at "D" sound rating.
2. Ballast for high intensity discharge fixtures shall be high power factor, regulating type, with voltage regulation of +/-10%, (+7.5%, -10% for 400 watt or 1000 watt high pressure sodium) and crest factor of not more than 1.8. Primary starting current shall not exceed operating current. Ballast in luminaires installed outdoors shall have ambient temperature rating of -20°F. Ballast for recessed high intensity discharge fixtures, installed indoors, shall be encapsulated core and coil type with vibration dampening mounting.

C. Lamps

1. Lamp types for each fixture are in general specified in the fixture schedule and shall also comply with this specification.
2. All incandescent lamps shall be 130 volt inside frosted unless other wise specified.
3. Provide rough service lamps for all fixtures located in plenum air chambers, elevator or escalator pits.

D. Lighting Controls

1. Photo control shall be for use on system voltage to which they are shown connected. Switching mechanism shall be hermetically sealed and shall be calibrated to close circuit when illumination drops below two-foot candles and open circuit when illumination exceeds five-foot candles. Switching mechanism shall contain delay feature to prevent circuit opening in transient illumination such as headlights from passing vehicles. Photocell shall be rated at not less than 1800-volt amps with standard EEI-NEMA 2-3/4" ID locking base. Control shall be mounted on twist lock receptacle on conduit fitting where indicated on the drawings. When mounted on roof locate device twelve inches above roof and orient photo control light sensing element north.
2. Time switch used for control of exterior lighting shall be twenty four hours type with skip-a-day feature reserve spring for maintaining time schedule during power outage and astronomical dial factory set for latitude of project. Time switch enclosure shall be NEMA One. Operation shall be for 277 volt lighting circuits with 277 volt control circuit. Time switch shall be number of poles as indicated on Drawings. Where number of lighting circuits to be controlled exceeds number of time switch load contacts, provide auxiliary lighting contactor to control additional circuits.
3. Magnetic contactors shall be multi-pole, mechanically held, electrically operated with contacts rated for not less than twenty amps at 480 volts A.C. or Tungsten load within a NEMA 1 enclosure. Separate contactors shall be provided for each control function. Contactors shall break all underground conductors of circuits being controlled. Use multiple contactors with operating coils in parallel when number of contacts required exceeds contactor pole limit. Contactor shall have coil clearing contacts. Control coil shall be rated 120V. Contactor shall be U.L. listed for short circuit withstand rating of the source panel serving the contactor load circuits.
4. Lighting control center shall control exterior lighting by exterior illumination level and time control.
5. The lighting control center shall consist of time switch electrically operated, mechanically held magnetic contactors, terminal blocks, selector switches and all internal wiring. Enclosure shall be N.E.M.A. type one, wall mounted with latching facilities. Manual-off-automatic selector switch for each mode of operation shall be mounted on hinged door. The lighting control center shall be wall mounted where indicated on the drawings.
6. Internal circuitry of control center shall prevent all exterior lighting circuits from being energized until outside illumination level falls below setting of the photo electric control device and to de-energize all circuits when setting of photo electric control device is exceeded. Within limits of photo control, designated circuits shall be time controlled while other circuits are photo controlled only.

PART 3 EXECUTION

3.01 FIXTURE SUPPORT AND MOUNTING

- A. Lighting fixtures shall be installed in accordance with the manufacturers recommended mounting methods and the provisions of the specifications and drawings as noted. All lighting shall be supported from the building structure. The fixtures shall be supported in a manner that will insure the fixture weight being equally distributed from each support and the fixture remaining in a level position.
- B. Fluorescent fixtures and 2 x 2 H.I.D. fixtures flush mounted in exposed tee suspended acoustical tile ceilings shall be of the lay-in type which shall rest on and be supported by the main runners of the ceiling support systems. Each fixture installation shall be attached to the main runners at each end with clips intended for that purpose.

- C. Fluorescent fixtures flush mounted in concealed suspension system type suspended acoustical tile ceilings, or in plaster, stucco or sheet rock ceilings shall be supported by adjustable brackets, integral with the fixture, resting on support channels of the ceiling suspension system. Brackets shall be adjustable from the inside fixture.
- D. Flush mounted incandescent fixtures and H.I.D. fixtures smaller than 2' x 2' shall be supported by fixture mounting bars, furnished with fixture, attached to two adjacent ceiling support system members with nylon tie straps.
- E. Fluorescent and H.I.D. fixtures installed recessed in a suspended ceiling system shall be supported from the building structure with two (2)-12 gauge wires on diagonal corners of the fixture. Safety chains shall be installed on all fixtures installed in or on suspended ceiling. Chains shall be attached to fixture and building structure with at least 18" of slack. Fixtures shall require two safety chains, one at each end.
- F. Surface mounted fluorescent and H.I.D. fixtures on suspended ceilings shall be supported from light weight channel (16 ga. 3/4" x 0.5") above the ceiling attached by nylon tie straps to two members of the ceiling suspension system. Two support channels are required for each four-foot fixture.
- G. Surface mounted fixtures mounted on concrete structure, sheet rock or plaster ceilings or low density acoustical tile ceilings shall be mounted with two 1/4" x 1-1/2" x 4" metal spacers between fixture and ceiling. Do not place spacers directly over ballast.
- H. Surface and wall mounted incandescent fixtures shall be mounted on fixture stud in outlet box. Outlet box shall be supported as specified under "Outlet Boxes and Pull Boxes" Sections of the specification.
- I. Where fixtures are specified to be pendant mounted type on suspended ceilings; pendants, hanger rods, or conduits used for mounting shall be attached to fixture mounting stud installed on junction box. Junction box shall be attached with light weight channel (16 ga. 3/4" x 5") secured by nylon tie straps to two members of ceiling suspension system or box may be secured directly to building structure with threaded rod.
- J. Factory furnished safety cable or chain shall be installed on all pendant mounted H.I.D. fixture. Connect to structure and fixture as recommended by manufacturer.

3.02 INSTALLATION

- A. Fixtures will be installed so that no labels will be visible under normal operating conditions of the fixture.
- B. If fixtures are installed in a fire rated ceiling, the Contractor will preserve the fire rating according to the U.L. assembly number.
- C. Lighting poles shall be grouted to fill the space between the pole base plate and the concrete base.
- D. Install lamps in all fixtures.
- E. Do not remove protective plastic covering over fixture louvers until the final inspection.

3.03 CLEANING AND ADJUSTMENT

- A. All installed fixtures shall be cleaned and free of fingerprints prior to final acceptance.
- B. All lamps shall be illuminated and operational at the time of the final inspection. Relamp burned out, inoperative, or other lamps not providing 100% output.
- C. All fixtures with lamp positions, tilt, shutters rotation, or other types of adjustment shall be roughly adjusted at the time of the installation. The architect will determine the final aiming and/or adjustments during the final inspection. Fixtures serving areas where day light is predominant will be adjusted after sunset.
- D. Metal-Halide lamps with a discernable color shift after 100 hours of operation shall be replaced with no additional cost to the owner.

END OF SECTION